

## CHAPTER - II

### LITERATURE SURVEY

The monetary debate has provided a critical analysis regarding association of "price and output with money supply." The discussion reached a peak at the beginning of 1970's in Milton Friedman's two articles "Theoretical Framework for Monetary Analysis" (1970) and "A Monetary Theory of National Income" (1971).

The debate centres around the role of monetary policy in the matter of influencing real output. Can money supply be tutored so as to affect output? This is the central issue of the debate. The Quantity Theory of Money at the very outset assumes full employment level of output or at best fixed level of output in the short run.

Therefore,  $MV = PT$

where T is always assumed to be fixed for all practical purposes, V, being constant. leads to proportionate change in price level(P) following change in Money Supply(M), since

$$P = \frac{MV}{T}$$

It, therefore, appears that price level rises with the rise in money supply and relative price level remains unchanged. Entrepreneurs find no reason for changing their production. Consequently, output level remains unchanged. Money is, therefore, neutral and it works like a veil.

According to Keynes (1936), the economy can not always remain at the full employment level. Even with underemployment equilibrium is also a possibility. In such case there remains a scope for pushing the output level further towards full employment level. According to him, money supply affects rates of interest. But it is not sure that this will promote investment. If MEC exceeds rates of interest, there may be spurt in investment. On the other hand, Keynes holds that additional money supply in the situation will only put pressure on prices. He even refers to the case of liquidity trap when entire additional money supply goes to match the additional demand for money. As a result, rate of interest remains unchanged at bare minimum level, and investment as well as output level also remain unchanged.

Friedman (1970,71) holds that Monetary policy is not as ineffective as Keynes suggests. He holds that money supply may affect output level in the short run. Monetary policies can influence output and employment only to the extent that they cause price changes that are not foreseen by agents in the private sector. In the long run, the effect on real variables peter out but the higher price level prevails.

Friedman's idea can be explained through the following simple model. Fiscal policy is assumed to be held constant, and monetary policy is the only policy variable affecting the demand for output. For expositional purposes, only the velocity of money is also taken to be constant. With these as options, the aggregate demand for output can be written as

$$M_t + \bar{V}_t = P_t + Y_t \dots\dots\dots (2.1) \text{ (Aggregate demand)}$$

- where  $M_t$  = log of money supply
- $\bar{V}_t$  = log of the constant velocity of money
- $P_t$  = log of the price level
- $Y_t$  = log of real output.

The assumption of a constant velocity of money requires that the demand for money is not responsive to interest rate, but the assumption is not crucial for the subsequent analysis.

The aggregate supply equation can be written as

$$Y_t = Y_p + \beta (P_t - {}_{t-1}P_t^e) \dots\dots\dots (2.2)$$

- where  $Y_p$  = natural (or given) level of output
- ${}_{t-1}P_t^e$  = log of the price level that the people expect for the period t at the end of period t-1.

Output will deviate from capacity output ( $Y_p$ ) only when actual price level differs from that people anticipate at period t-1 that some price level will prevail at period t. If the actual price level at period t exceeds the anticipated price level, representative producers will attribute part of this to an increase in their relative price level and output will be above the trend. On the other hand, if the actual price level is below the level anticipated by the producers, the producers believe that relative price is lower and output will fall below the trend value.

Friedman proceeds further to establish that

- (i) in the long run equilibrium, the actual rate of growth of nominal income is equal to the anticipated rate and these are equal to the rate of growth of money supply, and
- (ii) the deviation of the actual rate of growth of nominal income from the anticipated rate is proportional to the difference between the rate of growth of the money supply and the rate of growth of anticipated nominal income.

Friedman then proceeds to explain why an unanticipated change in the rate of growth of the money supply produces deviation in the rate of growth of nominal income from its anticipated trend rate of growth. In an equilibrium, economic agents hold an optimal level of real cash balances. If, through an unexpected change in the money supply, the actual level of real cash balances deviates from the optimal level, economic agents will alter their expenditure behaviour.

The excess supply of money appears as an excess demand for a broad spectrum of real assets, securities, investment goods, and consumer durables. This leads to an increase in the prices of goods and securities. Consequently, there is an equivalent decline in the effective yields of securities. As a result thereof, a new equilibrium higher level of income is established at which the supply of money again equals the demand for money.

Rational expectationists like Sargent (1975), Lucas (1976) and N. Wallace (1980) do not support Friedman's idea that money supply can affect output in the short run. On the other hand, they hold that change in money supply, if it is already anticipated by the agents, affects only inflation. Real output or employment remain unaltered. Thus, they put forth the famous "Invariance proposition" which asserts that any predictable part of money supply should have no effect on output, employment or any other real variables in the economy. Only unpredictable change in money supply can have effect on output level. The behaviour of price level and inflation rate will be affected by both anticipated and unanticipated parts of money supply. Only those changes in money supply which are not anticipated can affect output level.

In rational expectations models, price expectations are not fixed or predetermined but respond to anticipated movements in the money supply. To illustrate this, we must provide a monetary rule that is utilized by the policy authorities. An example of the rule is given below :

$$M_t = \alpha_1 Y_{t-1} + \varepsilon_t \dots\dots\dots (2.3)$$

where  $E(\varepsilon_t / I_{t-1}) = 0$

Here money supply at time t is a function of the last period's level of output, plus a random, unpredictable stock ( $\varepsilon_t$ ), which neither the policy authorities nor the public can predict. The portion of the money stock based on last periods output ( $\alpha_1 Y_{t-1}$ ) is known to the public and can be thought of feedback policy because it depends on past values of observed variables. The invariance proposition states that the parameter  $\alpha_1$  of the feedback rule that is set by the authorities has no effect on the behaviour of output in the economy.

Only the unanticipated part of money stock ( $\varepsilon_t$ ) will cause output to deviate from its full employment (or capacity or existing) level.

Under rational expectations hypothesis, the price expectations are determined within the model in the light of future developments of the money supply. This can be expressed as

$${}_{t-1}P_t^e = E(P_t / I_{t-1}) \dots\dots\dots (2.4)$$

Now from (2.1) and (2.2) we have,

$$M_t + \bar{V}_t = P_t + Y_p + \beta (P_t - {}_{t-1}P_t^e) \dots\dots\dots (2.5)$$

Taking the mathematical expectations of both sides of the equation (2.5), and using (2.3) and (2.4) we have

$$E(M_t) + \bar{V} - E(P_t / I_{t-1}) = Y_p + \beta [E(P_t / I_{t-1}) - {}_{t-1}P_t^e]$$

or,  $E[\alpha_1 Y_{t-1} + \varepsilon_t] + \bar{V} - {}_{t-1}P_t^e = Y_p + \beta ({}_{t-1}P_t^e - {}_{t-1}P_t^e)$

or,  $\alpha_1 Y_{t-1} + \bar{V} - {}_{t-1}P_t^e = Y_p$  ..... (2.6) [  $\because E(P_t / I_{t-1}) = {}_{t-1}P_t^e$  ]

$$[\because E(\varepsilon_t) = 0]$$

$$\therefore {}_{t-1}P_t^e = \alpha_1 Y_{t-1} + \bar{V} - Y_p \dots\dots\dots (2.7)$$

Again, from equation (2.5)

$$M_t + \bar{V}_t = P_t + Y_p + \beta (P_t - {}_{t-1}P_t^e)$$

or  $\alpha_1 Y_{t-1} + \varepsilon_t + \bar{V} - P_t = Y_p + \beta P_t - \beta ({}_{t-1}P_t^e)$

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$$[\because M_t = \alpha_1 Y_{t-1} + \varepsilon_t]$$

$$\text{or, } \alpha_1 Y_{t-1} + \varepsilon_t + \bar{V} - P_t(1 + \beta) = Y_p - \beta(\alpha_1 Y_{t-1} + \bar{V}) - Y_p$$

$$\text{or, } (\alpha_1 Y_{t-1} + \bar{V} - Y_p) + \beta(\alpha_1 Y_{t-1} + \bar{V} - Y_p) - P_t(1 + \beta) + \varepsilon_t = 0$$

$$\text{or, } (1 + \beta)P_t = (1 + \beta)(\alpha_1 Y_{t-1} + \bar{V} - Y_p) + \varepsilon_t$$

$$\text{or, } P_t = \alpha_1 Y_{t-1} + \bar{V} - Y_p + \frac{\varepsilon_t}{(1 + \beta)} \dots\dots\dots (2.8)$$

Therefore, the gap between the actual price and the expected price is

$$P_t - P_t^e = \frac{\varepsilon_t}{(1 + \beta)} \dots\dots\dots (2.9) \quad (\text{From 2.7})$$

Now substituting eqn.(2.9) in eqn. (2.2), we have,

$$Y_t = Y_p + \frac{\beta}{(1 + \beta)} \varepsilon_t \dots\dots\dots (2.10)$$

The equation (2.10) shows clearly that  $Y_t = f(\varepsilon_t)$  i.e. output is a function of unanticipated part of money supply ( $\varepsilon_t$ ). So, the unanticipated part of money supply ( $\varepsilon_t$ ) affects output. The predictable part of money supply [ i.e.  $\alpha_1 Y_{t-1}$  ] affects prices [ vide equation (2.8) ] but not the level of output. Thus, output fluctuates randomly around the existing level ( $Y_p$ ) with the fluctuations owing to unanticipated movements in the money stock. Therefore, the variation of output level is independent of any predictable counter cyclical (or even procyclical) policy by the monetary authorities. The behaviour of prices will, however, reflect the choice of the feedback rule.

Many studies have taken a time series approach to test the basic postulates of the R.E Hypothesis. Barro (1977) provided some initial evidence that indicated that the R.E. Hypothesis could not be dismissed simply as a theoretical curiosity. His approach was to use past values for money growth and other lagged variables to forecast money growth. These forecast equations were then identified explicitly with agents' expectations of money growth rates. In other words, Barro assumed that economic actors in the economy acted as if they used regression analysis on readily available data to forecast money growth rates. The forecast errors from the regressions predicting money growth were termed, "anticipated money growth" and used to test the hypothesis that fluctuations in unemployment around the natural rate depended only on unanticipated money growth. The natural rate of unemployment was allowed to be affected by variables reflecting minimum wage laws and the draft.

Barro tested his hypothesis by entering the actual money growth rates into the equation to determine if they added significant explanatory power to the regression explaining unemployment in terms of unanticipated money growth. However, it did not happen. So Barro argued that he could not reject the hypothesis that only unanticipated money growth causes unemployment to deviate from its natural rate.

J. Grossman (1979) used nominal Gross National Product (GNP) as a proxy for policy instruments to test the hypothesis that only unanticipated money growth causes unemployment to deviate from its natural rate. Grossman's study used quarterly data as a contrast to Barro's original study on annual data. His study lends support to the invariance proposition.

Mishkin's (1982) own empirical results somewhat support the assumption of rational expectations but generally throw doubt on the neutrality of money assumptions. In addition, Mishkin also found that, with rise in lag-structure, tests of the invariance proposition no longer support the hypothesis.

Gordon (1981) has forcefully challenged the studies claiming to have found support for the invariance proposition. He developed a model of gradual price adjustment. In it the invariance proposition may be obtained as a special case. Money is neutral in Gordon's alternative model in the long run but anticipated money growth may be non-neutral in the short run.

Gordon's empirical work on quarterly data covered the period 1890-1980. His basic finding was that prices did not move one for one with anticipated changes in nominal income as required by the invariance propositions. This finding was also true for the 1890-1930 period during which prices of commodities were more volatile than in the post-war era.

Under rational expectations the real sector of the model is completely independent of anticipated monetary policy. The expected rate of inflation fully reflects any change in the systematic component of the growth of the money supply and this directly raises the actual rate of inflation without any repercussions in the real sector. This result of the R.E. School is known as the "Policy ineffectiveness" proposition and has been the subject of heated dispute (McCallum, 1980).

After a slow start the concept of rational expectations became widely accepted, primarily because it seems to be the 'natural' rate hypothesis in the neo-classical model (McCallum, 1980, p. 917). But many economists disagree with some conclusions of R.E. School. The controversial issue is the policy

ineffectiveness postulate, according to which anticipated demand management policy will be ineffective in influencing unemployment and real output when expectations are formed rationally. However, it was soon pointed out that the policy ineffectiveness is based on not one but two assumptions (Tobin 1980 ; Buiter 1980 ; Frydman 1981 ; Gordon, 1981) ; rational expectations and market clearing prices.

Fischer (1977) constructs a model in the spirit of Sargent and Wallace. It was assumed in the model that expectations were rational but we replaced the market-clearing hypothesis in the labour market by the assumption of multi-period contracts negotiated in nominal terms. These contracts inject an element of short-run wage stickiness in the model. In this context the policy ineffectiveness proposition is found to be invalid. Monetary policy can affect output and employment if the length of the period of the labour contracts is larger than the time it takes the monetary authority to react to changing economic circumstances.

For instance, if the monetary authority increases the money supply (reacting to some recent economic disturbances) during the negotiated time period, this will affect the price level and therefore, the real wage (for the contract period) and in turn employment and real output will be affected. In this model public and private agents have the same information set at any time but the public agent has the larger opportunity set.

W. Pruitter (1980), in surveying R.E. debate, distinguished two types of models : the Walrasian model with frictionless markets and market-clearing prices and non-Walrasian model with sluggish wage and price adjustments. If the Walras type is combined with R.E., the policy ineffectiveness proposition will result. If, on the other hand, a non-Walrasian model is combined with R.E., demand management policy will have real consequences. Such policy will influence employment and output rates.

Clearly, the expectations of future monetary policy do affect wage and price decisions in this model so that it shares some features of the R.E. approach. It also shares some features of the alternative news because it allows some scope for the exercise of market power by big firms and unions. The policy advice based on this theory is similar to the policy advice coming from R.E. models - set money growth targets to maintain a desired long-run inflation rate and stick to it.

Srivastav and Saxena (1968) have taken the indices of money supply and price level for the period 1951-68. They have reported very high correlation between them in India over the period. They argued that money supply has mostly affected price level. Output level was found to be affected insignificantly by the growth of money supply over the period 1951-68.

Sushil Kumar (1972) constructed index numbers taking quotations of uncontrolled prices in the period 1901-1960. He found that quantity theory of money was applicable in India.

Guru (1987) found mixed response of output level and price level changes in money supply over the period 1970-1985. He reported that output level over some short period exhibited positive response to money supply. However, money supply variation over the period affected price level mostly.

Sinha (1990) analysed causal relationships between money supply, nominal income and prices in India during the planning era. He has observed that increase in money supply and nominal income lead to upward pressure on prices. The real income is reported to have negative effect on prices.

Devraj (1993) studied the role of monetary policy in India. He reported an important role of expectations in ensuring effectiveness of monetary policy over the period 1975-85. However, an adaptive expectations process has been adapted in the study.