INFLATION AND MONETARY POLICY: ANALYTICS OF THE MONETARIST VIEW

*Nidhi Dhamija**

This paper, based on the monetarist perspective about inflation, presents the analytics of devising a stabilization rule under an inflation adjustment mechanism. In doing so, the paper defends the monetarist view about monetary policy as a rule rather than discretion.

I. INTRODUCTION

The main objective of this paper is to devise a stabilization rule under an inflation adjustment mechanism. The inflation adjustment mechanism shows how changes in demand and supply of money affect the rate of change of inflation. The monetarist view about inflation is taken here, i.e. inflation gets determined by the monetary policy being followed. In studying the design of monetary policy, many issues need to be addressed(McCallum,1999). A major issue concerns the targets and the instruments of monetary policy. *Targets* refer to operational variables that take precedence in the actual conduct of policy and inflation targeting is a leading candidate for the provision of a practical guideline for monetary policy. *Instruments* refer to variables that the monetary authorities can actually manipulate in their attempts to achieve specified targets.

The other major issue that arises is: Why do monetary authorities follow a monetary policy rule rather than working on their discretion. Here it will be shown that following a rule leads to minimization of losses.

As far as stabilization is concerned, the monetarists say that there is no real need to stabilize the economy as long as the growth of the money supply follows a simple predictable rule. This paper does the stability analysis using phase diagrams of different money supply rules with an inflation adjustment mechanism and devises a rule that is stabilizing.

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*Lecturer, Department of Economics, Hindu College, University of Delhi, Delhi and Research Scholar, Department of Economics, Delhi School of Economics, University of Delhi, Delhi. The author would like to thank Prof. B.L. Pandit for the help received from him in writing this paper. However, the author alone is responsible for any errors that may remain.

The paper is, thus, divided into three sections. Section II deals with the general issues that arise in monetary policy, i.e. rule vs. discretion debate, what are the targets and what is preferred and also what are the instruments and which is chosen. Section III constructs a simple 'textbook' model of inflation, which incorporates some of Friedman's notions about the demand for money, the basic idea of Phillips curve and effects of inflationary expectations. This arrives at the short run(SR) and then long run(LR) equilibrium combinations of the rate of growth of output, inflation and unemployment when money supply is exogeneously increased. This gives the movement of adjustment from the SR to the LR equilibrium. What it shows is that when expansionary monetary policy is followed, inflation rises in the same proportion as money supply is increased, thus asserting the monetarist view about inflation. Section IV deals with the stability analysis of the dynamics of inflation and money supply. It adopts one inflation adjustment mechanism that is consistent with the empirical behaviour and is a function of money supply and money demand. Using Friedman's money demand function, we arrive at an equation, making the ratio of money demand and money supply a function of the rate of growth of output, inflation and rate of growth of money supply. The stability analysis of different money supply rules is then done using the set of two differential equations in π and μ (i.e. $d\pi/dt$ and $dM^d/M^s/dt$, respectively).

This analysis is then extended to real part of the economy by applying the rule to a modified model that differentiates between actual and full employment outputs.

II. DESIGNING MONETARY POLICY: MAJOR ISSUES

The need for monetary policy, targets and instruments is derived from the desire to pursue that particular monetary policy which is optimal in some sense. For this purpose, we define monetary policy as the manipulation of certain aspects of the economy that are under the direct control of the monetary authority, which are usually called the "policy instruments" so as to attain goals that are considered desirable. Since the choice of an optimal path for policy requires that the "optimal" be defined, it is assumed that the policy maker has some objective function in mind; this is usually called a "goal function".

The traditional approach has been to assume that the policy maker maximizes a social welfare function. But policy makers have their own agenda, have to face certain incentives and constraints and hence have to devise an alternative objective function. The alternative approach is to take into account some of the political or institutional realities that constrain actual policy. Thus, they have to rely on a simpler objective function, viz., the "macro welfare function" defined directly in terms of inflation and output. This is given as following a loss function (Blanchard and Fisher, 1989):

$$L = E\left[\sum_{0}^{\infty}(1+\theta)^{-t}\left(w_p(\pi_t - \bar{\pi}_t)^2 + w_y(y_t - \bar{y}_t)^2\right)/0\right]$$

where w_p and w_y are the weights .

This loss function is quadratic in the expected deviations of both the inflation rate and the level of output from their target values $\bar{\pi}_t$ and $\bar{y}_t$ and discounts future deviations at the rate θ. The quadratic term of output implies quadratic approximation to the welfare loss of being away from $\bar{y}_t$, the equilibrium level of output. The quadratic term in inflation gives welfare costs of inflation.

The standard characterization of the policy maker's objective function puts more weight on the costs of inflation and in doing so, it reflects political realities and heavy political costs of high inflation. In fact, inflation is perceived as costly by people and is costly for policy makers to ignore. Hence in recent years the target variable that takes precedence in the actual conduct of policy is nation's inflation rate. (The target variable is not price level but inflation, i.e. growth rate type target rather than growing-levels type. The growth rate type targets are better because with a levels-type target path, the target variable is forced back towards the present path after any disturbance that has driven it away, even if the effect of the disturbance is itself of a permanent nature. This type of targeting hence entails general macro economic stimulus or restraints and induces extra cyclical variability in demand conditions. Thus, it is desirable not to drive the nominal variables back to present path).

So, the aim of any monetary policy is inflation targeting. The two issues that arise are: (1) whether to follow rule or discretion; and (2) what are the instruments to achieve the target?

Rule vs. Discretion

Discretion implies period-by-period re-optimization on the part of the monetary authority. Rule calls for period-by-period implementation of a contingency formula that has been selected to be generally applicable for an indefinitely large number of decision periods. According to Friedman, the crucial advantage of a rule is said to be that decisions are made in the form of a policy applicable to many distinct cases, not on a case-by-case basis, with such a form of policy making having favourable effects on expectations. Also, he said that a rule that applies in general would on average lead to different and preferrable outcomes than those generated by decision making on a case-by-case basis. Barro and Gordan(1983) identify the same logic. They gave a model where rule led to lesser costs than discretion.

In that model, the policy makers' objective function is a cost for each period: X_t

$$X_t = a/2\,(\pi_t)^2 - b_t\,(\pi_t - \pi_t^e)$$

where the first term is the cost of inflation and the other is the benefit from inflation shock. The benefit from this type of surprise inflation includes expansions of economic activity and leads to unemployment rate below the natural rate. Also, surprise inflation reduces the real value of the government's nominal liabilities. In a discretionary regime, the monetary authority can print more and create more inflation than people expect. But people understand the policy maker's objective and hence adjust their inflationary expectations to eliminate a constant pattern of surprises. In this case, inflation shock only implies average rates of inflation, monetary growth and the corresponding costs of inflation will be higher than otherwise. In these situations, rules can improve matters and the equilibrium rates of inflation and monetary growth can be lowered. Hence, the policy maker controls a monetary instrument, which enables him to select the rate of inflation.

Discretionary Policy

Under discretion, the policy maker treats the current inflationary expectations π^e_t, and all future expectation π^e_{t+i}, for all $i > o$ as given when choosing the current inflation rate π_t. Therefore π_t is chosen to minimize the expected cost for the current period, EXt, while treating π^e_t and all future costs as fixed. So, minimize EX_t where X_t is given before and the solution is:

$$\hat{\pi}_t = \bar{b} / a$$

$$\left(dEX_t / dt = 2 \times a / 2 \times \pi_t - b = 0 \Rightarrow \hat{\pi}_t = b / a\right)$$

People also predict inflation by solving out the policy maker's optimization problem and forecast the solution for π_t. Hence we have

$$\pi^e_t = \pi_t = b / a$$

since $\hat{\pi} = \pi^e{}_t \Rightarrow \hat{\pi}_t - \pi_t{}^e = 0$

$\Rightarrow$ inflation shocks are zero in equilibrium and the cost is :

$$\hat{X}_t = (1/2)(\bar{b})^2 / a$$

Policy under Rule

Rule relates π_t to variables that the policy maker knows at date t. But, everyone knows all previous values of these parameters. Therefore, the policymaker can condition the inflation rate, π_t, only on variables that are known also to the private agents. Therefore, the policy maker chooses π_t and π^e_t together subject to the condition that $\pi^e_t = \pi_t$. Then the cost function is: $X_t = a/2\,(\pi_t)^2$

The best rule hence prescribes zero inflation at all dates,

$$\pi_t{}^* = 0$$

This amounts to a constant growth-rate rule where the rate of growth happens to be zero. Costs under a rule:

$$X_t{}^* = 0$$

Costs under a rule are lower (X_t*) than those under discretion ($\hat{X}_t$). So, discretion is worse than rule.

Also, Friedman's general arguments for rules rather than discretion are that a rule enables the monetary authority to withstand political pressures, provides criteria for judging its performance and ensures certainty about economic policy for private agents.

Choice of Instruments

There are two instruments at the disposal of the monetary authorities - interest rates and money supply. Three major propositions for the choice of instruments are (Poole, 1970):

(i) Monetary policy should set the money stock while letting the interest rate fluctuate, as it will. Its one of the variants is to achieve a constant rate of growth of the money stock and the other variant is to adjust the growth in money stock in response to the current state of the economy like inflation, output, employment, etc.

(ii) Monetary policy can use money market conditions as the director of instrument, i.e. push up interest rate in times of boom and push it down in times of recession, while the money supply is allowed to fluctuate.

(iii) Monetary policy can use both the money stock and the interest rate as instruments.

The academic economists favour the money supply instrument because according to them with this instrument it may be possible to design simple policy rules that are more effective from macroeconomic perspective than are comparable rules with the rate of interest as the instrument.

III. INFLATION: A SIMPLE MODEL

This section looks at a model of inflation (Vanderkamp, 1975) that incorporates Friedman's demand for money function (Friedman, 1971), the idea of Phillips Curve and the effects of inflationary expectations. The simple model has three basic components:

(i) A simple demand for money relation

(ii) A Phillips curve incorporating price change expectations -- in the short run these expectations are constant and in the long run they fully reflect actual inflation.

(iii) A mechanism which equilibrates this system, with real output acting as the equilibrator through its effect on the unemployment rate. The demand for money is assumed to be: $M = aPQ$ (1)

Where M = demand for money

P = overall price level

Q = real output level

Assumptions

(a) Continuous market clearing is assumed and hence M is equal to money supply.

(b) It is assumed that 'a' which is the reciprocal of income velocity of money is constant. The income velocity of money or velocity is the number of times the stock of money is turned over per year in financing the annual flow of income. The above equation is the famous quantity equation linking the price level and the level of output to the money stock.

Since we are interested in the rate of inflation, we differentiate equation (1) logarithmically,

$$\dot{M} = \dot{P} + \dot{Q} \quad (2)$$

The dots represent percent changes; thus

$\dot{P}$ = inflation rate

$\dot{Q}$ = rate of growth of real output.

In this equation, the change in money supply determines the change in nominal income levels. But we do not know how much of this money supply change will go into prices and how much into output. To determine this actual split, we need to add the Phillips curve relation.

$$\dot{P} = a_o + a_1 U^{-1} + \dot{P} \qquad (3)$$

U = unemployment rate and it appears in inverse form because the Phillips curve gives the negative relation between the unemployment rate and the rate of inflation.

$\dot{P}^e$ = expected rate of inflation. The expected rate of inflation is, in general, influenced by the past rates of inflation.

a_1 is positive

a_0 is negative

and these two parameters determine the shape of the Phillips Curve.

We shall distinguish between the SR, in which inflationary expectations are constant (for simplicity $\dot{P}^e = 0$) and the LR, in which inflationary expectations fully catch up with actual inflation experience ($\dot{P}^e = \dot{P}$).

The third component of this model is the equilibrating mechanism, which works by adjustment of the rate of change in output and the unemployment rate. $\dot{Q}^*$ is the (constant) growth rate of real output. When actual output growth exceeds $\dot{Q}^*$, unemployment rate declines, and when the actual output growth is less than $\dot{Q}^*$, unemployment rate increases. Hence we have the equation

$$\dot{U} = b(\dot{Q} - \dot{Q}^*) \qquad (4)$$

How the Model Operates

The system of equations (2), (3), and (4) is represented in Figure 1.

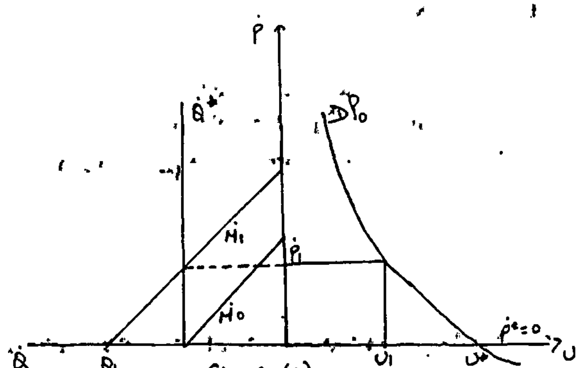

Figure (1)

Say $\dot{M}$ is an exogeneous variable in this system. The vertical axis gives $\dot{P}$. The right hand side of the horizontal axis shows U. Equation (3), i.e. the Phillips relation is shown in this $\dot{P}$-U space at D$\dot{P}$o and the expected rate of inflation $\dot{P}^e$ is shown as a horizontal line (initially assumed to be at $\dot{P}^e = 0$). The left hand side of the horizontal axis represents $\dot{Q}$ with larger rates of output increase further toward the left side. The constant long-term growth rate in output is shown by the vertical line $\dot{Q}*$. In the left quadrant two different rates of money supply increase are shown by lines $\dot{M}_o$ and $\dot{M}_1$. It must be noted that because of equation (2), the $\dot{M}$-lines are at 45^0-angles to the axes; a money supply increase can all be used for inflation or for real output increase or for linear combinations of the two.

The equilibrium solution with $\dot{M}_o$ is: $\dot{Q} = \dot{Q}*$, $\dot{P} = 0$ and U = U*. When $\dot{M}$ is increased from $\dot{M}_o$ to $\dot{M}_1$, the rate of output increase will initially go to $\dot{Q}_1$ because at a moment of time U is given at U = U*. But now $\dot{Q}$ is greater than $\dot{Q}*$ and the rate of unemployment is lowered from U* to U_1. As unemployment goes down we travel up the Phillips Curve and reach a point where $\dot{P} = \dot{P}_1$. When we arrive at this $\dot{P}_1 - U_1$ combination, this process stops and equilibrium is reestablished with $\dot{Q} = \dot{Q}*$, $\dot{P} = \dot{P}_1$ and $U = U_1$. As long as $\dot{P}^e$ stays at zero this will remain the equilibrium situation. But this is SR equilibrium because $\dot{P}^e$ is constant.

For different rates of monetary expansion we can trace out a set of SR equilibrium positions along the DP_0 Phillips Curve. At the same time, in the left hand quadrant, we can trace a series of equilibrium points along the $\dot{Q}*$ line with

$$\dot{P} = \dot{M} - \dot{Q}*$$

While clearly the ultimate cause of inflation stems from the rate of monetary expansion, we require knowledge about the Phillips Curve as well to determine the complete equilibrium configuration.

This situation of $\dot{P} = \dot{P}_1$ and $\dot{P}_e = 0$ cannot sustain itself forever. When this inflation rate remains constant for a long period, $\dot{P}_e$ will come to be equal to $\dot{P}$ therefore, firms and workers will expect that rate to continue.

Look at Figure 2 for the determination of LR equilibrium when the rate of monetary expansion is raised from $\dot{M}_0$ to $\dot{M}_1$.

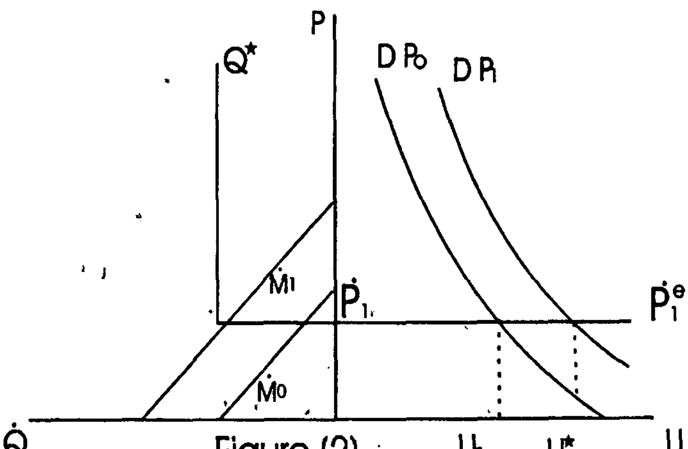

Figure (2)

The initial long-run equilibrium position is at ($\dot{Q}^*, \dot{P}_0 = \dot{P}^e = D, U^*$). After the shift from $\dot{M}_0$ to $\dot{M}_1$, the system will tend to travel in the direction of SR equilibrium ($\dot{Q}^*, \dot{P}_1$ and U_1). While this happens $\dot{P}^e$ will begin to rise and eventually will catch up with the actual inflation experience. Long run equilibrium will be re-established at ($\dot{Q}^*, \dot{P}_1$ and U^*) with P^e having shifted to $\dot{P}_1$.

So, the quantity theory relation holds in the LR with $\dot{P} = \dot{M} - \dot{Q}^*$.

If money supply growth is increased, $\dot{P}$ increases in the same proportion and $\dot{Q}^*$ is constant.

Adjustment Path

Ultimately the rate of monetary expansion determines the rate of inflation in this model but the Phillips Curve plays a very important role in the adjustment process. This role is more important the less rapidly inflationary expectations adjust to actual experience. If $\dot{P}^e$ is constant and does not adjust at all, then monetary policy can be employed to move along the Phillips Curve to the most desired $\dot{P}$ - O combination. While monetary expansion is the moving force, only a good estimate of the Phillips Curve will give us an accurate measure of the trade-off costs between $\dot{P}$ and U.

If price change expectations do adjust then there is a natural unemployment rate U* to which the system will tend in the long run. This natural unemployment rate U* is associated with full employment output level because, at full employment output, there is some amount of frictional unemployment associated with it. This amount of unemployment is called the natural rate (U* here). The natural rate of unemployment is the rate of unemployment arising from normal labour market frictions that exist when the labour market is in equilibrium.

The adjustment path between the two equilibrium situations is shown in Figure 3. If expectations adjust quite slowly, (a) will be the more probable path of adjustment, while rapid expectations adjustment will produce a path such as

(a) If $\dot{P}_e$ slowly reacts to experience, then one can use monetary policy very effectively to reduce unemployment at least for a while. Assuming the temptations of increasing employment in the short run, we would predict a trend of ever-increasing rates of inflation.

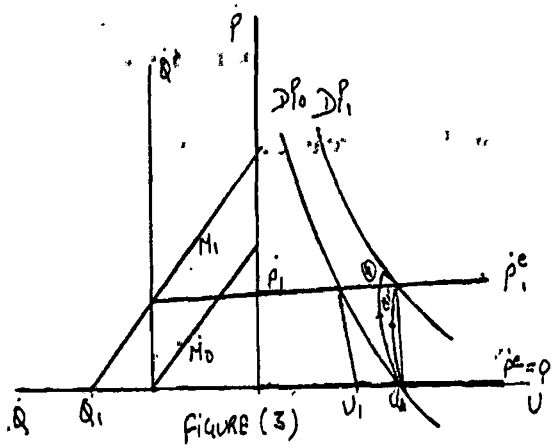

FIGURE (3)

In particular, if the expectations are largely shaped by past inflation, then a policy induced expansion of money supply growth could raise initially employment above the natural rate, at the cost of some initial inflation, by deceiving workers into working more, in the belief that they were offered higher real wages. However, if inflation was kept constant at that level, expected inflation would soon rise toward that level causing employment to move back to the natural rate. Thus, the deviation of employment from equilibrium depends not on the rate of inflation but on the (unexpected) increase in the rate of inflation.

Since the unemployment rate falls back to the natural rate U*, this leads economy to move back to its full employment output level. But the inflation rate is higher than the original rate in the same proportion as growth of money supply has been increased. This can be shown in Figure 4 in the sphere of $\dot{P}$ and $\dot{M}$.

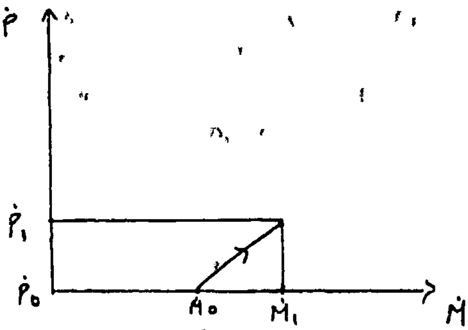

FIGURE (4)

With $\dot{M}_0, \dot{P} = \dot{P}_0 = \dot{P}^e$

With $\dot{M}_1, \dot{P} = \dot{P}_1 = \dot{P}^e_1$,

So, the system moves to a new equilibrium position rather than coming back to the original position. Here the assumption has been that the rate of growth of money supply is exogeneous and constant.

IV. DYNAMICS OF INFLATION AND MONEY SUPPLY: STABILITY ANALYSIS

The inflation adjustment mechanism has to be consistent with the empirical observations about the price behaviour :

(i) When an excess demand for money (excess supply of goods) emerges, it is the rate of inflation that declines rather than prices.

(ii) Money market as well as goods market clearance occurs with a non-zero rate of inflation.

The conventional Walrasian price adjustment mechanism:

$dp/dt = h\,(M^s - M^d),\ h > 0$

where H ⇒ speed of price adjustment. This relates the rate of price change to the excess supply of money. When $M^d > M^s$, prices are falling but not inflation. Hence, this does not satisfy condition (i). Also when market clears, i.e. $M^d = M^s$ this $\Rightarrow dp/dt = O$, i.e. prices are constant and hence inflation is equal to zero. This contradicts condition (ii), which calls for non-zero rate of inflation with market clearance. Hence this mechanism is not taken into account and the alternative mechanism is considered:

$$\pi = \pi^e + h\,[(M^s - M^d)/M^s]$$

$\pi = (dp/dt)/p$, i.e. rate of inflation.

and π^e = expected rate of inflation

This mechanism is also not satisfactory because when $M^d > M^s \Rightarrow \pi = \pi^e +$ (something negative) and does not give whether π is rising or falling. Also it implies that the rate of inflation will always be greater than the expected rate of inflation in periods of excess supply of money. There is no economic reason for this, as we have also seen in the last section that in fact inflation expectations touch the actual inflation rate.

The inflation adjustment mechanism that eventually gets adopted after rejecting the above two is:

$$d\pi/dt = h\,[(M^s - M^d)/M^s],\; h > O \qquad (1)$$

This relates the rate of change of inflation to the proportion of money supply that is in excess supply.

This mechanism satisfies the two above written conditions:

(i) When $M^d > M^s \Rightarrow d\pi/dt < O$

$\Rightarrow$ inflation rate falls.

(ii) When market clears i.e. when $M^d = M^s$, $d\pi/dt = O$

i.e. change in the rate of inflation which means that some non zero inflation is there which is constant now.

Hence, it is consistent with the two requirements listed above. So, we get this one differential equation in π.

To do the stability analysis, we require another differential equation and that we get from Friedman's money demand function.

$$M^d = a\,PQ \qquad (2)$$

i.e. money demand is assumed to be some fraction of nominal output.

$$M^d/P = aQ$$

a $\Rightarrow$ reciprocal of velocity and is constant.

Introduce, $\mu \Rightarrow M^d/M^s = \dfrac{aPQ}{M^s}$

The rates of growth of several variables are:

$$\frac{d\mu/dt}{\mu} = \frac{da/dl}{a} + \frac{dp/dt}{P} + \frac{dQ/dt}{Q} - \frac{dM^s/dt}{M^s}$$

$$= (O + \pi + n - \theta) \qquad (3)$$

Where n = exogeneous rate of growth of real national product and is assumed to be constant.

Q = rate of monetary expansion which is also assumed to be constant here.

Equation 3 $\Rightarrow$ $\dot{\mu} = du/dt = (\pi + n - \theta)\mu$ (4)

Now, we have a set of two differential equations in $\dot{\mu}$ and $\dot{\pi}$ which can jointly determine their time paths.

Now, we take different monetary policy rules to do the stability analysis and to find the rule that would lead to stability.

I: Conventional rule where the rate of growth of money supply is taken to be constant.

The equations are:

$\dot{\pi} = h(1 - \mu)$, $h' > O$ (a)

$\dot{\mu} = (\pi + n\text{-}\theta)\,\mu$ (b)

Putting $\dot{\pi}$ = O and $\dot{\mu}$ = O gives equilibrium conditions:

$$\mu = 1$$

and $\pi = \theta - n$

From the equations (a) and (b) $d\dot{\mu}/d\mu = -h < 0$

$\Rightarrow$ when $\mu > 1$, $\dot{\pi} < O$

and when $\mu < 1$, $\dot{\pi} < O$

$$d\dot{\mu}/d\pi = \mu > O$$

$\Rightarrow$ when $\pi > \theta - n$, $\dot{\mu} < O$

and when $\pi < \theta - n$, $\dot{\mu} < O$

These give directional arrows. All this is plotted in Figure 5.

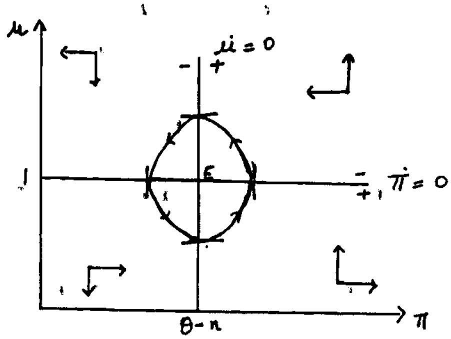

FIGURE (5)

The northward movement across $\dot{\pi} = 0$ passes across (+, 0, -) and an eastward movement across $\dot{\mu}$ = o passes through (-, 0, +) sequence.

E is the unique equilibrium. The directional arrows give E as a vortex equilibrium. Unless the economy is at E, it is impossible to attain equilibrium and hence is unstable.

This was seen in the last section also, that when money supply growth is exogeneously increased, we move to a new equilibrium point and do not come back to it, unless we decrease the money supply growth again. The equilibrium value $\dot{\mu} = 1 \Rightarrow M^d = M^s$, i.e. in equilibrium and since equilibrium rate of inflation is positive this implies $\theta > n$.

i.e. money growth > output growth.

The stability analysis can also be done through finding out the Jacobina value at the equilibrium, i.e. by taking partial derivatives of R.H.S. of equations (1) and (4) with respect to variables π and μ respectively:

$$J = \begin{bmatrix} O & -h \\ 1 & O \end{bmatrix}$$

∴ The Jacobian has trace zero and determinant positive and $(\text{trace } J)^2 < 4|J| \Rightarrow$ the characteristic roots are unstable and equilibrium is positive.

II : $\theta = \theta(\pi)$

i.e. money supply growth is a fraction of inflation and $\theta'(\pi) < O$.

Now the $\dot{\mu}$ equation transforms to:

$\dot{\mu} = [\pi + n - \theta(\pi)]\,\mu$

The other equation remains the same, i.e.

$\dot{\pi} = h\,[(M^s - M^d)/M^s]$

$= h\,(1 - \mu)$

Equilibrium conditions are:

$\dot{\pi} = O \Rightarrow \mu = 1$

and $\dot{\mu} = O \Rightarrow \pi = \theta(\pi) - n$

There is only one value of π say, π_1, that can satisfy the $\dot{\mu} = O$ equation and hence $\dot{\mu} = O$ is still a vertical line.

So, we get the same directional arrows and the same equilibrium as vortex.

The Jacobian for this rule is:

$$J = \begin{bmatrix} O & -h \\ 1-\theta^1 & O \end{bmatrix}$$

$$| J | = h - h\,\theta^1$$

$$= h\,(1-\theta^1) \quad \text{and} \quad \theta^1 < O \text{ and } h > O$$

$\Rightarrow |J|$ is positive and trace = O which is the same result as the last one.

III : $\theta = \theta\,(d\pi/dt)$, $\theta'\,(d\pi/dt) < O$

This rule is proposed by Obst (1978) and is the stabilizing rule.

Equilibrium conditions:

$$\dot{\pi} = O \Rightarrow \mu = 1$$

$$\dot{\mu} = O \Rightarrow \pi = \theta\,(d\pi/dt) - x$$

Now, $d\pi/d\mu = \theta^1\,(\dot{\pi})\; d\dot{\pi} =/du$

$$= \theta^1\,(\dot{\pi})\,(-h) \qquad \text{from} \qquad (a)$$

$$d\pi/d\mu > O$$

Hence slope of $\dot{\mu} = O$ line is positive.

$d\dot{\mu}/d\pi = \mu, > O$ and also $d\dot{\pi}/du = h, < O \Rightarrow$ the original directional arrows are retained, which are plotted in Figure 6.

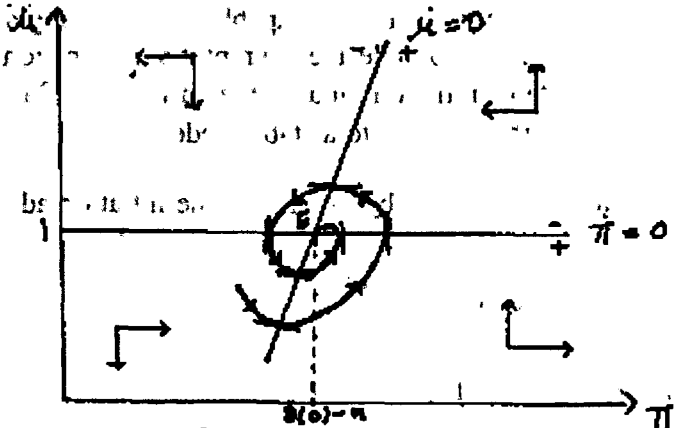

FIGURE (6)

The flatness of $\dot{\mu} = O$ curve depends on θ' ($\dot{\pi}$). Now the trajectories will move towards the equilibrium at $\overline{\mu} = 1$ and $\overline{\pi} = \theta(o) - n$. Hence, vortex is converted into a stable node.

Also,

$$J = \begin{bmatrix} O & -h \\ 1 & h\theta^1 \end{bmatrix}$$

Trace = $h - h\,\theta^1$ and $\theta^1 < O$

$\Rightarrow$ Trace = −ve

and $|J| = O + h$

$= h > O$

$\Rightarrow$ Stable focus.

This result gives that either we can have stable focus or stable node depending on the relative magnitudes of (trace J)^2 and 4|J|. The greater the absolute value of θ'(0) ⇒ the larger the value of trace J and hence (trace J)^2 > 4|J|, thereby giving the equilibrium as stable node.

Thus, the alternative monetary rule is seen to be capable of converting a vortex into a stable focus, thereby making possible the asymptotic elimination of the perpetual fluctuations in the rate of inflation, and with a sufficiently flat $\dot{\mu} = O$ curve it is even possible to turn the vortex into a stable node.

This analysis is extended to real economy by modifying the inflation adjustment mechanism as:

$$d\pi/dt = h\ [(M^s - M^d{}_f)/M^s]$$

where $M^d{}_f$ is full employment demand for money.

The excess full employment supply of money is equal to the size of an inflationary gap. An inflationary gap is usually defined as the excess full employment demand for commodities. Here the excess full-employment supply of money is used instead.

If Q^* = output of which money market clears i.e. $M^d = M^s$.

and Q_f = full employment output

then using $M^d = aPQ$

$$d\pi/dt = h\ [(Q^* - Q_f)/Q^*]$$

$\Rightarrow$ inflation rates increase when money market clearing output is greater than full employment output(the concepts of unemployment in labour, money and commodity markets gets inserted into the basic models by using the notion of an inflationary gap to slightly modify the inflation adjustment mechanism given by equation (1)).

Similarly, we can obtain the following equation from equation (4) :

$$d/Q_f/Q^*)/dt = (\pi + n - \theta)\ (\theta_f/Q^*) \qquad (5)$$

All the stability results of the proceeding discussion hold good because the nature of the set of the equations in the basic as well as the modified model is the same.

Hence, the stabilizing monetary rule ⇒ that θ_f/θ^* and inflation rate will converge to its steady rate.

Since, in equilibrium, $\dot{\mu} = 1$

$$\Rightarrow M^d = M^s$$

which also $\Rightarrow Q_f = Q^*$

giving the result that money market equilibrium output and hence commodities market output will converge to full employment level when the stabilizing monetary policy is followed. Which is not being achieved when the conventional rule, i.e. constant growth rate rule is followed.

V. CONCLUSION

The choice of an optimum stabilization path has been at the centre of the stabilization policy discussion in recent years both at the national and the international level (Modigliani, 1986).

This paper has defended the monetarist view that there is no need to use any stabilization tools and that instead the most effective instrument for stabilizing the economy is to be found out. From the point of view of the monetarists, the essential implication of their empirical assessment is that the velocity of circulation is quite stable. This conclusion establishes the basis for the monetarist contention that provided only the money supply is kept on a steady course, output can be relied on not to stray far from full employment and inflation will also follow a steady and stable path.

This paper has shown that stabilizing monetary policy rule leads to stable equilibrium of inflation rate and output unlike the conventional constant money growth rule-- leading to output at full employment level in the long run but inflation rate increasing in the same proportion as money supply growth has been increased—which does not give a stable equilibrium but gives a vortex.

References

Barro, Robert J. and David B.Gordon(1983), "Rules, Discretion and Reputation in a Model of Monetary Policy", ***Journal of Monetary Economics***, Vol.12.

Blanchard, O.J. and Stanley Fischer (1989), "Monetary and Fiscal Policy Issues", in their ***Lectures on Macro Economics***, Ch.11, MIT Press, Cambridge.

Fischer, Stanley (1990), "Rule versus Discretion in Monetary Policy", in Friedman, Benjamin and Frank Hahn (eds.), ***Handbook of Monetary Economics***, Ch.21, North Holland, Amsterdam.

Friedman, Milton (1971), "A Monetary Theory of National Income", ***Journal of Political Economy,*** Vol.79, March-April.

McCallum, Bennet T. (1999), "Issues in the Design of Monetary Policy Rules", in Taylor, J.B. and M. Woodford(eds.), ***Handbook of Macroeconomics***, Vol.1, North Holland, Amsterdam.

Modigliani, Franco (1986), ***The Debate over Stabilization Policy***, Cambridge University Press, Cambridge.

Obst, N.P. (1978), "Stabilization Policy with an Inflation Adjustment Mechanism", ***Quarterly Journal of Economics***, Vol.92.

Poole, William(1970), "Optimal Choice of Monetary Policy Instrument in a Simple Stochastic Macro Model", ***Quarterly Journal of Economics***, Vol.84.

Vanderkamp, John (1975), "Inflation: A Simple Friedman Theory with a Phillips Twist", ***Journal of Monetary Economics***, Vol.1.