ON ACTIVIST MONETARY POLICY WITH
RATIONAL EXPECTATIONS

Stanley Fischer

ON ACTIVIST MONETARY POLICY WITH RATIONAL EXPECTATIONS

Stanley Fischer

ABSTRACT

The paper examines the case for activist monetary policy. It
accepts the view that expectations are formed rationally, but not
the implication of flexible price, equilibrium, rational expectations
models, that monetary policy cannot and should not be used to affect
real magnitudes. The paper starts by asking why the economy has not
insulated itself from monetary disturbances through the adoption of
indexing and other provisions that would effectively shorten contracts,
and suggests that the costs of doing so must be substantial. These
costs provide the rational for activist policy, whose aim should be
to adjust for aggregate disturbances that the private sector has not
made provision to handle. The arguments about activist policy then
become those familiar from earlier discussions by Milton Friedman,
concerning the long and variable lags with which policy operates,
and the alleged propensity of the Fed to misbehave. It is argued
that an activist policy that does not respond to minor disturbances,
but does respond to actual and prospective major disturbances, would
provide a stabilizing force for the economy.

E52-280A
Massachusetts Institute of
  Technology
Cambridge, Massachusetts 02139
(617) 253-6666

ON ACTIVIST MONETARY POLICY WITH RATIONAL EXPECTATIONS

Stanley Fischer*

This paper discusses the potential effectiveness and desirability of activist monetary policy,[1] and also rules versus discretion. Recent academic discussions of the role of monetary policy have been heavily influenced by the rational expectations approach to macroeconomics: it has been argued that from the viewpoint of the behavior of output, any strictly adhered to monetary policy rule is as good as any other (e.g., Sargent and Wallace, 1975, Barro, 1976). This theoretical viewpoint receives support from empirical work by, among others, Sargent (1976) and Barro (1977, 1978), which appears to show that only unanticipated changes in the money stock affect output.

This paper accepts both rational expectations, as a theory of expectations, and the view that "unanticipated" changes in the money stock have a greater impact on real output than anticipated changes in the money stock. It argues nonetheless that systematic countercyclical monetary policy can affect the behavior of output, and that activist monetary policy should be used for that purpose.

The argument starts by asking why economic agents have not made contingent arrangements -- for example, wage rates indexed to the money stock or very short contracts -- that would insulate them from the effects

[1]While I concentrate on the same issue as Franco Modigliani in his 1977 AEA Presidential Address, the approach will be seen to differ from his.

of unanticipated changes in the money stock. The answer is that such contingent arrangements are costly; the private sector is therefore willing to bear the costs that output deviations caused by unanticipated money changes impose on it.

The potential role for monetary policy is created by those same costs of insulating the private sector from disturbances. The case for active monetary policy is that it is more efficient for the Fed to offset aggregate disturbances than it is for the private sector to do so. The efficient division of labor between the private and public sectors leaves it to macroeconomic management to deal with aggregate disturbances.

The perspective of this paper is one that views the private and public sectors as potentially co-operating in responding to economic disturbances; it contrasts with the view associated with rational expectations theorists that tends to regard monetary policy as working mainly through deception. Once the co-operative view of policy is adopted, the relevant questions about the desirability of activist monetary policy become those familiar from Milton Friedman's (1960) argument for a constant growth rate rule: they concern the possibility that attempts to control the economy could be destabilizing (long and variable lags), and the alleged propensity of the Fed to misbehave.

Although this paper does not accept the policy perspective of much of the rational expectations literature, it is not an attack on the rational expectations hypothesis. The rational expectations theory of expectations, which says that individuals form expectations optimally on the basis of the information potentially available to them, and the costs of using that information. has become and will

remain the leading theory of expectations.[1] But there is nothing inherent
in the hypothesis that implies that activist policy is either impossible
or undesirable.

Since the paper ranges widely, it is useful to outline the argument.
Given recent claims about the ineffectiveness of systematic monetary policy,
and apparent supporting evidence, I have first to establish that there is
something to talk about. Sections I and II therefore lay the groundwork
for the claim that, rational expectations oriented work notwithstanding,
systematic monetary policy matters for the behavior of output. Assuming
that claim is established, the issue of whether activist policy should be
used remains. Section III discusses the desirability in principle of ac-
tivist policy; Section IV discusses activist policy in practice; and
Section V considers rules versus discretion.

In more detail, it is shown in Section I that there is a variety of
mechanisms through which even fully anticipated monetary policy can affect
the behavior of output. However, these mechanisms are not central to the
case for countercyclical monetary policy, which hinges on short-run
considerations.

---

[1] It is worth distinguishing between the "strong form" of rational expectations,
which assumes that individuals' subjective probability distributions are
the same as those implied by the models in which they are presumed to be
agents, and the "weak form", which is defined in the text. ("Semi-strong"
forms of rational expectations may be defined to require that the first n
moments of subjective probability distributions co-incide with those of
the model.) I believe that rational expectations, in the weak form, will
be the leading theory of expectations in the same sense that utility theory
(or its equivalents) is the leading theory of consumer behavior. We fre-
quently use models in which behavioral functions are not explicitly derived
from maximization, but are uneasy in doing so, and are reassured if it
can be shown that the behavioral functions are consistent with maximization.
Similarly, economists will continue to use adaptive and other pre-specified
models of expectations, but will feel constrained to apologize for, and
attempt to justify, doing so.

Section II therefore reviews some of the evidence that only unanticipated changes in the money stock affect the behavior of output. If it could be established that any systematic monetary policy had no real effects on output, then there would be little to discuss about countercyclical policy except to the extent that price level behavior matters. Recent empirical work by Barro (1978) does indeed appear to establish that only unanticipated money matters for the behavior of output. I argue in Section II that Barro's results are quite consistent with the view that systematic monetary policy can be used to affect output: the crucial issue for the potential effectiveness of policy is whether output is affected by expectations that were formed before the monetary authority had to commit itself to a particular level of the money stock. Results presented in the appendix show that if Barro's mechanism of expectations formation is accepted, then the data do not reject the hypothesis that two year ahead forecast errors of the money stock affect the behavior of output. Since the Fed can clearly react to events with less than a two year lag, Barro's results do not force an end to further discussion of countercyclical monetary policy.

Section II argues that systematic monetary policy can be used to affect the behavior of output. The case in principle for activist policy is made in Section III, where it is argued that the same factors that make the economy vulnerable to "unanticipated" money suggest that monetary policy should be used to offset aggregate disturbances -- if the use of active policy is not itself destabilizing. The discussion in Section IV accordingly centers on older arguments about monetary policy, relating to the long and variable lags with which policy works and the lessons of history.

The issue of rules versus discretion is examined in Section V, which concludes with a presumption in favor of a monetary policy that leaves the Fed an important measure of discretion.

I. Equilibrium Considerations: Non-Neutralities of Anticipated Money

Since any systematic monetary policy would eventually come to be anticipated, it seems that systematic monetary policy can continue to affect output only if anticipated changes in the money stock can affect output;[1] accordingly, the natural place to start in considering the case for activist monetary policy appears to be with the non-neutralities of anticipated money. In this section, I discuss the non-neutralities of fully anticipated money, by which term is meant changes in the money stock that are anticipated at the time decisions relevant to the determination of output are made.

The neutrality of money has always been a central concern of monetary theory, precisely because it has long been obvious that money is not neutral. The implications of the latter fact for monetary policy depend on the source of the non-neutralities. Traditional discussions of neutrality distinguished between the transitional effects of a once and for all change in the money stock, which were generally thought to affect real variables, and the long-run or equilibrium effects of the change, which analysis suggested were insubstantial.[2]

---

[1] I shall argue below that this statement is in important respects misleading. A systematic policy, i.e., a rule that specifies money supply responses to disturbances, will itself eventually be anticipated, but actual changes in the money stock under such a policy may not have been anticipated as of an earlier date when decisions relevant to the determination of output were made.

[2] See, for instance, Irving Fisher (1922).

Modern analysis has added two important distinctions to the discussion: that between the neutrality and superneutrality of money, corresponding respectively to the effects of changes in the stock of money and growth rate of money, the latter producing changes in the inflation rate; and the distinction between anticipated and unanticipated changes in the money stock.[1]

Anticipated Inflation

In this section we concentrate on non-neutralities of money that arise from anticipated changes in the money stock and consequent changes in the expected rate of inflation. Informational considerations are deferred to Section II. As long as money pays no interest, changes in the expected rate of inflation change the expected real return from the holding of money, affecting the demand for real balances, and creating the possibility that anticipated changes in the growth rate of money affect real variables.[2]

---

[1] Both distinctions were at least implicit in the older discussions. First, there was typically mention of the elasticity of expectations, suggesting awareness of the importance of changes in the expected rate of inflation. Further, the typical money stock change had people waking in the morning to discover the good news of a doubling of their holdings, reflecting awareness also of the distinction between anticipated and unanticipated events.

[2] Two assumptions are maintained until further notice. First, there are no interest payments on money. Second, the government does nothing other than distribute money to the economy through transfer payments, which, however, are not related to individual holdings of money by the transfer recipients. The second assumption is designed to rule out, for the moment, real effects of anticipated inflation arising from the tax system.

Consider first the standard two-period lifetime consumption loans model in its simplest form in which there is no production and each individual has an endowment of a non-storable consumption good in the first period of his life; money is the only vehicle for saving. Changes in the growth rate of money affect the inter-generational allocation of resources in such a model if, say, the lump sum transfers are made to the old. If endowments varied stochastically over time, and there was a somehow agreed upon social welfare function for weighting generational expected utilities, the government might optimally want to vary the growth rate of money. However, since output is exogenously determined, monetary policy obviously does not affect the level of output.

The monetary authority's ability to affect the allocation of resources depends in this case on its ability to affect the real interest rate and thus saving. Higher rates of monetary expansion reduce the real interest rate by raising the expected rate of inflation. If we now allow for the inclusion of an endogenous labor supply (but do not yet add productive capital to the model), it will still be true that the monetary authority affects the real interest rate by varying the growth rate of money. Labor supply, and thus output, will respond to variations in the real rate of interest. A case for activist monetary policy in a context in which there were variations in the productivity of labor, could once again be made, given a social welfare function.

Expansion of the menu of assets makes it necessary to provide a rationale for portfolio diversification, particularly the holding of money. The simplest rationale lies in the existence of some form of transaction costs in buying and selling assets other than money.[1] Putting money in the utility function will also generate portfolio diversification; this device is best thought of as being justified by the existence of transaction costs that are not explicitly included in the analysis, but rather implicitly created as foregone utility. A third possible source of diversification is risk aversion, though here it is necessary to ensure that money is not a dominated asset.

Sidrauski (1967) has elucidated the very strict conditions under which the rate of inflation does not affect the level of output in a model with both labor and capital as factors of production, and money and capital as assets. Money is superneutral if the optimizing units in the economy are infinitely lived, if the quantity of real balances does not affect the economy's production possibilities, if labor is inelastically supplied, and if consumers have a constant discount factor for comparing utilities over time. The steady state capital stock is determined by the modified golden rule condition that the marginal product of capital be equal to the sum of the consumers' rate of time preference and the growth rate of population. Even this set of restrictions does not strictly speaking imply super-neutrality, since economic agents are not indifferent to the rate of inflation.

---

[1]At this stage the consumption loans model becomes more difficult to use, since it tends to emphasize the store of value function of money, while the transaction costs arguments rely on the medium of exchange function. See Bryant and Wallace (1978) for the attempted incorporation of money in a consumption loans model with other assets.

Relaxation of the specified conditions will again produce non-neutralities of anticipated money. If labor supply is not exogenously fixed[1], or if consumers do not effectively maximize over an infinite horizon[2], or if money enters the production function, money will not be superneutral. Nor does the superneutrality apply to the behavior of the economy before the steady state is reached;[3] more rapid rates of money growth tend to produce more rapid rates of accumulation of physical capital in the transition to the steady state.

Once there is a rationale for the holding of money, expansion of the menu of assets, held on grounds of risk aversion, introduces no fundamentally new issues. It is therefore useful to step back to examine the two basic mechanisms at work rather than continue to catalog possible non-neutralities. The first mechanism arises from the possibility that changes in the real return on holding money affect interest rates on other assets, thus portfolio composition, and possibly the rate of saving and labor supply. The second mechanism operates through the effect of an increase in the expected inflation rate on the level of real balances. Lower real balances may imply more transactions and less resources available for production; they may also produce wealth effects that will affect spending on goods and services, and labor supply.

---

[1]Brock (1974).

[2]Drazen (1976).

[3]Fischer (1979).

The empirical significance of these mechanisms is not known. But there is a priori reason to think the effects will be small. First, they do not all work in the same direction: the accumulation of physical assets induced by anticipated inflation tends to increase output, while the diversion of resources from the production of goods to the production of transactions tends to reduce final output. Second, the base on which the real balance effect works is small; the stock of non-interest bearing money is less than M_1, since some implicit interest is paid on demand deposits.[1] Further, it is likely that explicit interest payments on demand deposits will soon become legal, leaving currency as the only non-interest bearing nominal asset.

Institutional Effects of Anticipated Inflation

Up to this point, we have confined the government to making lump sum transfer payments in determining the growth rate of money. We want now briefly to consider the real effects of anticipated inflation arising from the nature of the tax system and other government regulations.

There is first the inflation tax itself. Changes in the growth rate of money affect the real revenue the government obtains from the creation of high-powered money, and make it possible to vary other taxes, given the level of government spending. Changes in the pattern of taxation will have real effects, though little more definite can be

---

[1]Startz (1978) estimates the implicit rate to be half the competitive rate.

said without considering the details of the tax structure.

However, the primary non-neutralities of the tax system arise from non-indexation of taxes. The major effects will arise from the payment of taxes on nominal, rather than real, interest, (combined with differential rates of personal and corporate taxation), and from the use of historical cost as the basis for depreciation.[1] Each of these features of the tax system implies that increases in the anticipated rate of inflation would discourage capital accumulation. Similarly, despite changes in the method of financing housing investment in the last few years, anticipated inflation still has potentially large effects in reducing the volume of housing investment;[2] the effects may be attributed in part to the existence of government imposed interest ceilings.

It is worth noting that the specified characteristics of the tax system and housing financing are part of the institutional setting of the economy that has not completely adapted to the existence of ongoing inflation. Their existence thus cannot be relied on as a permanent mechanism through which monetary policy will affect the economy.

at least partly
However, it is significant that the institutional features remain/in place after twelve or more years of continuing inflation. The costs of changing the institutions of an economy that are based on an implicit assumption of the stability of the value of money, to those that are based on the recognition of ongoing inflation, must be substantial.

---

[1] These effects have been emphasized by Feldstein and others; see, for instance, Feldstein and Summers (1978).

[2] Details are contained in Modigliani and Lessard (1975).

The institutional non-neutralities discussed above tend to make increases in the anticipated rate of inflation reduce the rate of investment and subsequent output. The net effect of anticipated changes in money on output in the current and subsequent periods is thus difficult to predict a priori; it will also probably be a delicate matter empirically to isolate the magnitudes of the mechanisms discussed in this section. One place to start is by examining the effects of anticipated changes in money on the real interest rate. In the next section we also discuss reduced form estimates of the effects of anticipated money on output.

But even if reliable estimates turned out to show that the non-neutralities of anticipated money are not trivial, it would still remain to make the theoretical case for the desirability of activist monetary policy. An initial reaction might be that the factors discussed in this section merely suggest that the growth rate of money should be set at that level which would produce the optimal quantity of money,[1] and the economy otherwise left free of monetary interference. However, in a context in which there are other distorting taxes, the inflation tax should also in general be used to raise revenue.[2] Nor, even ignoring the inflation tax, is the optimal quantity of money provided by keeping the growth rate of money constant if the marginal product of capital varies over time. The argument for an activist monetary policy would

---

[1]Friedman (1969) suggests that the optimum quantity of money obtains when the economy is satiated with real balances; this requires that money pay a real return equal to "the" real interest rate on other assets. The positive real return on money is achieved by producing deflation.

[2]Phelps (1973).

thus be derived from analysis of the optimal inflation tax: as government expenditure varies, and other disturbances impinge on the economy, the optimal use of the inflation tax would also change. The optimal growth rate of money would therefore change as the state of the economy changed.

There are three main conclusions from this section. First, there are sound theoretical reasons for thinking that anticipated money is not necessarily neutral. Second, we do not at present have empirical knowledge of the net direction and magnitudes of the mechanisms underlying the non-neutralities. Third, there is no reason to think that an optimal monetary policy derived in a model in which non-neutralities are present, and in which revenue from the inflation tax accrues to the government, will be a constant growth rate rule. Put differently, considerations of the type discussed in this section do not attach any sanctity to the constant growth rate of money.

A fourth conclusion should also be drawn: while the non-neutralities of this section may eventually be important in designing a framework for monetary and fiscal policy, they are not of central importance to the debate over countercyclical monetary policy. We therefore turn to the non-neutralities of unanticipated money.

II. Non-Neutralities of Unanticipated Money

Emphasis by Lucas (1973) and others on the importance of the unanticipated component of the change in the price level has led to empirical work, of which the best known is by Barro (1977, 1978), which appears to show that only unanticipated changes in the money stock affect real output and that

anticipated changes in money have no real effects. A finding that
only unanticipated money affects the behavior of output would be signifi-
cant for the conduct of monetary policy, though not decisive in estab-
lishing the desirability of a constant growth rate rule. The case for
activist policy would then have to rest on the effects of the policy
on the natural level of output, and on its implications for price level
behavior. The welfare case for a monetary policy that operates by
surprise or deception appears to be a difficult one to make, so that
the strong Barro position that only unanticipated money works would tend
to support rules over discretion.

For the purposes of this paper, I want to show that Barro's results
are not inconsistent with the view that systematic monetary policy can
affect the behavior of output. I therefore do not have to enter into
a detailed argument about the real meaning of Barro's results, and
particularly into the question of whether he has successfully measured
expectations of the growth rate of money[1] though fundamental criticisms
will doubtless center on this latter issue.

The key point in my argument is that anticipations of money
growth for periods other than one year ahead (Barro uses annual data)
are relevant to the determination of output. I believe that to a useful
first approximation, the long-run Phillips curve is vertical. That

---

[1]David Germany (1978) points out that the restrictions Barro needs to
identify the coefficients on unanticipated money in his output equation
are literally incredible: it is assumed that expectations are known
(by the output regression runner) exactly.

means that fully anticipated changes in the money stock would not

affect unemployment significantly. But one can hardly imagine

a change in the money stock that has always been anticipated: every

change in the money stock must be unanticpated as of some earlier date.

If the Fed can respond to disturbances occurring after decisions relevant

to the determination of output are made, then it can systematically

affect the behavior of output.[1]

The Barro Output Equation

I review Barro's procedure briefly in the text; more detail is

provided in the appendix. Unemployment, or the deviation of output

from trend, is explained in a regression using annual data with actual

and unanticipated changes in the money stock as regressors. A single

stable money supply rule was estimated and taken to have been used in

forming expectations, based on information available one year ahead,

of monetary growth over the period.[2] Barro finds that unanticipated

increases in the growth rate of money significantly increase the level

of output; the hypothesis that anticipated changes in money also

affect the behavior of output is not accepted.

---

[1]This point is worked out in Fischer (1977). That article implicitly
accepted the view that systematic monetary policy would be used to
"deceive" the private sector, rather than the view of the present paper that
systematic policy can be used to produce desirable outcomes more cheaply
than is possible with a passive policy.

[2]In an earlier version of his 1977 paper, Barro showed that his results
were not significantly affected if a money supply equation based only on
data available up to the time an expectation was formed, was used in
generating the expected change in money.

A relevant question about Barro's results from the viewpoint of activist policy concerns the time interval over which "unanticipated" is defined. In an earlier paper (1977) I argued that anticipations of the price level more than one period ahead might enter the output equation. Analogously, it is possible that expectations of the money supply formed two periods back, rather than one period back, could enter the output equation.

Using Barro's money supply equation, I have constructed two period ahead forecast errors for the money stock, and included them in the output equation. (Details are in the appendix.) As would be expected, the two period forecast errors are collinear -- though not perfectly so -- with the separate one period forecast errors over the same two years. The inclusion of a two period ahead forecast error in the output equation reduces the standard error in that equation, but not significantly so. Replacing the first one period ahead forecast errors with a two period error reduces the standard error of estimate, though not significantly. I conclude that the data cannot tell us whether only one year ahead or only two year ahead errors in predicting money, or both, contribute to explaining the behavior of output -- though if forced to choose, the data choose the two period forecast error. My belief is that both types of forecast error are relevant; there is nothing in the Barro data to reject that view.

The reason the inclusion of the two-period ahead error matters is that it is very hard to argue that the Fed cannot use a monetary rule that reacts within a period of two years to new information. If the two year expectation is somehow (for example in labor contracts) locked in, then the Fed has ample time to act to affect the behavior of output.

That does not mean it <u>should</u> act, but rather that it can systematically affect output. Moving in the other direction, though, it is also difficult to believe that the Fed cannot within the period of a year systematically react to information that becomes available to it, after the one year ahead expectations are locked in. That is, the length of the Barro period suggests that the Fed can systematically produce unanticipated money -- by acting on information that becomes available within the year.[1]

This possibility raises the familiar mutual causation question, as a potential explanation for the apparent strength of the effects of unanticipated money. It is somewhat surprising that Barro finds a stable money supply process over a period during which the Fed moved from a policy of supporting interest rates to one in which it claims to pay attention to monetary targets; it is also surprising that there is no apparent role for interest rates in Barro's equation.[2] His results might reflect the effects on both money and output of movements of other variables that tend to increase output, with the Fed increasing money to smooth interest rates.[3]

The Lucas Supply Function.

Given the uncertainties raised in the preceding paragraphs, it would be useful in judging the importance of Barro's results to know what mechanism might have produced them if they were true. The impact of an unanticipated increase in the growth rate of money by one percentage

---

[1] It is of course true that whether or not the Fed can systematically produce unanticipated money depends on private sector contracting arrangements; I return to this point below.

[2] See the comments on Barro's paper in this volume by Robert Weintraub.

[3] Preliminary evidence indicates that unanticipated increases in money (as measured by Barro) are positively correlated with unanticipated increases in short-term interest rates (the expected interest rate is calculated from the term structure), providing some support to the notion that increases in the demand for money partly produce unanticipated money.

point produces an increase in output of over one percent in the current year, and nearly 1.2 percent in the following year. The Fed rolls high-powered dice.

There are two competing explanations for results of the type Barro has obtained. The first is the standard rational expectations supply hypothesis, which will be detailed below. The second is a Keynesian story, which attributes Barro's results to the stickiness of wages that are based on expected prices.[1] The first explanation tends to rule out a role for active policy, while the second does not. The Phillips curve is an implication of both stories, and cannot be used to distinguish between them.[2]

In this section I discuss the Lucas supply hypothesis, to see whether there is independent evidence suggesting that it underlies Barro's reduced form results. The Lucas supply function is:

(1) $$y_t = y_{nt} + b(P_t - {}_{t-1}P_t) + e_t$$

where y is the level of output, y_n is the natural or full employment level of output, and P is the price level, each in logarithms; e is a disturbance term, and the notation ${}_{t-1}P_t$ denotes the expectation of P_t that is formed on the basis of information available at time (t-1). The Lucas analysis is most accessibly developed in his 1973 article; the rationale for (1) builds on information confusions, which cause individuals to increase their supply of output when nominal prices increase, under the mistaken impression that the relative price of their output has risen.

---

[1] Backward looking "catch-up" elements are also typically found empirically in the Phillips curve; Taylor (1978) has a model with overlapping labor contracts in which workers are concerned with relative wages, which is consistent with estimated Phillips curves.

[2] I am grateful to Robert Hall for emphasizing this point.

The key element in the Lucas mechanism is the increase in the supply
of output in response to a rise in the perceived relative price, a story
that is most naturally told as the model of an individual supplier of
labor services, for whom the price of output is the nominal wage.
However, Lucas notes (1977), a very similar mechanism would operate in
the case of firms. The strength of the mechanism would be greatest
in response to an increase in the perceived real wage that was thought
to be temporary, for in that case workers would like to increase the
amount they work in the current period (at a high wage) and substitute
more leisure next period (when the wage is expected to be lower than
its current level). An increase in the real wage that is expected to
be permanent might not elicit any increase in output, since labor supply
curves may even slope backward.

Doubts can be raised about the supply mechanism (1). First, as
David Small (1977) has pointed out, the assumed reaction of workers to
an increase in the current price level requires it to signal an increase
(or at least not a large decrease) in the real interest rate; in a
model in which monetary growth affects the real interest rate, monetary
policy can negate the labor supply response to unanticipated inflation.[1]
Second the mechanism provides no real explanation of a relationship
between unanticipated inflation and the unemployment rate -- it appears
that those who choose not to work when the perceived real wage falls
would not be unemployed. Perhaps, however, the existence of unemployment
insurance makes it profitable to appear to be unemployed even when workers
desire to reduce the amount they work; in addition, movements in the

---

[1]Bulow and Polemarchakis (1978) have studied essentially this mechanism.

participation rate, as in Sargent (1976), might help explain movements

in the unemployment rate. Third, if this mechanism were powerful,

temporary income tax changes would be potent instruments for affecting

the pattern of output over time--and there is little evidence of such

potency. Fourth, given the crucial importance of the mechanism,

the empirical support for it is small.[1]

Unanticipated Money and Sticky Prices

The evidence supporting the Lucas supply hypothesis is hardly strong

enough to justify the view that it is the main mechanism underlying

Barro's empirical results. Indeed, Barro's (1978) price equation reveals

some stickiness of the aggregate price level, leading him to remark

that the money to price link may be too weak to explain the estimated

effects of unanticipated money on output.[2]

The stickiness of prices suggests that a Keynesian mechanism, in

which changes in money affect aggregate demand, which affects employment,

may be at work. The response of some prices, particularly wages, to

changes in demand is sluggish relative to the period over which policy

is formulated;[3] Sargent (1976) finds that wage rates may be treated as

exogenous in a quarterly macro model. The most plausible generalization

---

[1]Lucas refers to his work with Rapping (1969), to work by Ghez and Becker (1975), and some more casual evidence. The Ghez and Becker evidence does not appear to bear strongly on cyclical labor supply substitution.

[2]Since interest rates are held constant in Barro's price equation, a more complete analysis might reverse, or for that matter, strengthen, this conclusion.

[3]Poole (1976) argues that there is some period short enough that the price adjustments assumed in the equilibrium supply framework do not operate.

of the Lucas supply function is prabably this: the longer in advance

a given type of change in the money supply has been expected, the greater

the effect on prices relative to the effect on output, with the effects

being proximately attributed to the stickiness of nominal prices fixed

over different horizons.[1,2]

In the short run (maybe several years) in which prices are sticky,

monetary policy can affect the behavior of output in the manner suggested

by Keynesian disequilibrium analysis, in which quantities are not

necessarily determined at the intersections of supply and demand curves.

There is no presumption that any intervention can only worsen the

situation in such circumstances.[3]

The conclusions from this section are that there is no strong

evidence for the view that only unanticipated (with a one year horizon)

changes in the money stock affect output. The data are not strong

enough to force acceptance of the view that it is one year ahead rather

than longer or shorter forecast errors that are relevant to the behavior

of output. Similarly, while there is some evidence supporting the Lucas

[1]This comment applies to the extent that money is neutral, price stick-
iness aside. In Fischer (1979b) I show that when anticipated money
affects output, prices may rise less the longer a given change in money
has been expected -- because the anticipated money then affects output
more.

[2]Taylor's (1978) model, op. cit., produces such an adjustment pattern.

[3]It can and has been objected to the view that short-run price stickiness
implies that output is not optimally determined, and can be predictably
affected by monetary policy, that the private sector would not enter
into arrangements that would "predictably" imply a deadweight loss
(Barro, 1977b). By the same token, the private sector would presumably
not enter into arrangements that leave it vulnerable to the effects
of unanticipated money.

supply mechanism, there is also evidence for price stickiness.

We are now free to discuss activist policy.

III. The Desirability in Principle of Activist Policy

The classical argument for government control of the money supply is that a fiat money system is unstable, tending to degenerate into a commodity money system. Historically, central banking developed in response to a slightly different instability: that of a financial system in which the quantity of claims on the existing stock of commodity money was larger than that stock. The Bank of England, for instance, was driven against its will to manage the London money markets by financial crises that threatened private sector financial institutions.[1] The private sector can manage financial panics,[2] but the nineteenth and early twentieth century record indicates that better management should not be difficult -- though the Great Depression proves that worse management is also possible.[3]

At a general level, we can agree that if the government is to control the money supply, it should provide a stable monetary background against which the economy can proceed with its real business of producing and consuming goods. If there were no disturbances to money demand, arising from disturbances affecting the level of output or interest rates, or the random term in the demand function, a stable monetary background would be a stable (predictable) money supply. A constant growth rate rule would serve well.

---

[1] See Bagehot (1906) and Sayers (1957).

[2] Friedman and Schwartz (1963) suggest that the private sector would have handled what became the Great Depression better than the Fed had the latter not existed.

[3] I assume that enough has been learned (and that institutions have changed) so that the Fed would not again act as it did in the early 1930's.

But there are of course disturbances to money demand. In the long

run these take the form of changes in the assets that constitute money.

Historically, the process has been one of a broadening of the class of

assets that serve as the medium of exchange. Price level behavior over

the long term would become less and less predictable if monetary policy

were devoted to control of the supply of an asset that constituted

a decreasing proportion of the money supply. We therefore cannot

expect that a constant growth rate rule, or for that matter any other

rule, would remain inviolate over the long term; occasions would arise

when it would be necessary to change the asset whose growth rate was

being controlled.[1] Such changes hardly constitute activism, however.

The General Rationale for Countercyclical Monetary Policy

The important issues arise in the short run. Short-run disturbances

to money demand arise both from goods market disturbances that affect

the level of income and the interest rate, and from random shifts in

money demand; the money demand function does not fit perfectly even for

the sample period 1955-73. The evidence reviewed in Section II suggests

that by reacting to these disturbances, the Fed can affect the subsequent

behavior of output, interest rates, and prices, even if the policy

actions constitute a regular pattern of behavior and are in that sense

anticipated.

I shall also argue that it is at least potentially desirable that

the Fed seek to offset distrubances. The argument most usefully starts

from the recognition that there would be no reason for disequilibria

to emerge as a result of monetary disturbances in the absence of transactions

[1]The 100 percent money plan would have difficulty in controlling the
development of money substitutes.

and information costs. In the absence of such costs, the private sector would closely monitor the aggregate price level and aggregate money stock, and make contracts contingent on them. Unanticipated money -- or any other disturbance -- would create disequilibrium, or an unsatisfactory state of affairs, for only as long as the arbitrarily short period over which prices and wages were fixed. There is of course noise in both price and money data, but some information is better than none.

It might be suggested that the private sector does not enter into complicated arrangements contingent on aggregate variables because aggregate fluctuations account for only a small part of the risk facing individual economic units. Such an argument is both correct and incomplete; it has to be combined with the obvious assumption that there are costs of acquiring and processing information, of writing detailed contingent contracts, and of reducing the length of contract periods, if it is to account for the non-existence of the contracts that would render the private sector immune to aggregate disturbances.

The costs that prevent the private sector insulating itself from aggregate disturbances lead also to temporarily sticky prices that produce the presumption that private sector output is not continuously optimal. Those costs are the underlying reason there is a potential role for activist monetary policy in attempting to offset aggregate disturbances.

If one takes the view that monetary management has the task of offsetting aggregate disturbances that the private sector has not made arrangements to deal with, the goals of policy are the standard ones of full employment (minimizing the deviations of the unemployment rate

from the natural rate) and price stability.[1] Price stability is desirable

in part for the reasons emphasized in the Lucas supply mechanism: it

enables the price system to operate more efficiently.[2] But this cannot

be the full explanation for the weight that inflation aversion has in

public opinion polls.[3]

To say that monetary policy should have worthwhile goals is hardly

a policy prescription. Detailed prescription cannot be expected from a

paper that does not present an empirical model as a basis for prescrip-

tion, though I do in the next two sections discuss general characteristics

of desirable monetary policy. In principle, the optimal monetary

policy to be used for stabilization can be studied using an appropriately

specified macroeconometric model, which pays due attention to the effects

---

[1] This sentence glides over some difficult issues, particularly in relation
to price stability versus price predictability.

[2] It has, of course, been recognized that a desire for price level stability
would support an activist monetary policy even if anticipated money did
not affect output. (Sargent and Wallace, 1975). But it is important to
realize that price level predictability, as well as stability, can in
principle be increased by the use of active feedback rules. The predic-
tability at issue is that of prices in the more distant future. In a
number of models, the one period ahead variance of the price level is
the same whatever the monetary rule that is being followed. But the
uncertainty today about the level of prices in the distant future in
general is greater if monetary policy does not respond to current dis-
turbances than if it does attempt to stabilize prices. To the extent
that price level predictability more than one period ahead is relevant
to the allocation of resources, activist monetary policy might be desirable
on those grounds alone.

[3] Fischer and Modigliani (1979) list many of the real effects of inflation
on the economy; these may in part account for popular attitudes to inflation,
which are frequently ascribed to irrationality.

of changes in policy regime on the structure of the model.[1] Such models

are not inherently impossible to build.

IV. Activist Policy in Practice

There is no inconsistency in accepting the general argument of

Section III for activist policy and in urging the immediate acceptance

of a constant growth rate rule (CGRR). After all, we do not know the

optimal activist policy. In this section I concentrate on a comparison

among a number of monetary policies, leaving the rules versus discretion

issue to Section V.

The first policy is the most difficult to describe: it is the

current system, in which the Fed makes monetary policy as best it can,

with inputs from business, academic, and other sources of pressure, and

in ways that change over time. The second is the constant growth rate

policy (CGRP) or a passive policy. Most studies of alternative monetary

policies have compared these two, with history serving as the repre-

sentation of Fed policy. Third I will consider a policy that is intermediate

between the first two -- one in which policy is basically passive

except in the face of major actual or anticipated disturbances.

The major arguments for CGRP as compared with actual policy are

familiar from earlier discussions: they are that ignorance of

---

[1]The warning by Lucas (1976) that the structure of econometric models
will not remain invariant to policy changes applies also to the struc-
ture of contracts. The monetary policy of the last three decades has,
by some accounts, been largely in error but the private sector has allowed
itself to be left in the position where, by some estimates, a 1% unanticipated
change in the money supply affects output by 1% within a year, and more the
next year. If monetary policy were to improve, the private sector would make
itself _more_ vulnerable to the effects of unanticipated money, by adopting
longer term contracts and paying less attention to monetary variables.

the structure of the economy makes policy intervention destabilizing

("long and variable lags"); that most serious disturbances have been

caused by inept policies; and that political pressures lead to monetary

mismanagement. Underlying these arguments is an interpretation of the

historical record that claims the Great Depression would have been

more moderate had the Fed followed a CGRP (Friedman and Schwartz,

1963), and that macroeconomic behavior in a number of subsequent

episodes would likewise have been better had the Fed been following such

a policy.   (Friedman, 1960).[1]

At the theoretical level it is correct that increased uncertainty

about the structure of the economy supports the use of more passive

policies. Similarly, it is entirely possible for naive policies to be

destabilizing. Whether ignorance and naivete have in practice caused

policy to be destabilizing, and will do so in the future, are difficult

questions to answer. The historical record, to which we turn

shortly, casts some light on these questions.

Before we examine the record, though, we have to ask whether the

entire post-1913 history of the Fed, including the Great Depression,

should be thrown into the scales, or whether it is reasonable to assume

the Fed has learned something. As previously noted, I will proceed on the

assumption that the Fed can and has learned from history, and that deposit

insurance, memory, and the persuasive evidence of Friedman and Schwartz,

will prevent repitition of the behavior of the monetary authority during

the early 1930's. Similarly, I believe that the Fed is now more aware of

the potentially destabilizing influence of stabilizing nominal interest

---

[1]Poole's contribution to this volume makes that claim for the 1971-75
period.

rates than it was in the sixties, and that it pays more attention to the behavior of the monetary aggregates than it did.[1]

The Historical Record

The record of monetary policy up to 1960 was studied by Friedman (1960), who emphasized the debacle of the Great Depression, and regarded post World War II monetary policy as less obviously defective (p94).

The evaluation of monetary policy in the post World War II period (or in any other period) presents substantial difficulties. The natural way to proceed appears to be to use an econometric model to compare the historical performance of the economy with that which would have occurred under CGRP. Such experiments typically show actual monetary policy outperforming, or not being markedly worse than, a passive policy (for example, Modigliani, 1977, Eckstein, 1978[2]). Unfortunately these experiments are subject to the reservations emphasized by Lucas (1976) in his discussion of econometric policy evaluation.

The other method of evaluating policy is less formal. It is to select particular episodes for discussion, criticism, and comparison with the results of a passive policy. For instance, it is reasonably clear that the growth rate of money was too high in 1968 and early 1969 and that a policy that maintained the growth rate of money at say the average rate of the sixties would have been better.

---

[1] The need for this paragraph may not be obvious to all readers. However, some comments on the first draft of this paper persuaded me that the question of whether the monetary authority has learnt anything is central to disagreements about CGRP.

[2] Eckstein's passive policy controls the growth rate of unborrowed reserves rather than M1. The growth rate of money under such a policy is not much more stable than the historical path.

Similarly, Poole provides an interesting evaluation of the 1971-5 period in his contribution to this volume. Poole argues convincingly that monetary policy was too expansionary in 1971-2, especially given the existence of wage and price controls. He also suggests that more expansionary monetary policy in the first half of 1974 -- as urged at the time by, for instance, Modigliani (1974) -- would have produced substantially more inflation but little more output than actually occurred. He argues, interestingly, that the Fed could not really have followed a more expansionary policy in the first half of 1974 because such a policy would not have looked right at a time of high inflation and relatively low unemployment. He absolves the fall in monetary growth in the second half of 1974 from most of the blame for the recession. And he argues for a constant growth rate rule.

Although exercises of this type are subject to both the Lucas critique and selection bias, the argument is sufficiently interesting to be worth pursuing. The initial appearance is that Poole's analysis does not support the case for CGRP. The implication of Poole's argument is that monetary growth should have been reduced below the trend rate in 1971-2 to accompany wage and price controls, and it should have been increased above its trend level in the second half of 1974. (Poole seems to be agnostic about the first half of 1974.) If political forces indeed restrained monetary growth in the first half of 1974, then one of the major arguments for rules -- that they remove the Fed from unfortunate political pressures -- appears redundant.

However, there is more to be said in defense of CGRP. In the first place, although optimal policy in 1971-2 would not have been CGRP, the latter would have been better than actual policy. And

second, it is open to proponents of CGRP to argue that there would have
been no need for wage-price controls in 1971 if the rule had been
in effect in the sixties.

Although Lucas's critique of econometric policy evaluation
makes any statements about the historical record difficult to support
strongly at this stage, the following remarks are in order. First,
monetary policy in the post-World War II period has not on average
been markedly worse than a constant growth rate rule, and has
probably been somewhat better. Second, it is easy to find particular
episodes for which one can confidently assert that actual policy was
worse than a constant growth rate policy. Third, we can on general
grounds be sure that a 4% growth rule would have produced a lower
inflation rate between 1960 and the present than actually occurred.
But without an econometric model, we do not know whether overall
economic performance -- including the behavior of the unemployment
rate -- would have been better under such a policy.

The historical record since World War II does not tell the
unambiguous story that proponents of CGRP find in it, even though
there are episodes in which CGRP would have been better than actual
policy.

Modified Activist Policy

The arguments against activist policy outlined in this section,
and the evolution of actual policy, point in the same direction --
towards a policy that responds very little or not at all to minor
actual and prospective disturbances, but with proportionately more

vigor to actual and potential major disturbances. For want of a
better term, I shall refer to this policy as modified activist policy,
or MAP.

The arguments made by Friedman against activist policy are telling
against fine tuning: given uncertainty about the structure of the
economy, policy has to be cautious in reacting to information con-
tained in minor disturbances, in part because data revisions are often
large. However, there is no reason why policy should not react to
major disturbances, actual or prospective, when it is clear that
either expansionary or contractionary policy is required.[1] In
saying this, I assume that major disturbances could occur even in the
absence of government policy: the nineteenth and early twentieth century
record suggests that possibility. If it should be the case that
large disturbances have been the fault of the Fed, the absence or
mildness of fine tuning would soon establish itself as a major
success -- unless political pressures make it impossible to run
a cautious policy.

The discussion of the three policies of this section can
conveniently be continued in the next section, under the heading of
rules versus discretion. In practice, a monetary rule would almost
certainly be written as a constant growth rate rule, and discretion
would mean continuance of the present evolving system of monetary
control. In operation, a monetary rule would be much like MAP,
for the rule would likely be adapted or changed in response to an

---

[1]The monetary policy required in the case of a demand disturbance is
usually clear, but the response to supply disturbances presents greater
difficulties.

anticipated or actual crisis.

V. Rules versus Discretion

The general issue of rules versus discretion in monetary policy
amounts to the question of whether the Fed should be given a narrowly
defined task by legislation specifying the behavior of variables
fairly directly under its control (rules), or alternatively, should
be left to decide the appropriate means of achieving ultimate targets
of monetary policy (price stability, full employment, etc.) specified
by legislation (discretion). As with most convenient distinctions,
there is no hard and fast line: a rule that would leave the Fed
with a minimum of discretion would prescribe the behavior of its
own portfolio; the current situation in which various ultimate
targets are mentioned in legislation, but the appropriate weights
and the means of reaching those goals are not, gives the Fed a much
larger measure of discretion. For convenience, we can draw the line
between legislation that controls the behavior of a (or several)
monetary aggregates, as being a rule, and legislation that prescribes
the goals of stabilization policy without specifying the behavior
of monetary aggregates, as providing discretion.[1]

Any monetary rule would have to be amended as the financial
system evolved, as we have already noted. Changes in the rule might
also have to be made in the short run, if it proved defective in

---

[1]On this definition, Henry Simons (1952) argued for discretion in the
1930s; his proposed monetary rule was that the Fed aim to achieve price
stability. At the time he was concerned about the instability of the
demand for money. He argued that an optimal system would have 100%
money and a fixed amount of it, and he believed that such a system could
eventually be set up.

operation. Indeed, the proposal for a monetary rule is equivalent
to the suggestion that monetary policy be subject to the same
legislative process as tax changes unless it is seriously suggested
that the rule be embodied in a constitutional amendment. The latter
suggestion reflects excessive confidence (or hubris) in conclusions
reached on the issues discussed in Section IV.

Two complementary methods for changing the monetary rule suggest them-
selves. First, there could be hearings on the performance of the rule at
fixed intervals: the Fed might be required to report regularly on the
workings of monetary policy and make recommendations for changes.
Second, changes could be proposed as the Congress or the Fed or any
other agency saw the need.

The Case for Discretion

The benefit of discretion, or leaving monetary policy in
the hands of the Fed, is flexibility. There are two aspects
of flexibility. The first relates to the classic lender of last
resort function of the central bank, in which flexibility enables
the central bank to intervene in potential financial crises. Such
intervention was useful in the Penn Central and Franklin National
cases, even if the methods of intervention in the latter case were
not optimal. In neither of these cases, though, did it seem that
there was any threat of a run on high-powered money, and it may
be that the advent of the FDIC has indeed removed the need for a lender
of last resort. Further, a rule that fixes the growth rate of M1
would provide an element of built-in stabilization since increases

in the demand for currency at the expense of demand deposits would
be accommodated automatically. However, the basic source of the
instability that underlies a panic -- the multiple expansion of credit --
would not be removed by CGRR.

There is thus no certainty that panics would be avoided under
CGRR and accordingly it is important that.there be some agency in a
position to deal with potential panics in the financial markets.
The most natural agency for this purpose would be the Fed, which should
have left open to it the possibility of discounting freely and/or
conducting large scale open market operations.

The second type of flexibility is that which permits the Fed to
react to business cycle developments. The argument here would be
that there might be business cycle developments to which the Fed
should react, and that the details are too subtle to spell out in
legislation. If a rule were in operation, the Fed could ask the
Congress for authorization to engage in extraordinary measures if
the need were foreseen, but delays in the legislative process and un-
certainty about its outcome might well exacerbate any underlying
disturbance.

The loss of flexibility that a constant growth rate rule would
imply for the Fed in dealing with run-of-the-mill small disturbances
would probably not be any great loss; it would essentially be the
end of fine tuning. But economic instability might be seriously
worsened if the legislative process made it impossible for the Fed
to react to a financial panic, or to react in a situation, such as
a deep recession, when action was clearly called for.

The Case for a Rule

The advantages of a rule are in large part the disadvantages of discretion. The alleged tendency of the Fed to undertake action that is too much and too late would be reduced by the introduction of CGRR, or any other rule, for the decision lag of discretionary policy would be avoided. Policies that reduce the money stock at a time when it should be increased -- as during the Great Depression -- would be avoided. The accountability of the Fed for its actions would be enhanced, since its task would be well defined. The record shows that CGRR would not have been much worse than actual monetary policy during the post World War II period.

Another argument against discretion has recently been advanced by Kydland and Prescott (1977)[1]. The Kydland and Prescott argument is essentially that the Fed always or usually has an incentive to change monetary policy (the argument is a general one that applies to any policy) once the private sector has committed itself to a set of plans based on given expectations of policy. For instance, to take a not irrelevant example, if the public has adjusted to a relatively low rate of inflation, it might be in the Fed's interest to accelerate the inflation rate, apparently improving the short-run situation.

If the Fed has discretionary power, and a different set of aims than the public, it might sometimes face the incentive to exploit

---

[1] A similar problem is examined by Calvo (1978). The remarkable feature of the Kydland-Prescott result is that it can apparently occur even if the policy authority is maximizing the expected utility of the representative individual, and if individual tastes are consistent through time.

the short-run Phillips tradeoff. By a similar token, it rarely seems a good time to reduce the inflation rate. But why should the Fed have a different utility function than the public? The typical argument is that the Fed reads the election returns, and that it, discretely to be sure, does the bidding of the president. This argument implies the not novel view that political success can be bought by policy which is not in the public's real interest. (It also implies that the Fed can systematically affect output.) Although democracy is frequently invoked in the argument for rules, it is not clear what democracy requires in this case.

I believe there is in fact a conflict between the short and long run interests of the public in the political business cycle, and that some weight should on that account be given to rules. But I would feel much easier about this argument for rules if I did not have the suspicion that it is a rationalization of the typical economist's belief (shared by the public) that inflation is a more serious problem than the revealed preference of the political process, or any serious economic analysis, suggests, and that inflation control has therefore to be imposed, if necessary by rule.

A Modified Constant Growth Rate Rule or MAP

Friedman (1960) made only modest claims for CGRR -- namely, that it would prevent the Fed from making major mistakes. The major drawback of a strict form of CGRR is the possibility that monetary policy will be immobilized precisely at a time when it is obviously useful.

The question that then arises is whether CGRR would not in practice
be the best of all worlds, given the right of the Fed to ask for changes
in the rule. There would then be CGRR in the ordinary course of events,
and active monetary policy when circumstances warranted -- which is pre-
cisely the modified activist policy described in Section IV. However,
given the delays of the legislative process, CGRR in practice could well
be destabilizing,[1] particularly in the case of a financial panic.

A similar solution, which I favor, would leave the initiative for
taking action with the Fed, but would maintain the presumption that
in the ordinary course of events, monetary policy would be passive.
Under such a solution, the Fed would be expected to maintain a con-
stant growth rate rule, and would be required to explain ex post
(within some specified period) all deviations from the constant growth
rate path to a congressional oversight panel.

This latter solution is very close to the current situation. It
is beyond the scope of this paper, and my ability, to specify the
legislative formula that would be required to make the Fed follow its
targets more closely than it has since 1975. More Congressional over-
sight, and more public explanation from the Fed of what it is doing,
are both to be welcomed in any event.

It is not clear to me whether the proposed policy is a rule or
discretion. It is a rule in that it prescribes expected conduct for
the monetary authority, but it leaves the Fed with sufficient discretion
to take rapid action if that is necessary.

---

[1] Tax rates are not typically changed rapidly.

VI. Concluding Comments

I will not repeat the summary of this paper, which is contained in the introduction. I want to make three final points. First, the purpose of the paper was to discuss the possibility of countercyclical, activist monetary policy in the light of developments in macroeconomics associated with rational expectations. Much of the paper was therefore devoted to the question of whether systematic monetary policy can have _any_ real effects on output. Given the need to concentrate on that question, and the absence from the paper of a well specified macro model, only the most general of policy prescriptions could be made.

Second, the reader will have been struck by the number of places in the paper at which it is asserted that there is no very strong evidence favoring one position over another. The only strong statement the evidence on adoption of a constant growth rate policy supports is that we do not know how such a policy would work. The conservative course is not to immobilize monetary policy when it might be useful in a recession or panic.

Third, the terms in which the argument is couched may seem unusual. But the general argument that is made for activist policy is not new. In Keynesian terms[1], the issue that is being discussed is whether "we should, in effect, have monetary management by the Trade Unions, aimed at full employment, instead of by the banking system". The answer given in this paper is that the central banking system rather than the private sector should provide monetary management.

---

[1] _General Theory_, p. 267.

Appendix: The Barro Output Equation

A typical Barro output equation, estimated from data in Barro (1978), over the sample period 1948-76 is:[1]

(1) $\log y_t = 5.98 + 1.03 \text{ DMR}_t + 1.18 \text{ DMR}_{t-1} + 0.49 \text{ DMR}_{t-2}$
         $\quad\quad\quad (0.016)(0.23) \quad\quad\quad (0.23) \quad\quad\quad (0.24)$

$\quad\quad\quad + 0.20 \text{ DMR}_{t-3} + 0.55 \text{ MIL}_t + .035 \text{ t}$
$\quad\quad\quad\quad (0.25) \quad\quad\quad (0.11) \quad\quad\quad (.0004)$

$\quad\quad\quad$ SER $= 0.0168$, SSR $= .00622$, DW $= 1.81$

In this equation, y is the level of real GNP, DMR is the unanticipated component of the growth in the money stock, MIL is a measure of the proportion of the prime age male labor force that has been drafted,[2] and t is time. If one adds the current and three lagged values of the actual growth rate of money to the regression (this is equivalent to including the anticipated component of the growth rate of money), the sum of squared residuals falls to .005872. An F-test indicates that the hypothesis that the anticipated component of money contributes to the explanation of the behavior of output, given the inclusion of the variables in (1), is not accepted.

Barro also estimates an equation in which the actual rather than unanticipated growth rates of money serve as regressors, and fails to accept the hypothesis that the coefficients on the anticipated and unanticipated growth rates are the same, for his sample period. I

---

[1]Barro expresses some dissatisfaction over the inclusion of the MIL variable in the output equation.

[2]This sample period was chosen because I later introduce a variable that was only conveniently available over these years.

find that I do accept that hypothesis for the 1948-76 period, but the power of the test is very weak. Further, there is really no good reason to have a null hypothesis that the coefficients on anticipated and unanticipated money are the same, since verticality of the long-run Phillips curve is inconsistent with that view.

As noted in the text, a more relevant question about Barro's results from the viewpoint of activist policy, concerns the time interval over which "unanticipated" is defined. I have constructed a variable 2DMT that is the anticipation, based on information available at the end of period (t-2), of the growth rate of money in period t. The construction is straightforward insofar as the money rule depends on lagged growth rates of money. It also depends on the unemployment rate, for which I formed expectations using Barro's 1977 unemployment equation. Finally, the exogenous variables FEDV, MIL, and MINW[1], were assumed known with perfect foresight. As might be expected, the constructed variable is collinear with DMR (correlation coefficient of 0.65) and DMR lagged once (correlation coefficient of 0.82).[2] As might also be expected, the data are not able to tell us whether the two period ahead unanticipated growth rate of money has significant independent effects on output. Adding the variable $(DM_t - 2\ DMT)$ to the Barro equation (1) reduces the sum of squared residuals from .00622 to .00547. If the current value of the DMR variable is then deleted from the regression, the sum of squared

---

[1] For definitions see Barro (1977, 1978).

[2] The sample period 1948-76 was used because (DM - 2DMT) was available only over that period.

residuals rises only slightly to .00553. Neither variable has a
significant coefficient when both are included in the equation. We
conclude that the data cannot tell us whether only one year ahead or
only two year ahead errors in predicting money or both contribute
to explaining the behavior of output.[1]

---

[1]F tests are inconclusive: given the inclusion of the two year forecast
error, the hypothesis that the DMR variable is irrelevant to the explana-
tion of output is accepted, and vice versa.

BIBLIOGRAPHY

Bagehot, Walter (1906). <u>Lombard Street</u>, London: Kegan Paul.

Barro, Robert J. (1976). "Rational Expectations and the Role of Monetary Policy," <u>Journal of Monetary Economics</u> (Jan.), 1-32.

---------- (1977). "Unanticipated Money Growth and Unemployment in the United States," <u>American Economic Review</u> (March), 101-115.

---------- (1977b). "Long Term Contracting, Sticky Prices, and Monetary Policy," <u>Journal of Monetary Economics</u> (July), 305-316.

---------- (1978). "Unanticipated Money, Output, and the Price Level in the United States," <u>Journal of Political Economy</u> (Aug.), 549-580.

Brock, William A. (1974). "Money and Growth: The Case of Long-Run Perfect Foresight," <u>International Economic Review</u> (Oct.), 750-777.

Bryant, John and Neil Wallace (1978). "Open Market Operations in a Model of Regulated, Insured Intermediaries," Research Department, Federal Reserve Bank of Minneapolis, Staff Report #34.

Bulow, Jeremy and Heraclis Polemarchakis (1978). "Retroactive Money," unpublished, MIT.

Calvo, Guillermo (1978) "On the Time Consistency of Optimal Policy in a Monetary Economy", <u>Econometrica</u> (Nov.), 1411-1428.

Drazen, Allan (1976). "Essays on the Theory of Inflation," unpublished Ph.D. Dissertation, M.I.T.

Eckstein, Otto (1978). The Great Recession. Amsterdam: North-Holland, Chapter 7.

Feldstein, Martin and Laurence Summers (1978). "Inflation, Tax Rules, and the Long-Term Interest Rate," <u>Brookings Papers on Economic Activity</u> (1), 61-99.

Fischer, Stanley (1977). "Long-Term Contracts, Rational Expectations and the Optimal Money Supply Rule," <u>Journal of Political Economy</u> (Feb.), 191-205.

--------------- (1979). "Capital Accumulation on the Transition Path in a Monetary Optimizing Model," forthcoming in <u>Econometrica</u>.

---------------(1979b). "Anticipations and the Non-Neutrality of Money," forthcoming in <u>Journal of Political Economy</u>.

--------------- and Franco Modigliani (1979). "The Real Effects of Inflation," unpublished, M.I.T.

Fisher, Irving (1922). _The Purchasing Power of Money_, New York: Macmillan.

Friedman, Milton (1960). _A Program for Monetary Stability_, New York: Fordham University Press.

----------- (1969). "The Optimum Quantity of Money", in _The Optimum Quantity of Money_, Chicago: Aldine.

----------- and Anna J. Schwartz (1963). _A Monetary History of the United States, 1867-1960_, Princeton, N.J.: Princeton University Press.

Germany, J. David (1978). "Can the Effects of Unanticipated Policy be Estimated?," unpublished, M.I.T.

Ghez, Gilbert and Gary Becker (1975). _The Allocation of Time and Goods Over the Life Cycle_, New York: Columbia University Press.

Keynes, J.M. (1936). _The General Theory of Employment, Interest and Money_. London: Macmillan, 1936.

Kydland, Finn E. and Edward C. Prescott (1977). "Rules Rather Than Discretion: The Inconsistency of Optimal Plans," _Journal of Political Economy_ (June), 473-491.

Lucas, Robert E., Jr. (1973). "Some International Evidence on Output-Inflation Tradeoffs," _American Economic Review_ (June), 326-334.

-----------(1976). "Econometric Policy Evaluation: A Critique" in K. Brunner and A. Meltzer (eds.) _The Phillips Curve and Labor Markets_, Supplement to the _Journal of Monetary Economics_, 19-46.

----------- (1977). "Understanding Business Cycles," in K. Brunner and A. Meltzer (eds.), _Stabilization of the Domestic and International Economy_, Supplement to the _Journal of Monetary Economics_, 7-29.

----------- and L.A. Rapping (1969). "Real Wages, Employment and the Price Level," _Journal of Political Economy_ (Sept./Oct.), 721-54.

Modigliani, Franco (1974). "A Critique of Past and Prospective Monetary Policies", _American Economic Review_ (Sept.), 544-557.

----------- (1977). "The Monetarist Controversy or, Should We Forsake Stabilization Policies?," _American Economic Review_ (March), 1-19.

----------- and Donald Lessard, eds. (1975). _New Mortgage Designs for Stable Housing in an Inflationary Environment_, Federal Reserve Bank of Boston, Conference Series No. 14.

Phelps, Edmund S. (1970). "Money Wage Dynamics and Labor Market Equilibrium", in Phelps (ed.), _Microeconomic Foundations of Employment and Inflation Theory_, New York: W.W. Norton.

---------- (1973). "Inflation in the Theory of Public Finance," Swedish Journal of Economics (March), 67–82.

Poole, William (1976). "Rational Expectations in the Macro Model," Brookings Papers on Economic Activity (2), 463–514.

Sargent, Thomas J. (1976). "A Classical Macroeconomic Model for the United States," Journal of Political Economy (April), 207–237.

---------- and Neil Wallace (1975), "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule," Journal of Political Economy (April), 241–54.

Sayers, R.S. (1957). Central Banking After Bagehot, London: Oxford University Press.

Sidrauski, M. (1967). "Rational Choice and Patterns of Growth in a Monetary Economy," American Economic Review Proceedings (May), 534–44.

Simons, Henry C. (1952). "Rules Versus Authorities in Monetary Policy," in Readings in Monetary Theory, London: George Allen and Unwin.

Small, David N. (1978), "The Endogeneity of Rational Expectations and Labor Supply," unpublished, Northwestern University.

Startz, Richard (1978). "Interest Bearing Demand Deposits," unpublished Ph.D. Dissertation, M.I.T.

Taylor, John B. (1978). "Aggregate Dynamics and Staggered Contracts," unpublished, Columbia University.