UNIT 13 MONEY AND THE ECONOMY

Structure

13.0 OBJECTIVES

After going through this unit, you will be in a position to:

- discuss the relationship between money and real income;
- evaluate the Quantity Theory of Money;
- discuss the Keynesian theory of demand for money;
- explain the money supply process and monetary equilibrium;
- bring out the relationship among the quantity of money in the economy, interest rate and expected inflation; and
- assess the applicability of various monetary theories to the Indian situation.

13.1 INTRODUCTION

In the Unit 2 we defined money. In this Unit we will go further try to understand the link between money and other macroeconomic variables (such as inflation, interest rates and output etc.)

We will start with the simple framework which explicitly shows theoretical relationship between money, output and prices and is based on the Quantity Theory of Money. Next we examine the relationship in the context of Keynesian perspective which critically evaluates the Quantity Theory of Money and propounds a different approach. After that we look at the Friedman's restatement of Quantity Theory of Money. Then in subsequent sections, we take the discussion further and examine the relationship empirically between money with interest rate, and of money, output growth, and inflation.

In this Unit, we're going to look at how money is related with other macroeconomic variables, specifically the price level, its rate of change (the inflation rate), the interest rate, and the output level. The idea is that inflation is associated with high rates of money growth. This theory, you'll see shortly, exhibits a strong separation between

real and nominal variables, since we have already discussed how real variables are determined with no mention of the price level or inflation rate. This is the most important feature of Classical theory. We'll also see shortly that the Keynesian theory does not subscribe to this view and considers the real and monetary sectors of the economy to be interdependent, and economists differ about whether it is strength, a weakness, or both.

We start with Quantity Theory of Money which has been hotly debated theory and in its original form quite intuitive. It relates money with nominal income through velocity. Interest rate does not enter the picture explicitly as it is believed to be determined in the real economy.

Then we go to the Keynesian theory which links money with real economy as interest rate as well as output level is theorized to have strong link with money. We also bring in the Friedman's restatement of Quantity Theory of Money to bring in the more recent development in the monetary theory.

13.2 MONEY AND NOMINAL INCOME: THE QUANTITY THEORY OF MONEY

We start this section with the Quantity Theory of Money (QTM) which tried to relate the money with the nominal income. Then we will discuss the Keynesian perspective of the link between the money and other macroeconomic variables.

We start with some pure reasoning that goes back to a few hundred years. Like a lot of good theory, it's based on an analogy. As a start, you should ask yourself what the effect of a two-for-one stock split would be on the price of a stock. Suppose it's now selling for 100, then you'd probably expect it to sell for 50 after a split, unless the split is an indicator of some new information about the firm. The point is that the value of the firm's stock shouldn't depend on anything as arbitrary as the number of shares outstanding: its value is more fundamental than that.

Now suppose we do the same thing with money. This is unrealistically simple (remember, we're doing theory now!) but suppose the government were to replace every rupee with two new rupees, marked so we can tell the difference between old and new rupees. Then we'd expect that prices in terms of new rupees would be twice as high. In short, changes in the money supply executed in this way will be associated with proportionate changes in prices, with no effect on output or employment.

Of course the world is more complicated than this, and monetary policy consists of more than just currency exchanges, but some of the same reasoning applies more generally (or may apply, we'll look at some data shortly). The so-called quantity theory of money is the result of two ideas: that money is not fundamental (pieces of paper don't change the effectiveness of Tata Steel's manufacturing processes or marketing strategies), and that its usefulness is in executing transactions. Let's start with the latter. Suppose we think of Y as all the transactions in the economy and PY is the rupee value of all these transactions (sales revenue). Then we need M rupees of money to make all these transactions each period, or

$$M = P \,.\, Y$$

Note that this equation has the stock-split property: if we double M then we double PY. We can make this more specific by associating transactions Y with real GDP, PY with nominal GDP, and P with the GDP deflator.

A slight generalization is that money can be used several times each period for transactions, as it goes from one person to another. That is,

$$M\,V = P\,.\,Y$$

where V is *the velocity of money*, the number of times each period a unit of money is in a transaction. The assumption of the quantity theory, which dates back to about three hundred years, is that velocity is approximately constant. This equation maintains the stock-split property that increases in M are associated with proportionate increases in PY.

In principle the increase in PY could be in either in P, or Y, or both. Later we'll consider a theory in which Y changes are possible (the Keynesian theory). But for now let's say that Y is not affected by changes in M. The theory behind this in our case is that Y has been determined by the production function and the labor market. That leaves only one thing to adjust when M changes: the price level P. In short, changes in the stock of money lead, in this theory, to proportionate changes in prices.

The same theory can be reinterpreted in terms of the inflation rate, the rate of growth of the price level. To see this, we need to covert the quantity theory relation to growth rates. We take the quantity equation at two different dates and divide, getting

$$(M_t/M_{t-1})\,(V_t/V_{t-1}) = (P_t/P_{t-1})\,(Y_t/Y_{t-1}).$$

For reasons similar to our growth accounting relations mathematically we could write it as

$$(M_t - M_{t-1})/M_{t-1} + (V_t - V_{t-1})/V_{t-1} = (P_t - P_{t-1})/P_{t-1} + (Y_t - Y_{t-1})/Y_{t-1}$$

or

$$m + v = p + y$$

Where lower case characters represent the rate of growth of upper case variables (i.e, for example m refers to the rate of growth of money M and so on for v, p and y respectively).

If *velocity is constant* [i.e. $(V_t - V_{t-1})/V_{t-1} = 0$] we get, approximately, the growth rate of money equals the growth rate of prices (inflation) plus the growth rate of output

$$(M_t - M_{t-1})/M_{t-1} = (P_t - P_{t-1})/P_{t-1} + (Y_t - Y_{t-1})/Y_{t-1}$$

or

$$m = p + y$$

If money growth does not influence output, then higher money growth leads to higher inflation. That's quite obvious. This prediction is overly strong, as we'll see, but the simplicity has some value of its own, including making it easy to remember. As Milton Friedman put it: "Inflation is always and everywhere a monetary phenomenon." It's only after you think about that sentence for a while that you realize it's not as informative as it first sounds and it implicitly has 2 strong assumptions:

i) Constant v, and

ii) M is supposed to have no influence on Y.

Next we move to alternative perspective of relationship of money with other macroeconomic variables due to Keynes. Keynesian model argues for the interdependence of the real and monetary sectors unlike the classical theory of dichotomy between the two.

The Keynesian Perspective on Money

This theory was formulated originally by Keynes in his famous book "*The General Theory of Employment, Interest and Money*" Published in 1936. To understand Keynes theory two questions need to be separated:

a) First, why is money demanded?; and

b) Second, what are the determinants of demand for money?

Both these questions are inter-linked. According to Keynes, demand for money has three components: **transactions demand for money, precautionary demand for money**, and the **speculative demand for money**.

Keynes made the demand for money a function of two variables: namely

i) Money income, or Y; and

ii) Rate of interest, or r;

In functional form:

$M^d = M^d (Y , r)$ *where* $\partial M^d/\partial Y > 0$ *and* $\partial M^d/\partial r < 0$

Keynes retained the Cambridge approach to the demand for money under which demand for money is hypothesised to be a function of nominal income. But, according to him, this only explained the transactionary demand for money & Precautionary demand for money and not the entire demand for money. The revolutionary insight of Keynes has been the speculative demand for money component. Through it Keynes made this part of the demand for money a declining function of rate of interest, which is purely a monetary phenomenon and solely influenced by the monetary influences in the economy. The speculative demand for money arises from the speculative motives for holding money. This arises from changes in the rate of interest in the market and uncertainty about them.

The Transactions Demand for Money: Money is needed to carry out day-to-day transactions due to the discrepancies between receipts of income (say once in a week or a month) and the expenditures of a person. This demand for money is called the transactions demand for money (M^d_t). An individual with higher level of income has a greater demand of goods and services, in general, than an individual with a lower level of income making M^d_t directly related to the level of income (Y).

$M^d_t = M^d_t(Y)$ *where* $\partial M^d_t/\partial Y > 0$

The Classical economists agreed with this and emphasised the role of money as the medium of exchange. However, the precautionary and the 'speculative' demand for money are the Keynes' additional sources of 'liquidity preference', (or demand for money).

For simplicity, we can say that transactionary demand for money, is a constant proportion, k, of the level of national income, Y

i.e.

$M^d_t = k \,.Y = k \,.\, P \,.\, y \qquad 0<k<1$

Precautionary Demand for Money*:* The Precautionary demand for money by individuals and firms arises out of the need for any contingent payments/expenditures for covering events of a more uncertain nature like accidents, prolonged illness, and sudden change in technology forcing firms to replace machinery to stay competitive. Like the transactions demand for money, Precautionary demand for money is also closely and positively related to the level of income. Thus, the Precautionary demand for money is also a function of level of Y:

$M^d_p = g(Y) \qquad where\ \partial M^d_p / \partial Y > 0$

Keynes aggregated the transactionary demand for money and precautionary demand for money together (Figure 13.1) and argued that these two are a stable function of level of national income (nominal). The rate of interest as an important determinant of the demand for money function enters through the third motive: *the speculative demand for money*.

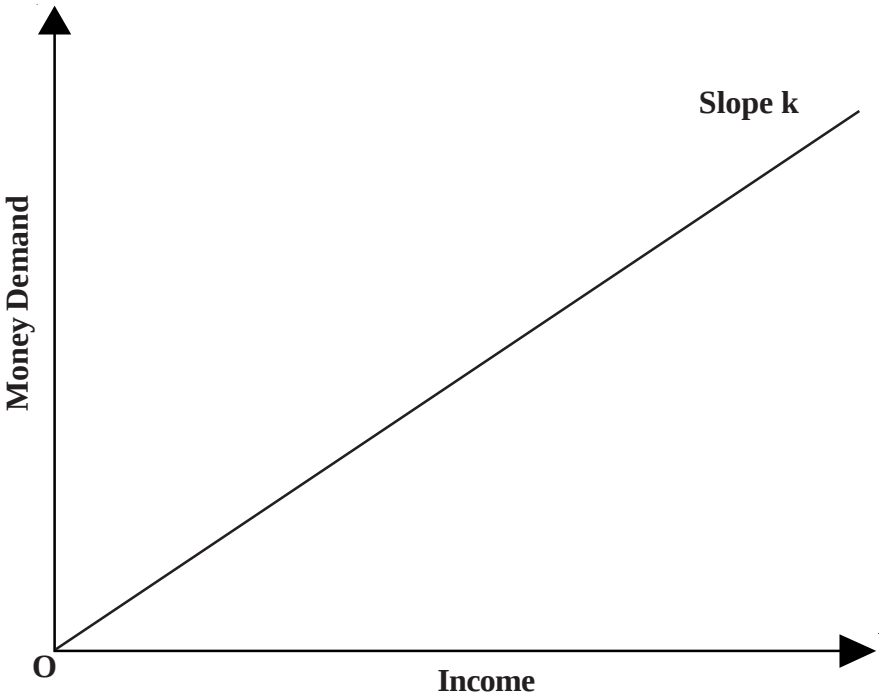

Fig. 13.1: The transactions and precautionary demand for money curve

Speculative Demand for Money: The speculative demand for money is the demand for money as an asset or as a store of value. Through it Keynes made (a part of) the demand for money a declining function of rate of interest. The speculative demand for money constitutes the main pillar of Keynes' revolution in monetary theory and Keynes' attack on classical QTM.

The speculative demand for money arises from the variability of interest rates in the market and uncertainty about them. For simplicity, Keynes assumed that all securities (bonds, debentures, shares etc.) to be of only one type, i.e. perpetual bonds. These perpetual bonds are the only non-money financial assets, which compete with money in the asset portfolio of the public. Money doesn't earn its holders any interest income but its capital value in terms of itself is fixed. Bonds on the other hand, yield interest income to their holders. But this income can be more than wiped out if bond prices fall in future.

Economic agents hold a part of their wealth in the form of financial assets. In the two assets model of money and bonds (perpetual), bond prices keep changing sometime with the change in the rate of interest. Therefore, they are subject to capital gains or losses. Thus, to be a bondholder the return from bond holding per unit period (say a year) per rupee is the rate of interest ± capital gains or loss per year. At the time of making decision about investment in bonds, the market rate of interest will be a given datum to an economic agent, but the future rate of interest gain or loss will have to be anticipated. Hence the element of speculation in the bond as well as the money market comes in.

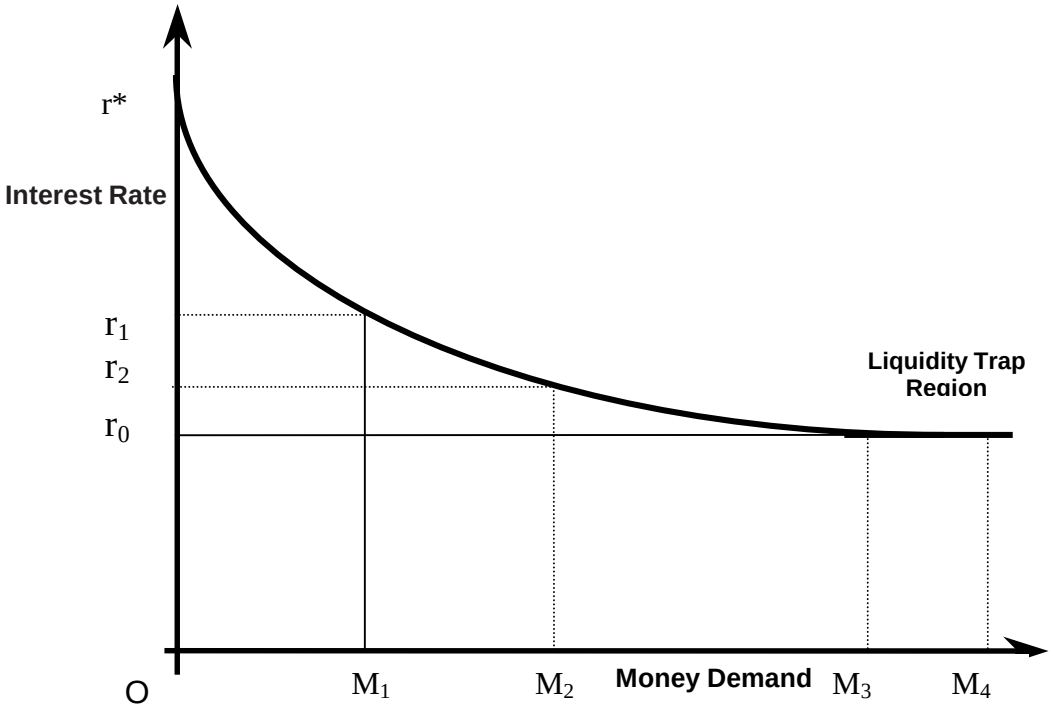

Fig. 13.2 : The speculative demand for money curve

In Keynes' theory, an economic agent holds either money or bonds but not both at any given rate of interest. The speculators are of two types – *bulls and bears*. Bulls are those who expect the bond prices to rise in future. Bears expect these prices to fall. Bulls are assumed to invest all their idle cash into bonds. Bears instead will move out of bonds into cash if their expected capital losses on bonds exceed interest income from bond holding. Thereby they minimise the losses. Thus, the speculative demand for money arises only from bears. These bears accumulate their cash balances to move into bonds when bond prices will rise in future. Thus, at a very low price of bonds, all may be bulls (which mean that 'r' will be quite high). At this point (r*), the speculative demand for money will be equal to zero. But at a lower rate of interest (r_1) (higher bond prices) some bull will become bears and a positive speculative demand for money will emerge (M_1). At a still lower rate of interest (r_2) (still higher bond prices) more bulls will become bears and there will be even higher speculative demand for money (M_2). This is how Keynes' derives his famous downward sloping aggregate speculative demand for money schedule with respect to rate of interest, as shown in figure 13.2. In the extreme, the interest rate could fall so low that no one expects it to fall further. In this case, the demand for the M_{sp} becomes infinitely elastic. A good example of this phenomenon has been the Japanese economy since the mid nineties where the interest rate has been close to zero.

In equation form, speculative demand for money is a function of rate of interest:

i.e. $M^d_{sp} = L(i)$ where $\partial M^d_{sp} / \partial r < 0$

Next we aggregate different components of the money demand function.

Aggregating the Money Demand Function

As noted earlier the transactionary and precautionary demand for money depends on the level of Y. Moreover, this relationship is proportional one, given by the proportionality factor, k. We can, now aggregate the demand for money which is given by

$M^d = k.(P.Y) + L(i)$

i.e. the demand for money has two components – one depending on the level of nominal income and the other on the rate of interest.

Milton Friedman's Modern Version of QTM

Milton Friedman, a Chicago economist, Nobel Laureate, made a restatement of the QTM and referred to it as Monetarism or the New Quantity Theory. Friedman's theory of the demand for money is partly Keynesian and partly Classical (or non-Keynesian). The classical QTM is basically a theory of the general price-level. It is also a theory of money income determination. For Friedman, however, it is primarily a theory of the demand for money. It is non-Keynesian in the sense that Friedman neglects completely Keynes' classification of the motives for holding money and the corresponding component demands for money.

In the Classical macroeconomics, role of money is emphasised as a medium of exchange. Friedman, in his version of the theory, regards money as an asset or a capital good also (similar to Keynes' theory). According to him, wealth can be held not only in the form of (i) money; and (ii) bonds; as analysed by Keynes, but also in the form of (iii) equities, (iv) physical goods (durable and semi-durable consumer goods, structures and real property); and (v) human wealth (h). Human wealth as embodied in human beings in the form of their potential to earn income. Total wealth is one of the key determinants of Friedman's demand for money. In practice, it is very difficult to estimate, especially the wealth in human form. He, to overcome this problem took permanent income as an approximation for wealth.

According to him, the expected rates of return on various forms of wealth, w, was the key determinant of the demand for money.

In short,

$$M^d = f(w, h, p, r-(1/r)(\Delta r/\Delta t), (1/p)(\Delta P/\Delta t))$$

Where

w = Wealth: wealth could be in form of money, bonds, equities, physical goods etc.

h = Human Wealth: It is the personal income earning capacity of a person.

p = Price level

[r-(1/r). Δr/Δ t] = Change in rate of interest

(1/p).Δp/Δ t = Expected inflation

Comparison between Keynesian and Friedman Perspective

Now we shall discuss one issue which makes for the crucial distinction between the Keynesian approach and Friedman's approach, this concerns the stability of the demand function for money. By stability, in this case, we mean that the functional relationship between money demanded and the variable influencing it, is not subject to frequent changes.

According to the monetarist approach, lead by Friedman, the classical demand for money function MV = PY is quite stable. In other words, the velocity of money V is relatively stable. Given the stability of the value of V, the supply of money determines PY in the short run. Indeed, the essence of monetarism is that a change in money supply is the major determinant of nominal income (PY) growth. Monetarism, like the Keynesian multiplier theory (which you studied in earlier units - unit 6) is a theory of determination of aggregate demand. However, according to the monetarists, crudely speaking, "*Only money matters*" in determining aggregate demand while fiscal policy does not. For, given V, it is M that determines nominal income. Suppose V were not stable but an upward rising function of the cost of holding money so that people want to minimise their cash balances. In other words, velocity of circulation of a unit of currency increases per period of time. The government's fiscal policy, by stimulating public expenditure may partially reduce the induced private investment by driving up the rate of interest. This results in an increase in 'V' and hence, correspondingly, in the level of nominal income (i.e. PY). Thus, even without an increase in M, fiscal policy can raise nominal income if V is an increasing function of the rate of interest. The constancy of V as assumed by the monetarists, rules out any importance of the fiscal policy.

However, the volatility of the value of **V** and the existence of liquidity trap, led the Keynesians to raise doubts about the importance of monetary policy. The simple Keynesian system does away with money completely and provides exclusive importance to the fiscal policy in determining the level of aggregate demand of the economy. This is to be expected from a theory which was primarily trying to understand the phenomenon of 'Great Depression' and providing solutions to correct it. In recessionary situations the rate of interest is likely to be quite low due to the demand constraint and if country follows a monetary policy then there is a real danger of getting in the problem of liquidity trap (as Japan has been realizing in the recent times) .

The Keynesian policy makers were at their hey-day in the fifties and sixties. It is sometimes called '*the golden age of capitalism*'. The resurgence of inflation in the seventies, however, gave the monetarists certain respectability. The controversy between the Keynesian and the monetarist theories and policies, however, still continues. However, Samuelson and Nordhaus note that there has been convergence to a certain degree "*from disagreement into the synthesis of modern mainstream macroeconomics*".

Money and Income Relationship

In this sub-section we examine further into the relationship between money, output and interest rate. As we saw earlier the link between the money and the interest rate comes through the money market.

We saw above that money demand is a decreasing function of rate of interest but a rising function of level of income.

Money supply on the other hand may or may not be a function of rate of interest depending on whether money is assumed to be *endogenous* or *exogenous*. In the classical model money is considered to be *exogenous* in the sense the monetary authority has complete control over it. This means it is not affected by the changes in the interest rate. In case of *endogenous money*, the monetary authority has no control over the money supply, and the demand for money determines the supply of money. In real world the situation is a convex combination of the two. This means money supply process is partly controlled by the monetary authority and partly by the money demand. It has been observed that the monetary authority tries to accommodate the expansion in money demand in normal circumstances. However, in the situation of high inflation (or overheating) the central bank uses its control over the interest rate through the instruments of monetary policy available to it to stabilize the economy.

Impact on Output: Once the money supply is altered the interest rate undergoes change. With the interest rate changes the level of investment in the economy undergoes changes. If the rate of interest falls then more investment projects becomes profitable, housing market tends to get a push and the consumer spending of durables (which toady is largely based on credit) tends to go up too. Also the stock markets tend to look up as well. So, on the whole the economy's growth tends to pick up. This policy of expansionary monetary policy as one will expect is adopted in the times of ensuing recession by the central bank in many economies across the world. In recent times, central banks of the US, India, European Union have used this policy to pop up their economies. Japan has been experiencing recession since the early 1990s and the policy of lowering the interest seems to have backfired. What has gone wrong in Japan?

According to Keynesian perspective, money demand becomes perfectly elastic at very low rates of interest (see figure 13.2 above). Keynes referred to this phenomenon as the 'liquidity trap'. At very low rates of interest the speculative demand for money becomes infinite. That means the people in the economy hold on to cash as they believe that the interest rate is so low that it can move in only one direction that is up. The rate of interest in Japan has been close to zero from past few years. So the expansionary monetary policy being followed by Bank of Japan has been ineffective as the interest rate cannot fall below zero. So the demand boosting effect of monetary policy did not happen and the recession lasted much longer for the Japanese economy. It is only in last few quarters that the situations seems to have improved as the Bank of Japan has started changing the course of its monetary policy. The expansionary monetary policy is followed along with the fiscal policy whenever the recessionary pressures build up in an economy.

If one examines the recent experience of India, Europe and the US one could observe that these countries have used the policy of monetary and fiscal stimulus to pop up their economies. The central banks across these economies reduced interest rate (which is nothing but an expansionary monetary policy) to take economy out of recession. In last five years since 2001 he world economy has been growing at very fast pace. The fall in the interest rate as mentioned earlier boosts consumer spending, as well investment demand besides pushing the housing and stock market. This has helped the world economy to come out of recession reducing significantly the volatility which could result from the usual business cycles,

Keynesian Perspective using the IS – LM Framework

Sir John Hicks in 1937 tried to capture the essence of Keynesian analysis using the

now famous IS-LM framework. This basically tries to bring the goods and money market together to determine the equilibrium in the economy. The IS curve indicates the different level of rate of interest and level of income where the goods market is in equilibrium. The LM curve on the other hand shows the different level of rate of interest and level of income where the money market is in equilibrium. The shift in IS curve happen by the changes in fiscal policy (not shown here) and shifts in the LM curve by the monetary policy. Let us concentrate on the money for the time being, we find that the expansionary monetary policy would shift the LM schedule to the right (from LM to LM' in the figure) and as a result the rate of interest will fall (from r to r'). Once the rate of interest falls there will be an impact on the real economy through the investment spending (there will be movement along the IS curve). So investment in the economy will go up and through the multiplier impact the level of income in the economy will go up from Y to Y'.

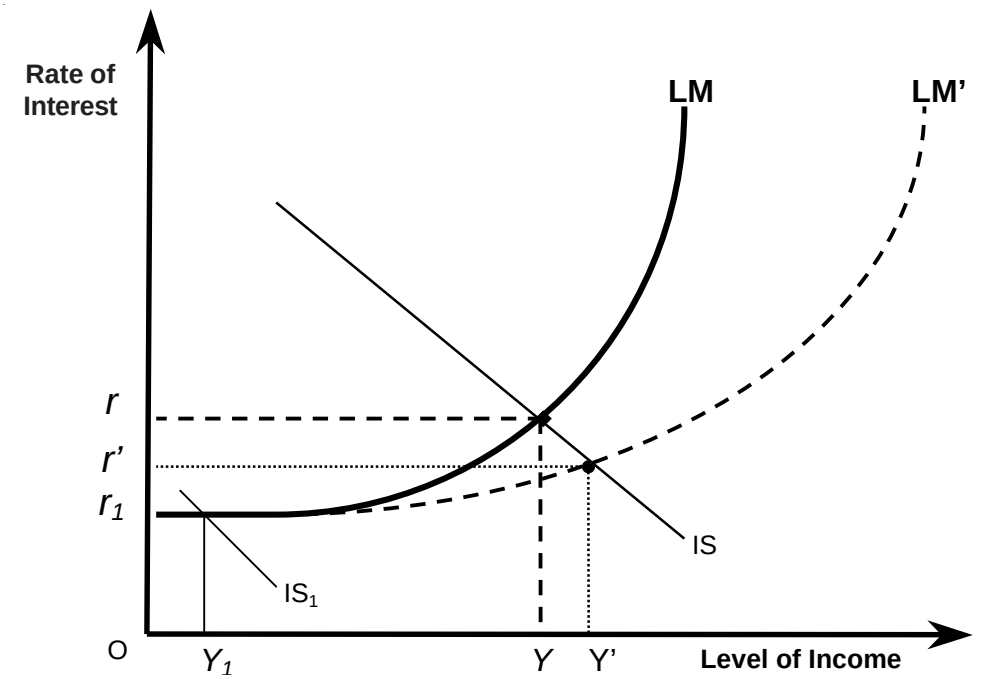

Fig. 13.3: IS-LM Framework

As one could notice from the figure 13.3 at the interest rate r_1 most people in the economy feel it to be at the lowest and expects it to rise, in this situation the monetary policy is ineffective as the interest rate cannot go down any further so the level of income remains unchanged. It is believed that this has been one of the main reasons responsible for the persistence of Japanese recession and earlier in our discussion in this Unit we described it as the problem of 'liquidity trap'. Here the same phenomenon shows off as the horizontal part of the LM schedule. We could notice that if the LM curve shifts there is the level of income remains unchanged at Y_1(see figure 13.3).

So we see in this perspective inspired by Keynesian theory there is strong link between the real and monetary sectors of the economy. The evidence does seem to indicate that the Keynesian perspective to be closer to the empirical evidence.

Check Your Progress 1

1) Explain the traditional Quantity Theory of Money.

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2) Explain the Keynesian speculative demand for money.

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3) Bring out a comparison of the Keynesian theory of demand for money with Friedman's version of the quantity theory of money.

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13.3 THE MONEY SUPPLY PROCESS

The supply of money (M^s) could be assumed to be *exogenous* or *endogenous*. In the exogenous money case, the money supply is determined outside the system. In other words, monetary authority determines the supply of money and banking (or financial) sector, firms and households do not play any role in influencing it.

$M^s = M$ (given, exogenously) Where M^s = supply of money.

However, in the case of endogenous money the banking sector along with firms and households play an important role in influencing the money supply.

If money supply is assumed to exogenous then it is given and is not a function of rate of interest. In the classical model money is considered to be *exogenous* in the sense the monetary authority has complete control over it. This means it is not affected by the changes in the interest rate. In case of *endogenous money*, the monetary authority has no control over the money supply, and the demand for money determines the supply of money. This happens through the money multiplier process.The process works as follows: whenever central banks issues new base money (M0) the money comes to banking system in form of deposits. Then banks keep a very small part of it as reserves and rest they lend it out. What they lend out again comes back to them as deposits and again part of it is kept as reserves and rest is lent out. This process goes on if there is sufficient demand for loans and total money generated in the system would be much larger than M0 (issued by the central bank) as bank deposits are treated as money as well. So now the money demand would largely be demand determined and the behaviour of bank, and banks' borrowers (firm, and household) crucial in this process.

Figure13.4 shows the schedule of exogenous and endogenous money supply process.

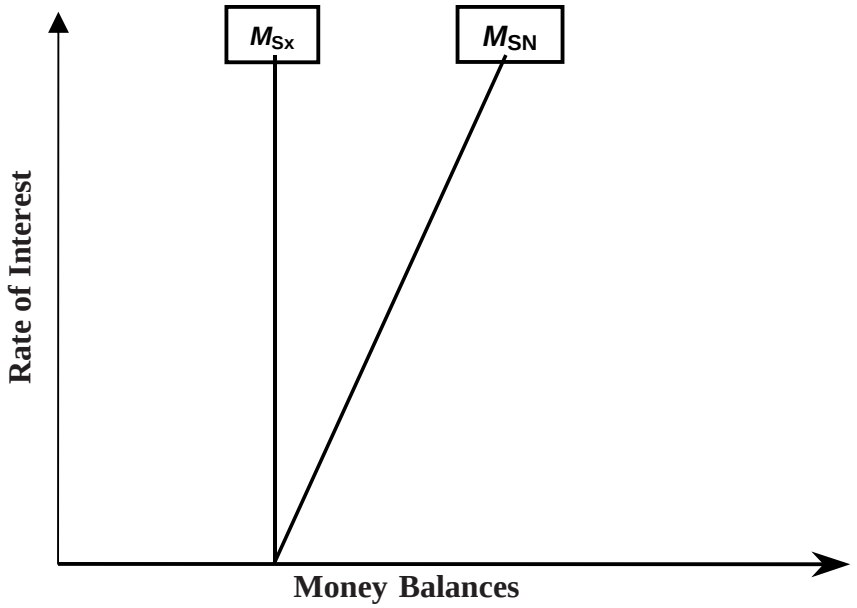

Fig. 13.4: The money supply curves: a) Exogenous money supply (M_{sx}); b) Endogenous money supply (M_{sN})

In real world, however, the situation is more likely to be a convex combination of the two. This means money supply process is partly controlled by the monetary authority (through the instruments of monetary policy) and partly by the money demand from firms and households. It has been observed that the monetary authority tries to accommodate the expansion in money demand in normal circumstances. However, in the situation of high inflation (or overheating) the central bank uses its control over the interest rate through the instruments of monetary policy available to it to stabilize the economy.

$$\frac{M}{H} = \frac{C + D}{C + R}$$

Money Multiplier Model

M = C + D

M = Money Supply C = Currency, R = Reserves with banks
D = Demand deposits H = High powered (Reserve or base) Money

$H = C + R$

$$\frac{M}{H} = \frac{C/D + 1}{C/D + R/D}$$

$$\frac{M}{H} = \frac{cdr + 1}{cdr + rr}$$

Where cdr = currency-deposit ratio rr = reserve-deposit ratio

$$\frac{M}{H} = \frac{cdr + 1}{cdr + rr} * H = mh$$

$$where\ m = \frac{cdr + 1}{cdr + rr}$$

13.4 MONEY MARKET EQUILIBRIUM

Now for the money market to be in equilibrium the demand for money should equal the supply of money, i.e. actual money holding or cash balances of the public should match the total needed or desired balances

Or $M^d = k.P.y + L(i) = M = M^s$

From this equation, it follows that combination of **Y** and **i** must be such that people's demand for money equals the supply of money by the monetary authority

Thus as we see, according to Keynesian perspective, the rate of interest is purely a monetary phenomenon, determined by the demand for and supply of money. This is in sharp contrast to the classical QTM. For them rate of interest is a real variable determined by the commodity market by the equation between the supply of real saving & the demand for investment.

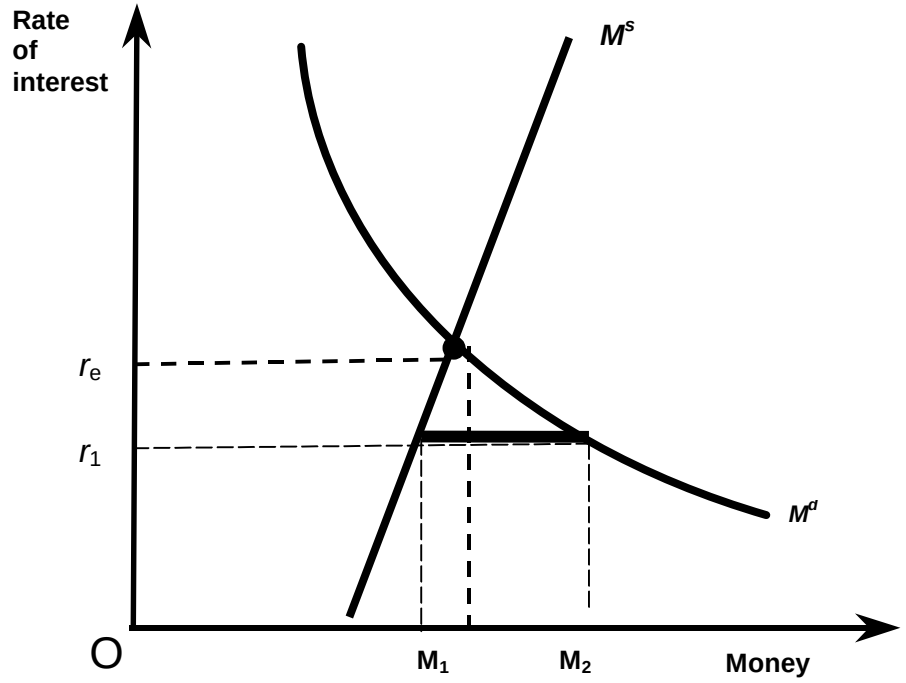

Fig. 13.5: Equilibrium in the money market

Next we bring the M^d and M^s together to determine the equilibrium in the money market. Figure 13.5 shows the M^d and M^s schedule. The dynamics works through the rate of interest. At r1 there is excess demand for money as the interest rate is lower than the equilibrium level. This means there will be too many people holding on to money balances (mainly the speculative). Due to the imbalance between demand and supply there will be pressure on the interest rate to go up. But how will this happen? At lower rate of interest the demand is more than the supply which means the banks will be willing to offer a higher rate of interest to get deposits once that happens the money multiplier will raise the Ms and at higher rate of interest the money demand will go down and this process will go on till the equilibrium gets restored. The reverse will happen in case of rate of interest which is higher than the equilibrium interest rate.

Impact of Changes in Supply of Money

Changes in Money Supply would mean the M^s Schedule in figure 13.6 will shift to $M^{s'}$, what would be its consequences? Increase in supply of money would push

down the rate of interest in the money market which would make the bears active. As a result of this the *speculative demand for money* would start rising till the point where the excess supply of money gets absorbed by the rise in the demand for money and the equilibrium is restored in the money market at r_1 (lower rate of interest) and M_1 (higher quantity of money) levels.

In the figure, one can see that to raise the interest rate the central bank need to use the contractionary monetary policy and to reduce the interest rate the expansionary monetary policy.

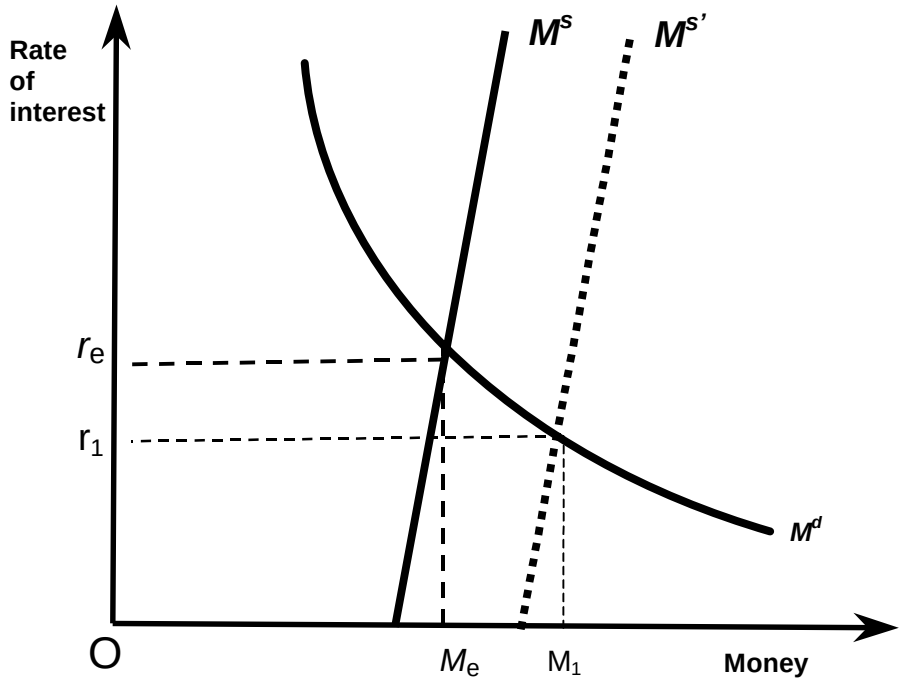

Fig. 13.6: Equilibrium in the money market

Next we turn to further analysis of money and its linkages with interest rate and level of output.

Check Your Progress 2

1) Explain the supply of money through the money multiplier process.

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2) Explain the concept of equilibrium in money markets.

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3) What would be the effect of an increase in money supply on the equilibrium in money markets?

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13.5 MONEY, INTEREST RATE AND INFLATION: FISHER'S HYPOTHESIS

The **Fisher hypothesis** is the proposition by Irving Fisher that the real interest rate is independent of monetary measures. The Fisher equation is

$r_n = r_r + ð^e$.

This means, the nominal interest rate (r_n) equals the real interest rate(r_r) *plus* expected inflation ($ð^e$). Therefore, if ð*e* rises, so must r_n, if you assume r_r to be constant. This is known as the *Fisher effect*

Fisher Effect: The one for one adjustment of the nominal interest rate to the expected inflation rate.

According to the principle of *monetary neutrality* due to *the classicals*, an increase in the rate of money growth raises the rate of inflation but does not affect any real variable. An important application of this principle concerns the effect of money on interest rates. Interest rates are important variables for macroeconomists to understand because they link the economy of the present and the economy of the future through their effects present and future consumption. Also there is a link between real and monetary sectors through interest rate as we in Keynesian perspective.

To understand the relationship between money, inflation and interest rates we need to understand nominal interest rate and real interest rate. The nominal interest rate is the interest rate you hear about at your bank. If you have a savings account, for instance, the nominal interest rate tells you how fast the number of rupees in your account will rise over time. The real interest rate corrects the nominal rate for the effect of inflation in order to tell you how fast the purchasing power of your savings account will rise over time. The real interst rate is the nominal interest rate minus the expected inflation rate.

Real interest rate = Nominal Interest Rate – Expected Inflation Rate

Or in other words

Nominal Interest Rate = Real interest Rate + Expected Inflation Rate

If inflation permanently rises from a constant level, let's say 4 percent a year, to a constant level, say 8 percent a year, that currency's interest rate would eventually catch up with the higher inflation, rising by 4 points a year from their initial level. These changes leave the real return on that currency unchanged. The Fisher hypothesis argues that in the long-run, purely monetary developments will have no effect on that country's relative prices. We will examine this empirically in the context of Indian economy later

Applications: Money in the Depression

One of the many unusual events of the 1930s is that the stock of money (think of this as M_3) actually fell by 35 percent between March 1930 and March 1933. Some economists (notably Milton Friedman and Anna Schwartz) have argued that this decline was one the major factors in the Depression, and point to a 30 percent decline in the price level (deflation). Interestingly, while the stock of money fell, the monetary base rose by about 20 percent.

What happened? Clearly the money multiplier fell, but why? Two reasons stick out.

i) There was a great deal of uncertainty about the health of the banking system. One of the consequences was a sharp increase in the currency-deposit ratio as people pulled their money out of banks.

ii) Banks held large excess reserves, in anticipation of runs, and the Federal Reserve (in one of the dumb-headed moves of all time) increased reserve requirements to match. Thus both excess reserves as well as cash reserve ratio (CRR) rose and this led, as in our theory, to a sharp decline in the money multiplier (see Appendix).

Problems with the banking system in the 1930s led to changes in banking legislation in the U.S. that are still important today: Glass-Steagall Act, deposit insurance, and so on. Many other countries taking from the U.S. have adopted similar measures. Reports from the 1930s sounded, in some ways, much like the late 1980s early 2000s but none of these resulted in any depression situation due to the better understanding of the linkages between the real and monetary sectors of the economies by economist and policymakers.

Application: Money Growth and Hyperinflations

In the low inflation countries there is debate about the best policy, but in some countries there is little doubt that a constant growth rate rule is better than what they have. In the last decade, Argentina, Bolivia, Brazil, and Israel have experienced hyperinflation situations (situation of very high rates of inflation). Russia in the nineties also experienced very high rates of inflation. We can confidently expect several more over the years.

But why did it happen? If the relation between money growth and inflation is so clear, why don't these countries simply print less money? If only it were so easy! The real problem most of these countries have had was a large fiscal deficit. Let's think how that influences monetary policy. If a government is running a deficit, then it must issue IOU's of some sort to pay for it. Roughly, speaking, they may issue money (rupee notes or their local equivalent) or interest-bearing debt (treasury bills and notes) denoted with the B. Mathematically we can express this as

$$P_t(G_t - T_t) = \Delta M_\tau + \Delta B_t,$$

Or

$$G_t - T_t = \Delta M_t/P_t + \Delta B_t/P_t$$

where the two terms on the right are issues of new money (ΔM) and new interest-bearing debt (ΔB), respectively. This is an example of a government budget constraint: it tells us that what the government doesn't pay for with tax revenues, it must finance by issuing debt of some sort.

So why do these countries increase the money supply? The problem, typically, is

that a political impasse makes it nearly impossible to reduce the deficit. Given the government's budget constraint, it must then issue debt. Now for OECD countries' debt there is apparently no shortage of ready buyers, but the same can't be said for Argentina, Brazil, or Russia and many other developing countries. If they can't issue debt and they can't reduce the deficit, the only alternative left is to print money and the only option to raise resources: in short, when they can't pay their bills any other way, they pay them with money, which is easy enough to print. The effect of this, of course, is that these countries experience extremely high rates of inflation.

Note that whenever a central bank prints "fresh money" it can obtain goods and services in exchange for these new pieces of paper. The amount of goods and services that the government obtains by printing money in a given period is called "seignorage". In real terms, this quantity of goods and service is given by the following expression:

$\text{Seignorage}_t = \Delta M_t/P_t$ = New bills printed in period t/Price level during period t.

The monetary aggregate that the central banks control directly is the "monetary base" consisting of currency in the hands of the public and reserves of the commercial banks deposited in the central bank. Thus, when we refer to a central bank as "printing more money", we mean increasing the monetary base.

Note that since the government, by printing money, acquires real goods and services, seignorage is effectively a tax imposed by the government on private agents. Such a seignorage tax is also called the inflation tax. The reason is the following. From the definition of seignorage:

$$\text{Seignorage}_t = \Delta M_t/P_t = (\Delta M_t/M_t)\,(M_t/P_t)$$

Since the rate of growth of money ($\mathbf{\Delta}M/M = m$) is equal to inflation (p) (assuming, for simplicity, that the rate of growth of output y is zero), we get:

$$\text{Seignorage}_t = p_t\,(M_t/P_t)$$

In other terms the inflation tax is equal to the inflation rate times the real money balances held by private agents. This makes sense: the inflation tax must be equal the tax rate on the asset that is taxed times the tax base. In the case of the inflation tax, the tax base is the real money balances while the tax rate at which they are taxed is the inflation rate. In other terms, if I hold for one period an amount of real balances equal to M_t/P_t, the real value of such balances (their purchasing power in terms of goods) will be reduced by an amount equal to $p_t\,(M_t/P_t)$ after one period. The reduction in the real value of my monetary balances caused by inflation is exactly the inflation tax, the amount of real resources that the government extracts from me by printing new money and generating inflation.

Some claim that inflation is actually a 'fiscal' phenomenon. To understand better why inflation is a *fiscal phenomenon*, note again that a government with a budget deficit can finance it either by monetizing it (i.e. by printing money – that leads to seignorage or the inflation tax) or by issuing public debt:

$$P\,(G-T) = \Delta M + \Delta B = p\,(M/P) + \Delta B$$

Note also that countries such as Argentina, Bolivia, Brazil and Israel had very high inflation rates in the 1980s. Now, if inflation was purely a monetary phenomenon caused *in the first place* by an *exogenous* excessive rate of growth of money, these countries could have reduced inflation quite fast by printing less money and reducing the growth rate of the money supply. Instead, all these countries had a

really hard time in reducing their inflation rates. So, if inflation was due to an exogenous high growth rate of money, why didn't these countries print less money? The main problem was that these countries had large structural budget deficits and printed money to finance it. In this sense, the excessive growth rate of money that led to seignorage and caused inflation was not exogenous but rather endogenous and *caused* itself by the need of these governments to finance their budget deficits.

Note, however, that these countries could have in principle avoided the high inflation if they had cut their budget deficits (thus reducing the need for seignorage revenues) and/or if they had financed their budget deficits by issuing bonds rather than by printing money. This leads to the further question: why weren't the deficits reduced and/or why weren't the deficits financed by issuing bonds?

Budget deficits are often very hard to reduce for political and structural reasons. Conversely, increasing seignorage revenues is much easier as it implies printing new money, an executive action rather than a legislative action as in the case of traditional taxes. Of course, seignorage is as much of a tax as regular taxes but it is politically more hidden (at least at low levels of inflation) as the effect of higher money growth leads to higher inflation only slowly over time.

For what concerns the possibility of (non-inflationary) bond financing rather than (inflationary) monetary financing of the deficits, there are several obstacles to such a policy option in many developing countries.

1) Bond markets are not very well developed (and in some cases altogether absent) in many countries.

2) Citizens are concerned about buying nominal long-term bonds issued by the domestic government because an unexpected increase in inflation by the government would lead to a fall in the real value of these bonds (that is equal to a wealth tax on the public holdings of such bonds).

3) Bonds indexed to inflation and/or short-term bonds that pay returns close to current market rates are still subject to default risk if the government decide to renege on its obligations.

4) The ability to borrow abroad and/or issue bonds denominated in foreign currency in international capital markets may also be limited by the default risk of the country.

5) Even when some bond borrowing may be available either domestically or abroad, governments may not be willing to issue such bonds. In fact, bond financing is more expensive than monetary financing (seignorage) since governments do not pay interest on their monetary liabilities while they have to pay interest (high ones if inflation is high) on their borrowing.

6) Borrowing by issuing debt means that the stock of debt goes up every year by the amount of the flow debt financing: $B_{t+1} = B_t + \Delta B_t$. This growth of debt may be very costly and could lead to debt trap in the long-run. In fact, if the public debt grows a lot (relative to GDP), at some point private agents might become unwilling to buy new debt (or even roll-over old debt that comes to maturity) as high debt increases the probability that the government might at some point default on its debt obligations. So, if such a panic occurs and the private sector refuses to buy new debt and/or renew the old one, a government with a structural budget deficit will eventually be forced to start printing money and thus create inflation.

Therefore, in face of a structural deficit, trying to reduce inflation today by issuing bonds rather than printing money will just lead to higher debt in the future that will eventually force the government to monetize the deficit (when the debt constraint is hit) and thus will cause inflation in the future. Again, inflation becomes a fiscal phenomenon and there is no escape from it if the underlying deficit problem is not solved: attempts to reduce current inflation by issuing bonds only implies that future inflation will be higher when the ability to issue debt is exhausted and the government is forced to switch to a monetary financing of the deficit.

Therefore, while the near proximate cause of high inflation is always *monetary* as inflation is associated with high rates of growth of money, the true structural cause of persistent high inflation is likely to be *fiscal* deficit that is not eliminated with cuts in spending and/or increases in (non-seignorage) taxes.

Evidence from India

According to classical theory, real output (Y) and the real interest rate (r) are determined in the real side of the economy. The money stock governs the price level and the rate of inflation. In conjunction with the real side of their theoretical economy, the quantity theory states that higher money growth is associated with higher inflation and nominal interest rates. As was argued by Keynesians, this complete separation between real variables and inflation is overly strong, especially in the short run, but it illustrates the potentially important long-run effects. Does it hold for the Indian economy? We examine this contention by looking at some empirical evidence.

Here's how the theory goes in practice. The first prediction can be expressed two ways: velocity is approximately constant or (this follows from the quantity equation) the price level mimics the money stock adjusted for output growth. In logarithms,

$log\ P_t = log\ M_t - log\ Y_t + log\ V_t$.

By assumption V is constant, so if M is growing faster than Y we should see a comparable rise in the price level. Do we?

It seems that the assumption of constant velocity is borne out in reality in the Indian monetary situation. Most of the increase in the price level over the past thirty years has been associated with a comparable increase in the broad stock of money. There are, however, some fluctuations in velocity over the short run. The velocity with respect to narrow money has fluctuated in the range of 6 to 7 but since the mid-eighties it has been coming down continuously. The econometric results using the techniques of unit roots (you need not bother with the details) tend to confirm this. As far the velocity with respect to broad money is concerned it has been falling more steadily. This means that the broad money has been growing at a faster rate than the nominal GDP in the context of Indian economy.

As far as annual growth rates of nominal income and money are concerned, we know that in terms of the theory, the prediction is that they move closely together.

In the Indian case the two do sometimes move together but many times they do not. And as expected, the growth rate of broad money is mush faster than the rate of growth of broad money, except in 5 years of the last 35 years.

$$(P_t - P_{t-1})/P_{t-1} = (M_t - M_{t-1})/M_{t-1} - (Y_t - Y_{t-1})/Y_{t-1}$$

Or

$$p = m - y$$

If one assumes velocity to be constant then the relation between money and nominal GDP should be fairly close. We find in the Indian context that the connection between money growth and inflation is much looser for these short-run movements. In this sense, the theory seems better at predicting long-run tendencies but certainly nor for short-run fluctuations.

Our second prediction concerns the link between inflation and the interest rates. In the theory we saw that the real interest rate was determined by saving and investment schedules. In principle these curves, and hence the real rate of interest, can move about over time. For example, as government deficits vary, the nominal interest rate will move around for a second reason: because expected rates of inflation vary.

In India, inflation rose during the seventies, peaked above 15 percent in 1973-4, and 1974-5, declined sharply, and rose again at about 14 percent in 1979-80 and around 12-13 percent in 1979-80 and 1980-1, rose again in early 1990s to over 12 percent. The pattern in short term interest rates show close association with inflation since the mid-eighties. However, for the long term interest rate the association is not as close.

As a rough approximation, at least, nominal interest rates do show some association with rates of inflation. There are still, though, some significant short-run deviations. Note in particular that growth rates of real rate of interest, measured as the difference between the growth rates of inflation and interest rate show wide fluctuations in this period.

Thus the classical QTM seems to provide a reasonably good guide to long-run trends in inflation and interest rates. In the short-run, though, something more complex seems to be going on, which the classical theory is not able to explain very well. That's where the Keynesian theory comes in as it provides a better understanding of these short-term fluctuations as discussed earlier.

Check Your Progress 3

1) Explain the Fisherian hypotheseis and the Fisher equation of the relationship between interest rates and inflation.

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2) What is seignorage? How does it work?

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3) Discuss the evidence from India regarding the applicability of quantity theory of money.

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13.6 LET US SUM UP

In our discussion of link between money with macroeconomics variables we saw that the Classical theory argues that there is complete separation between real and monetary sectors of an economy. There is, by design, no effect of money growth on real output or the real rate of interest.

In the Classical theory, inflation is driven by money growth (the QTM) and nominal interest rates by inflation (the Fisher relation).

In the data, the classical theory's predictions look better for long-run trends than for short-run fluctuations. The Keynesian perspective is found to be better at understanding the short run dynamics.

So according to the Keynesian theory there is strong link between the real and monetary sectors of the economy. The empirical evidence does seem to indicate that the Keynesian perspective to be closer to the empirical evidence. However, this link tends to get disturbed in the two situations:

1) In the situation of hyperinflation, money tends to loose its function as medium of exchange forcing the economy to go back to barter system severely increasing the transactions cost of the production process in the economy by requiring double coincidence of demand (as happened in Germany, Brazil, Russia etc. in last century).

2) If the economy is characterized by the situation of liquidity trap as the interest rate comes to its lowest level and cannot fall further making monetary policy ineffective. Japan is a classic example for this;

After the Keynesian theory, the unit presented Friedman's version of the quantity theory of money. The unit then went on to draw a comparison between the Keynesian theory and Friedman's theory. Finally the unit moved on to a discussion of the Fisherian hypothesis regarding interest rates and inflation. The unit then discussed applications of the theories to situations of depression and hyperinflation, and explained the process of seignorage. Finally evidence from India was assessed regarding the applicability of various theories to India and the Indian experience with inflation and movements in monetary variables over time.

13.7 KEY WORDS

Currency : coins and paper money.

Desired Currency to Deposit Ratio : the amount of currency the public wishes to hold as a fraction of demand deposits

Desired Excess Reserve Ratio : the amount of excess reserves banks wish to hold as a fraction of demand deposits.

Endogenous Money Supply : the upward sloping money supply curve that results when the determinants of money supply, notably the currency to deposit ratio and the desired excess reserve ratio are endogenous and depend on economic variables like interest rates.

Monetary Base : currency in the hands of the public plus commercial bank reserves, also called high powered money

Money Multiplier : it determines the factor by which the money stock (currency plus deposits) changes as a result of change in the monetary base.

Velocity : the number of times that the average unit of money changes hands in one year.

3.8 SOME USEFUL BOOKS

Bhaduri, A. (1986), *'Macroeconomics – The Dynamics of Commodity Production'* McMillan, India, New Delhi.

Mishkin, Frederic S. (1998) *'The Economics of Money, Banking and Financial Markets'* Addison-Wesley, Reading.

13.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) See Section 13.2 and answer.
2) See Section 13.2 and answer.
3) See Section 13.2 and answer.

Check Your Progress 2

1) See Section 13.3 and answer.
2) See Section 13.4 and answer.
3) See Section 13.4 and answer.

Check Your Progress 3

1) See Section 13.5 and answer.
2) See Section 13.5 and answer.
3) See Section 13.5 and answer.