Chapter 3

Money and Banking

Money is the commonly accepted medium of exchange. In an economy which consists of only one individual there cannot be any exchange of commodities and hence there is no role for money. Even if there are more than one individual but they do not take part in market transactions, such as a family living on an isolated island, money has no function for them. However, as soon as there are more than one economic agent who engage themselves in transactions through the market, money becomes an important instrument for facilitating these exchanges. Economic exchanges without the mediation of money are referred to as *barter exchanges*. However, they presume the rather improbable *double coincidence of wants*. Consider, for example, an individual who has a surplus of rice which she wishes to exchange for clothing. If she is not lucky enough she may not be able to find another person who has the diametrically opposite demand for rice with a surplus of clothing to offer in exchange. The search costs may become prohibitive as the number of individuals increases. Thus, to smoothen the transaction, an intermediate good is necessary which is acceptable to both parties. Such a good is called money. The individuals can then sell their produces for money and use this money to purchase the commodities they need. Though facilitation of exchanges is considered to be the principal role of money, it serves other purposes as well. Following are the main functions of money in a modern economy.

3.1 Functions of Money

As explained above, the first and foremost role of money is that it acts as a *medium of exchange*. Barter exchanges become extremely difficult in a large economy because of the high costs people would have to incur looking for suitable persons to exchange their surpluses.

Money also acts as a convenient *unit of account*. The value of all goods and services can be expressed in monetary units. When we say that the value of a certain wristwatch is Rs 500 we mean that the wristwatch can be exchanged for 500 units of money, where a unit of money is rupee in this case. If the price of a pencil is Rs 2 and that of a pen is Rs 10 we can calculate the relative price of a pen with respect to a pencil, viz. a pen is worth

10 ÷ 2 = 5 pencils. The same notion can be used to calculate the value of money itself with respect to other commodities. In the above example, a rupee is worth 1 ÷ 2 = 0.5 pencil or 1 ÷ 10 = 0.1 pen. Thus if prices of all commodities increase in terms of money which, in other words, can be regarded as a general increase in the price level, the value of money in terms of any commodity must have decreased – in the sense that a unit of money can now purchase less of any commodity. We call it a deterioration in the purchasing power of money.

A barter system has other deficiencies. It is difficult to carry forward one's wealth under the barter system. Suppose you have an endowment of rice which you do not wish to consume today entirely. You may regard this stock of surplus rice as an asset which you may wish to consume, or even sell off, for acquiring other commodities at some future date. But rice is a perishable item and cannot be stored beyond a certain period. Also, holding the stock of rice requires a lot of space. You may have to spend considerable time and resources looking for people with a demand for rice when you wish to exchange your stock for buying other commodities. This problem can be solved if you sell your rice for money. Money is not perishable and its storage costs are also considerably lower. It is also acceptable to anyone at any point of time. Thus money can act as a store of value for individuals. Wealth can be stored in the form of money for future use. However, to perform this function well, the value of money must be sufficiently stable. A rising price level may erode the purchasing power of money. It may be noted that any asset other than money can also act as a store of value, e.g. gold, landed property, houses or even bonds (to be introduced shortly). However, they may not be easily convertible to other commodities and do not have universal acceptability.

3.2 Demand for Money

Money is the most liquid of all assets in the sense that it is universally acceptable and hence can be exchanged for other commodities very easily. On the other hand, it has an opportunity cost. If, instead of holding on to a certain cash balance, you put the money in a savings account in some bank you can earn interest on that money. While deciding on how much money to hold at a certain point of time one has to consider the trade off between the advantage of liquidity and the disadvantage of the foregone interest. Demand for money balance is thus often referred to as liquidity preference. People desire to hold money balance broadly from two motives.

3.2.1 The Transaction Motive

The principal motive for holding money is to carry out transactions. If you receive your income weekly and pay your bills on the first day of every week, you need not hold any cash balance throughout the rest of the week; you may as well ask your employer to deduct your expenses directly from your weekly salary and deposit the balance in your bank account. But our expenditure patterns do not normally match our receipts. People earn incomes at discrete points in time and spend it continuously throughout the interval. Suppose you earn Rs 100 on the first day of every month and run down this balance evenly over the rest of the month. Thus your cash balance at the beginning and end of the month are Rs 100 and 0, respectively. Your average cash holding can then be calculated as (Rs 100 + Rs 0) ÷ 2 = Rs 50, with which you are making transactions worth Rs 100 per month. Hence your average transaction demand for money is equal to half your monthly income, or, in other words, half the value of your monthly transactions.

Consider, next, a two-person economy consisting of two entities – a firm (owned by one person) and a worker. The firm pays the worker a salary of Rs 100 at the beginning of every month. The worker, in turn, spends this income over the month on the output produced by the firm – the only good available in this economy! Thus, at the beginning of each month the worker has a money balance of Rs 100 and the firm a balance of Rs 0. On the last day of the month the picture is reversed – the firm has gathered a balance of Rs 100 through its sales to the worker. The average money holding of the firm as well as the worker is equal to Rs 50 each. Thus the total transaction demand for money in this economy is equal to Rs 100. The total volume of monthly transactions in this economy is Rs 200 – the firm has sold its output worth Rs 100 to the worker and the latter has sold her services worth Rs 100 to the firm. The transaction demand for money of the economy is again a fraction of the total volume of transactions in the economy over the unit period of time.

In general, therefore, the transaction demand for money in an economy, M_T^d, can be written in the following form

$$M_T^d = k.T \tag{3.1}$$

where T is the total value of (nominal) transactions in the economy over unit period and k is a positive fraction.

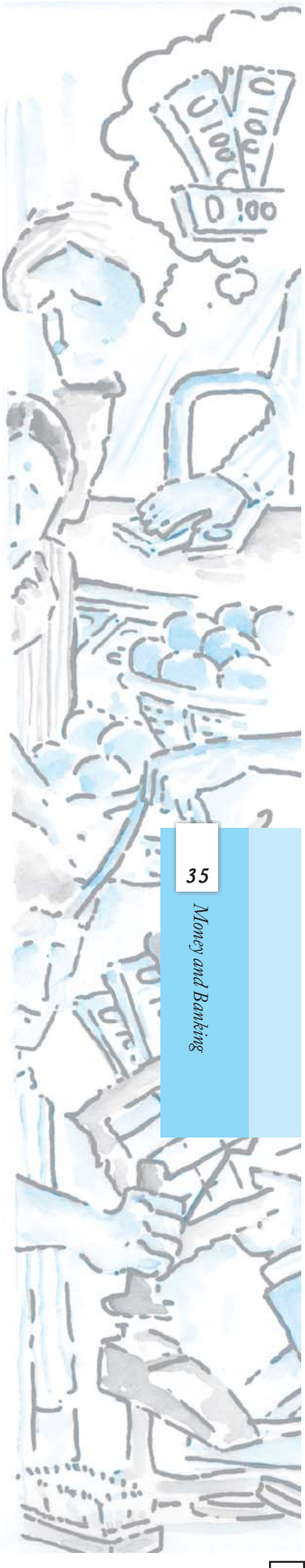
The two-person economy described above can be looked at from another angle. You may perhaps find it surprising that the economy uses money balance worth only Rs 100 for making transactions worth Rs 200 per month. The answer to this riddle is simple – each rupee is changing hands twice a month. On the first day, it is being transferred from the employer's pocket to that of the worker and sometime during the month, it is passing from the worker's hand to the employer's. The number of times a unit of money changes hands during the unit period is called the **velocity of circulation of money**. In the above example it is 2, inverse of half – the ratio of money balance and the value of transactions. Thus, in general, we may rewrite equation (3.1) in the following form

$$\frac{1}{k}.M_T^d = T, \text{ or, } \upsilon.M_T^d = T \tag{3.2}$$

where, $\upsilon = 1/k$ is the velocity of circulation. Note that the term on the right hand side of the above equation, T, is a flow variable whereas money demand, M_T^d, is a stock concept – it refers to the stock of money people are willing to hold at a particular point of time. The velocity of money, υ, however, has a time dimension. It refers to the number of times every unit of stock changes hand during a unit period of time, say, a month or a year. Thus, the left hand side, $\upsilon.M_T^d$, measures the total value of monetary transactions that has been made with this stock in the unit period of time. This is a flow variable and is, therefore, equal to the right hand side.

We are ultimately interested in learning the relationship between the aggregate transaction demand for money of an economy and the (nominal) GDP in a given year. The total value of annual transactions in an economy includes transactions in all intermediate goods and services and is clearly much greater than the nominal GDP. However, normally, there exists a stable, positive relationship between value of transactions and the nominal GDP. An increase in nominal GDP implies an increase in the total value of transactions and hence a greater transaction demand for money from equation (3.1). Thus, in general, equation (3.1) can be modified in the following way

$$M_T^d = kPY \tag{3.3}$$



where Y is the real GDP and P is the general price level or the GDP deflator. The above equation tells us that transaction demand for money is positively related to the real income of an economy and also to its average price level.

3.2.2 The Speculative Motive

An individual may hold her wealth in the form of landed property, bullion, bonds, money etc. For simplicity, let us club all forms of assets other than money together into a single category called 'bonds'. Typically, bonds are papers bearing the promise of a future stream of monetary returns over a certain period of time. These papers are issued by governments or firms for borrowing money from the public and they are tradable in the market. Consider the following two-period bond. A firm wishes to raise a loan of Rs 100 from the public. It issues a bond that assures Rs 10 at the end of the first year and Rs 10 plus the principal of Rs 100 at the end of the second year. Such a bond is said to have a face value of Rs 100, a maturity period of two years and a coupon rate of 10 per cent. Assume that the rate of interest prevailing in your savings bank account is equal to 5 per cent. Naturally you would like to compare the earning from this bond with the interest earning of your savings bank account. The exact question that you would ask is as follows: How much money, if kept in my savings bank account, will generate Rs 10 at the end of one year? Let this amount be X. Therefore

$$X\left(1 + \frac{5}{100}\right) = 10$$

In other words

$$X = \frac{10}{\left(1+\frac{5}{100}\right)}$$

This amount, Rs X, is called the present value of Rs 10 discounted at the market rate of interest. Similarly, let Y be the amount of money which if kept in the savings bank account will generate Rs 110 at the end of two years. Thus, the present value of the stream of returns from the bond should be equal to

$$PV = X + Y = \frac{10}{\left(1+\frac{5}{100}\right)} + \frac{(10+100)}{\left(1+\frac{5}{100}\right)^2}$$

Calculation reveals that it is Rs 109.29 (approx.). It means that if you put Rs 109.29 in your savings bank account it will fetch the same return as the bond. But the seller of the bond is offering the same at a face value of only Rs 100. Clearly the bond is more attractive than the savings bank account and people will rush to get hold of the bond. Competitive bidding will raise the price of the bond above its face value, till price of the bond is equal to its PV. If price rises above the PV the bond becomes less attractive compared to the savings bank account and people would like to get rid of it. The bond will be in excess supply and there will be downward pressure on the bond-price which will bring it back to the PV. It is clear that under competitive assets market condition the price of a bond must always be equal to its present value in equilibrium.

Now consider an increase in the market rate of interest from 5 per cent to 6 per cent. The present value, and hence the price of the same bond, will become

$$\frac{10}{\left(1+\frac{6}{100}\right)} + \frac{(10+100)}{\left(1+\frac{6}{100}\right)^2} = 107.33 \text{ (}approx.\text{)}$$

It follows that the price of a bond is inversely related to the market rate of interest.

Different people have different expectations regarding the future movements in the market rate of interest based on their private information regarding the economy. If you think that the market rate of interest should eventually settle down to 8 per cent per annum, then you may consider the current rate of 5 per cent too low to be sustainable over time. You expect interest rate to rise and consequently bond prices to fall. If you are a bond holder a decrease in bond price means a loss to you – similar to a loss you would suffer if the value of a property held by you suddenly depreciates in the market. Such a loss occurring from a falling bond price is called a capital loss to the bond holder. Under such circumstances, you will try to sell your bond and hold money instead. Thus speculations regarding future movements in interest rate and bond prices give rise to the speculative demand for money.

When the interest rate is very high everyone expects it to fall in future and hence anticipates capital gains from bond-holding. Hence people convert their money into bonds. Thus, speculative demand for money is low. When interest rate comes down, more and more people expect it to rise in the future and anticipate capital loss. Thus they convert their bonds into money giving rise to a high speculative demand for money. Hence speculative demand for money is inversely related to the rate of interest. Assuming a simple form, the speculative demand for money can be written as

$$M_S^d = \frac{r_{max} - r}{r - r_{min}} \qquad (3.4)$$

where r is the market rate of interest and r_{max} and r_{min} are the upper and lower limits of r, both positive constants. It is evident from equation (3.4) that as r decreases from r_{max} to r_{min}, the value of M_S^d increases from 0 to ∞

As mentioned earlier, interest rate can be thought of as an opportunity cost or 'price' of holding money balance. If supply of money in the economy increases and people purchase bonds with this extra money, demand for bonds will go up, bond prices will rise and rate of interest will decline. In other words, with an increased supply of money in the economy the price you have to pay for holding money balance, viz. the rate of interest, should come down. However, if the market rate of interest is already low enough so that everybody expects it to rise in future, causing capital losses, nobody will wish to hold bonds. Everyone in the economy will hold their wealth in money balance and if additional money is injected within the economy it will be used up to satiate people's craving for money balances without increasing the demand for bonds and without further lowering the rate of interest below the floor r_{min}. Such a situation is called a **liquidity trap**. The speculative money demand function is infinitely elastic here.

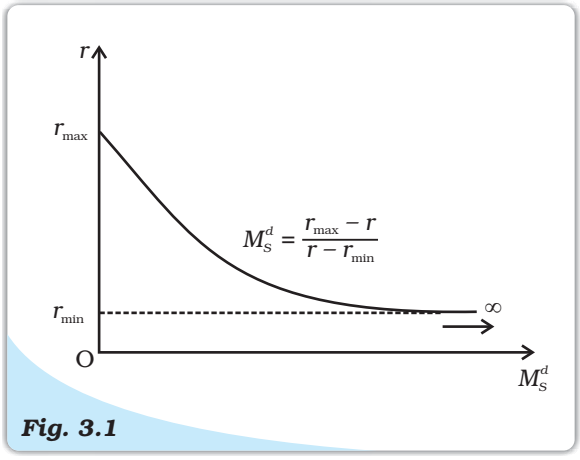


Fig. 3.1
The Speculative Demand for Money

In Fig. 3.1 the speculative demand for money is plotted on the horizontal axis and the rate

of interest on the vertical axis. When $r = r_{max}$, speculative demand for money is zero. The rate of interest is so high that everyone expects it to fall in future and hence is sure about a future capital gain. Thus everyone has converted the speculative money balance into bonds. When $r = r_{min}$, the economy is in the liquidity trap. Everyone is sure of a future rise in interest rate and a fall in bond prices. Everyone puts whatever wealth they acquire in the form of money and the speculative demand for money is infinite.

Total demand for money in an economy is, therefore, composed of transaction demand and speculative demand. The former is directly proportional to real GDP and price level, whereas the latter is inversely related to the market rate of interest. The aggregate money demand in an economy can be summarised by the following equation

$$M^d = M_T^d + M_S^d$$

$$\text{or, } M^d = kPY + \frac{r_{max} - r}{r - r_{min}} \qquad (3.5)$$

3.3 The Supply of Money

In a modern economy money consists mainly of currency notes and coins issued by the monetary authority of the country. In India currency notes are issued by the Reserve Bank of India (RBI), which is the monetary authority in India. However, coins are issued by the Government of India. Apart from currency notes and coins, the balance in savings, or current account deposits, held by the public in commercial banks is also considered money since cheques drawn on these accounts are used to settle transactions. Such deposits are called demand deposits as they are payable by the bank on demand from the account-holder. Other deposits, e.g. fixed deposits, have a fixed period to maturity and are referred to as **time deposits**.

Though a hundred-rupee note can be used to obtain commodities worth Rs 100 from a shop, the value of the paper itself is negligible – certainly less than Rs 100. Similarly, the value of the metal in a five-rupee coin is probably not worth Rs 5. Why then do people accept such notes and coins in exchange of goods which are apparently more valuable than these? The value of the currency notes and coins is derived from the guarantee provided by the issuing authority of these items. Every currency note bears on its face a promise from the Governor of RBI that if someone produces the note to RBI, or any other commercial bank, RBI will be responsible for giving the person purchasing power equal to the value printed on the note. The same is also true of coins. Currency notes and coins are therefore called **fiat money**. They do not have **intrinsic value** like a gold or silver coin. They are also called **legal tenders** as they cannot be refused by any citizen of the country for settlement of any kind of transaction. Cheques drawn on savings or current accounts, however, can be refused by anyone as a mode of payment. Hence, demand deposits are not legal tenders.

3.3.1 Legal Definitions: Narrow and Broad Money

Money supply, like money demand, is a stock variable. The total stock of money in circulation among the public at a particular point of time is called money supply. RBI publishes figures for four alternative measures of money supply, viz. M1, M2, M3 and M4. They are defined as follows

M1 = CU + DD

M2 = M1 + Savings deposits with Post Office savings banks

M3 = M1 + Net time deposits of commercial banks

M4 = M3 + Total deposits with Post Office savings organisations (excluding National Savings Certificates)

where, CU is currency (notes plus coins) held by the public and DD is net demand deposits held by commercial banks. The word 'net' implies that only deposits of the public held by the banks are to be included in money supply. The interbank deposits, which a commercial bank holds in other commercial banks, are not to be regarded as part of money supply.

M1 and M2 are known as **narrow money**. M3 and M4 are known as **broad money**. These gradations are in decreasing order of liquidity. M1 is most liquid and easiest for transactions whereas M4 is least liquid of all. M3 is the most commonly used measure of money supply. It is also known as **aggregate monetary resources**[1].

3.3.2 Money Creation by the Banking System

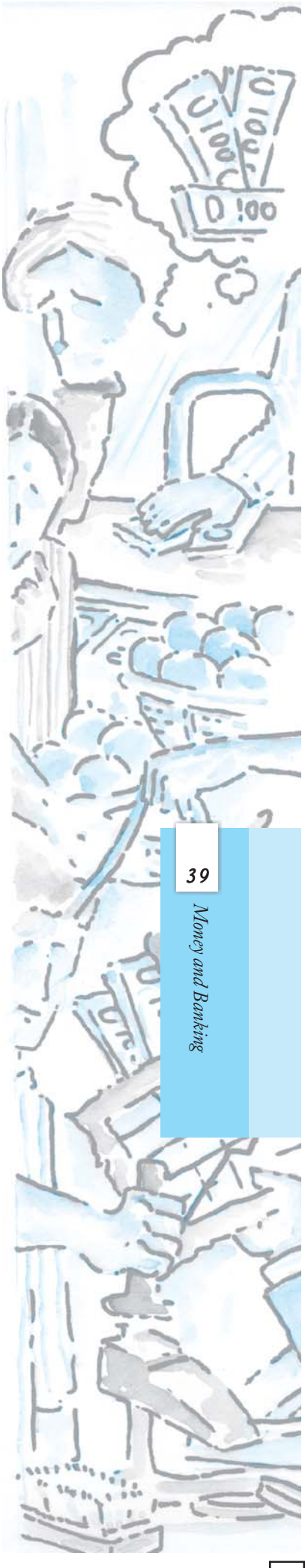
In this section we shall explore the determinants of money supply. Money supply will change if the value of any of its components such as CU, DD or Time Deposits changes. In what follows we shall, for simplicity, use the most liquid definition of money, viz. M1 = CU + DD, as the measure of money supply in the economy. Various actions of the monetary authority, RBI, and commercial banks are responsible for changes in the values of these items. The preference of the public for holding cash balances vis-´a-vis deposits in banks also affect the money supply. These influences on money supply can be summarised by the following key ratios.

The Currency Deposit Ratio: The currency deposit ratio (**cdr**) is the ratio of money held by the public in currency to that they hold in bank deposits. cdr = CU/DD. If a person gets Re 1 she will put Rs 1/(1 + cdr) in her bank account and keep Rs cdr/(1 + cdr) in cash. It reflects people's preference for liquidity. It is a purely behavioural parameter which depends, among other things, on the seasonal pattern of expenditure. For example, cdr increases during the festive season as people convert deposits to cash balance for meeting extra expenditure during such periods.

The Reserve Deposit Ratio: Banks hold a part of the money people keep in their bank deposits as reserve money and loan out the rest to various investment projects. Reserve money consists of two things – vault cash in banks and deposits of commercial banks with RBI. Banks use this reserve to meet the demand for cash by account holders. Reserve deposit ratio (**rdr**) is the proportion of the total deposits commercial banks keep as reserves.

Keeping reserves is costly for banks, as, otherwise, they could lend this balance to interest earning investment projects. However, RBI requires commercial banks to keep reserves in order to ensure that banks have a safe cushion of assets to draw on when account holders want to be paid. RBI uses various policy instruments to bring forth a healthy rdr in commercial banks. The first instrument is the **Cash Reserve Ratio** which specifies the fraction of their deposits that banks must keep with RBI. There is another tool called **Statutory Liquidity Ratio** which requires the banks to maintain

[1]See Appendix 3.2 for an estimate of the variations in M1 and M3 over time.



a given fraction of their total demand and time deposits in the form of specified liquid assets. Apart from these ratios RBI uses a certain interest rate called the **Bank Rate** to control the value of rdr. Commercial banks can borrow money from RBI at the bank rate when they run short of reserves. A high bank rate makes such borrowing from RBI costly and, in effect, encourages the commercial banks to maintain a healthy rdr.

Table 3.1: Sample Balance Sheet of a Commercial Bank

Assets – Rs		*Liability – Rs*	
• Reserves		Deposits	100
– Vault Cash	15		
– Deposits with RBI	5		
• Bank Credit			
– Loans	30		
– Investments	50		
rdr = 0.2			

Commercial Banks

Commercial Banks accept deposits from the public and lend out this money to interest earning investment projects. The rate of interest offered by the bank to deposit holders is called the 'borrowing rate' and the rate at which banks lend out their reserves to investors is called the 'lending rate'. The difference between the two rates, called 'spread', is the profit that is appropriated by the banks. Deposits are broadly of two types – demand deposits, payable by the banks on demand from the account holder, e.g. current and savings account deposits, and time deposits, which have a fixed period to maturity, e.g. fixed deposits. Lending by commercial banks consists mainly of cash credit, demand and short-term loans to private investors and banks' investments in government securities and other approved bonds. The creditworthiness of a person is judged by her current assets or the **collateral** (a security pledged for the repayment of a loan) she can offer.

Table 3.2: Sample Balance Sheet of RBI

Assets (sources) – Rs		*Liability (uses) – Rs*	
Gold	10	Currency	
Foreign Exchange	20	*Currency held by Public*	200
Govt. Securities (Loan to GOI)	230	*Vault Cash held by Commercial Banks*	10
Loan to Commercial Banks	5	Deposits of Commercial Banks with RBI	40
		Treasury Deposits of GOI	15
Monetary Base (sources)	265	Monetary Base (uses)	265

***High Powered Money*:** The total liability of the monetary authority of the country, RBI, is called the **monetary base** or **high powered money**. It consists of currency (notes and coins in circulation with the public and vault cash of commercial banks) and deposits held by the Government of India and commercial banks with RBI. If a member of the public produces a currency note to RBI the latter must pay her value equal to the figure printed on the note. Similarly, the deposits are also refundable by RBI on demand from deposit-holders. These items are claims which the general public, government or banks have on RBI and hence are considered to be the liability of RBI.

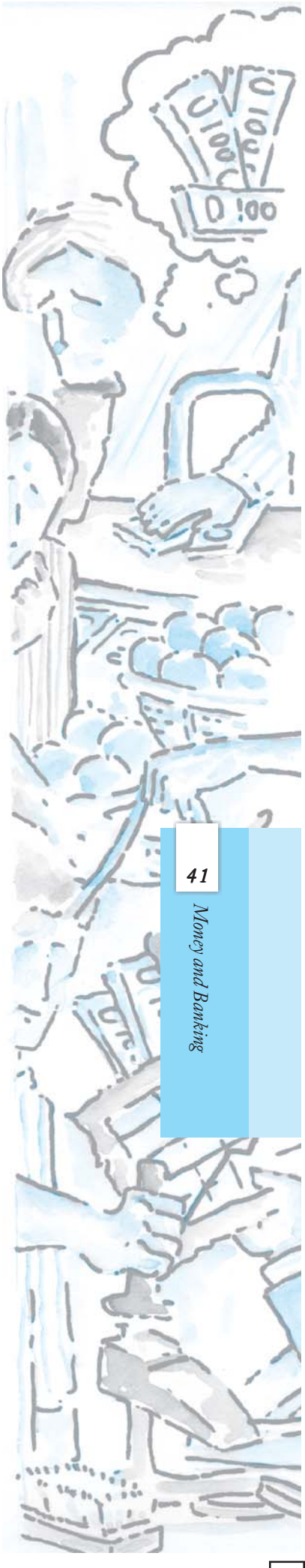
RBI acquires assets against these liabilities. The process can be understood easily if we consider a simple stylised example. Suppose RBI purchases gold or dollars worth Rs 5. It pays for the gold or foreign exchange by issuing currency to the seller. The currency in circulation in the economy thus goes up by Rs 5, an item that shows up on the **liability** side of the balance sheet. The value of the acquired assets, also equal to Rs 5, is entered under the appropriate head on the Assets side. Similarly, RBI acquires debt bonds or securities issued by the government and pays the government by issuing currency in return. It issues loans to commercial banks in a similar fashion[2].

We are now ready to explain the mechanism of money creation by the monetary authority, RBI. Suppose RBI wishes to increase the money supply. It will then inject additional high powered money into the economy in the following way. Let us assume that RBI purchases some asset, say, government bonds or gold worth Rs H from the market. It will issue a cheque of Rs H on itself to the seller of the bond. Assume also that the values of cdr and rdr for this economy are 1 and 0.2, respectively. The seller encashes the cheque at her account in Bank A, keeping Rs $\frac{H}{2}$ in her account and taking Rs $\frac{H}{2}$ away as cash. Currency held by the public thus goes up by $\frac{H}{2}$. Bank A's liability goes up by Rs $\frac{H}{2}$ because of this increment in deposits. But its assets also go up by the same amount through the possession of this cheque, which is nothing but a claim of the same amount on RBI. The liability of RBI goes up by Rs H, which is the sum total of the claims of Bank A and its client, the seller, worth Rs $\frac{H}{2}$ and Rs $\frac{H}{2}$, respectively. Thus, by definition, high powered money increases by Rs H.

The process does not end here. Bank A will keep Rs $\frac{0.2H}{2}$ of the extra deposit as reserve and loan out the rest, i.e. Rs $\frac{(1-0.2)H}{2}$ = Rs $\frac{0.8H}{2}$ to another borrower[3]. The borrower will presumably use this loan on some investment project and spend the money as factor payment. Suppose a worker of that project gets the payment. The worker will then keep Rs $\frac{0.8H}{4}$ as cash and put Rs $\frac{0.8H}{4}$ in her account in Bank B. Bank B, in turn, will lend Rs $\frac{0.64H}{4}$. Someone who receives that money will keep $\frac{0.64H}{8}$ in cash and put $\frac{0.64H}{8}$ in some other Bank C. The process continues *ad infinitum*.

[2]See Appendix 3.2 for an estimate of changes in the sources of monetary base over time.

[3]We are implicitly assuming that the demand for bank loans at the existing lending rate is infinite, i.e. banks can loan out any amount they wish.



Let us now look at Table 3.3 to get an idea of how the money supply in the economy is changing round after round.

Table 3.3: The Multiplier Process

	Currency	*Deposits*	*Money Supply*
Round 1	$\frac{H}{2}$	$\frac{H}{2}$ (Bank A)	H
Round 2	$\frac{0.8H}{4}$	$\frac{0.8H}{4}$ (Bank B)	$\frac{0.8H}{2}$
Round 3	$\frac{0.64H}{8}$	$\frac{0.64H}{8}$ (Bank C)	$\frac{0.64H}{4}$
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	etc.

The second column shows the increment in the value of currency holding among the public in each round. The third column measures the value of the increment in bank deposits in the economy in a similar way. The last column is the sum total of these two, which, by definition, is the increase in money supply in the economy in each round (presumably the simplest and the most liquid measure of money, viz. M1). Note that the amount of increments in money supply in successive rounds are gradually diminishing. After a large number of rounds, therefore, the size of the increments will be virtually indistinguishable from zero and subsequent round effects will not practically contribute anything to the total volume of money supply. We say that the round effects on money supply represent a **convergent** process. In order to find out the total increase in money supply we must add up the infinite geometric series[4] in the last column, i.e.

$$H + \frac{0.8H}{2} + \frac{0.64H}{4} + \cdots\cdots\infty$$

$$H\left\{1+\left(\frac{0.8}{2}\right) + \left(\frac{0.8}{2}\right)^2 + \ldots\ldots\infty\right\} = \frac{H}{1-0.4} = \frac{5H}{3}$$

The increment in total money supply exceeds the amount of high powered money initially injected by RBI into the economy. We define **money multiplier** as the ratio of the stock of money to the stock of high powered money in an economy, viz. M/*H*. Clearly, its value is greater than 1.

We need not always go through the round effects in order to compute the value of the money multiplier. We did it here just to demonstrate the process of money creation in which the commercial banks have an important role to play. However, there exists a simpler way of deriving the multiplier. By definition, money supply is equal to currency plus deposits

$$M = CU + DD = (1 + cdr)DD$$

where, cdr = CU/DD. Assume, for simplicity, that treasury deposit of the Government with RBI is zero. High powered money then consists of currency held by the public and reserves of the commercial banks, which include vault cash and banks' deposits with RBI. Thus

$$H = CU + R = cdr.DD + rdr.DD = (cdr + rdr)DD$$

[4]See Appendix 3.1 for a brief discussion on such series.

Thus the ratio of money supply to high powered money

$$\frac{M}{H} = \frac{1 + cdr}{cdr + rdr} > 1, \quad \text{as } rdr < 1$$

This is precisely the measure of the money multiplier.

3.3.3 Instruments of Monetary Policy and the Reserve Bank of India

It is clear from the above discussion that the total amount of money stock in the economy is much greater than the volume of high powered money. Commercial banks create this extra amount of money by giving out a part of their deposits as loans or investment credits. It is also evident from Table 3.1 that the total amount of deposits held by all commercial banks in the country is much larger than the total size of their reserves. If all the account-holders of all commercial banks in the country want their deposits back at the same time, the banks will not have enough means to satisfy the need of every account-holder and there will be bank failures.

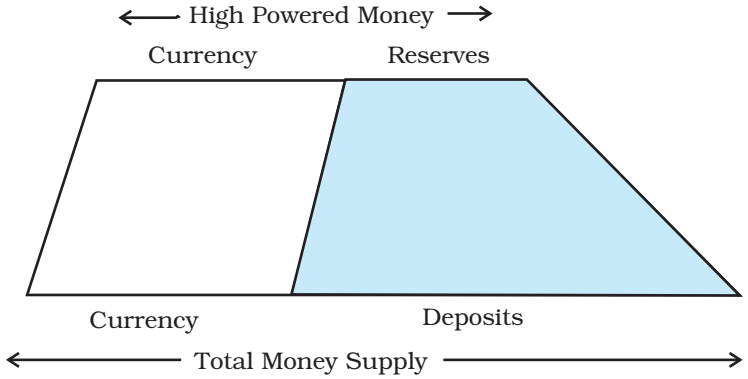


Fig. 3.2: *High Powered Money in Relation to Total Money Supply*

All this is common knowledge to every informed individual in the economy. Why do they still keep their money in bank deposits when they are aware of the possibility of default by their banks in case of a bank run (a situation where everybody wants to take money out of one's bank account before the bank runs out of reserves)?

The Reserve Bank of India plays a crucial role here. In case of a crisis like the above it stands by the commercial banks as a guarantor and extends loans to ensure the solvency of the latter. This system of guarantee assures individual account-holders that their banks will be able to pay their money back in case of a crisis and there is no need to panic thus avoiding bank runs. This role of the monetary authority is known as the **lender of last resort**.

Apart from acting as a banker to the commercial banks, RBI also acts as a banker to the Government of India, and also, to the state governments. It is commonly held that the government, sometimes, 'prints money' in case of a budget deficit, i.e., when it cannot meet its expenses (e.g. salaries to the government employees, purchase of defense equipment from a manufacturer of such goods etc.) from the tax revenue it has earned. The government, however, has no legal authority to issue currency in this fashion. So it borrows money by selling treasury bills or government securities to RBI, which issues currency to the government in return. The government then pays for its expenses with this

money. The money thus ultimately comes into the hands of the general public (in the form of salary or sales proceeds of defense items etc.) and becomes a part of the money supply. Financing of budget deficits by the governments in this fashion is called **Deficit Financing through Central Bank Borrowing**.

However, the most important role of RBI is as the controller of money supply and credit creation in the economy. RBI is the independent authority for conducting monetary policy in the best interests of the economy – it increases or decreases the supply of high powered money in the economy and creates incentives or disincentives for the commercial banks to give loans or credits to investors. The instruments which RBI uses for conducting monetary policy are as follows.

Open Market Operations: RBI purchases (or sells) government securities to the general public in a bid to increase (or decrease) the stock of high powered money in the economy. Suppose RBI purchases Rs 100 worth government securities from the bond market. It will issue a cheque of Rs 100 on itself to the seller of the bond. The seller will deposit the cheque in her bank, which, in turn, will credit the seller's account with a balance of Rs 100. The bank's deposits go up by Rs 100 which is a liability to the bank. However, its assets also go up by Rs 100 by the possession of this cheque, which is a claim on RBI. The bank will deposit this cheque to RBI which, in turn, will credit the bank's account with RBI with Rs 100. The changes in RBI's balance sheet are shown in Table 3.4.

Total liability of RBI, or, by definition, the supply of high powered money in the economy has gone up by Rs 100. If RBI wishes to reduce the supply of high powered money it undertakes an open market sale of government securities of its own holding in just the reverse fashion, thereby reducing the monetary base.

Table 3.4: Effects of Open Market Purchase on the Balance Sheet of RBI

Assets (sources) – Rs		*Liability (uses) – Rs*	
All Other Assets	0	Currency	0
Government Securities	+ 100	Deposits of Commercial Banks with RBI	+ 100
Monetary Base (sources)	+ 100	Monetary Base (uses)	+ 100

Bank Rate Policy: As mentioned earlier, RBI can affect the reserve deposit ratio of commercial banks by adjusting the value of the bank rate – which is the rate of interest commercial banks have to pay RBI – if they borrow money from it in case of shortage of reserves. A low (or high) bank rate encourages banks to keep smaller (or greater) proportion of their deposits as reserves, since borrowing from RBI is now less (or more) costly than before. As a result banks use a greater (or smaller) proportion of their resources for giving out loans to borrowers or investors, thereby enhancing (or depressing) the multiplier process via assisting (or resisting) secondary money creation. In short, a low (or high) bank rate reduces (or increases) rdr and hence increases (or decreases) the value of the money multiplier, which is (1 + cdr)/(cdr + rdr). Thus, for any given amount of high powered money, *H*, total money supply goes up.

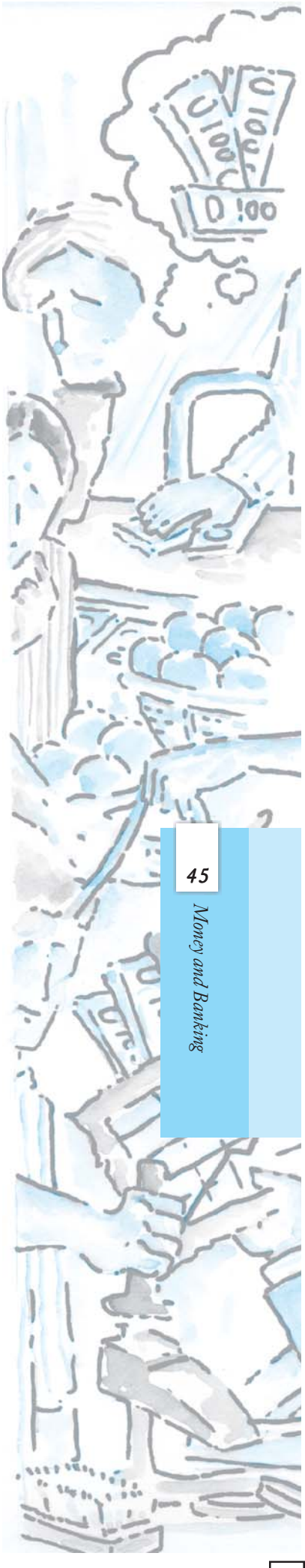
Varying Reserve Requirements: Cash Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) also work through the rdr-route. A high (or low) value of CRR or SLR helps increase (or decrease) the value of reserve deposit ratio, thus diminishing (or increasing) the value of the money multiplier and money supply in the economy in a similar fashion.

***Sterilisation by RBI*:** RBI often uses its instruments of money creation for stabilising the stock of money in the economy from external shocks. Suppose due to future growth prospects in India investors from across the world increase their investments in Indian bonds which under such circumstances, are likely to yield a high rate of return. They will buy these bonds with foreign currency. Since one cannot purchase goods in the domestic market with foreign currency, a person who sells these bonds to foreign investors will exchange her foreign currency holding into rupee at a commercial bank. The bank, in turn, will submit this foreign currency to RBI and its deposits with RBI will be credited with equivalent sum of money. What kind of adjustments take place from this entire transaction? The commercial bank's total reserves and deposits remain unchanged (it has purchased the foreign currency from the seller using its vault cash, which, therefore, goes down; but the bank's deposit with RBI goes up by an equivalent amount – leaving its total reserves unchanged). There will, however, be increments in the assets and liabilities on the RBI balance sheet. RBI's foreign exchange holding goes up. On the other hand, the deposits of commercial banks with RBI also increase by an equal amount. But that means an increase in the stock of high powered money – which, by definition, is equal to the total liability of RBI. With money multiplier in operation, this, in turn, will result in increased money supply in the economy.

This increased money supply may not altogether be good for the economy's health. If the volume of goods and services produced in the economy remains unchanged, the extra money will lead to increase in prices of all commodities. People have more money in their hands with which they compete each other in the commodities market for buying the same old stock of goods. As too much money is now chasing the same old quantities of output, the process ends up in bidding up prices of every commodity – an increase in the general price level, which is also known as inflation.

RBI often intervenes with its instruments to prevent such an outcome. In the above example, RBI will undertake an open market sale of government securities of an amount equal to the amount of foreign exchange inflow in the economy, thereby keeping the stock of high powered money and total money supply unchanged. Thus it sterilises the economy against adverse external shocks. This operation of RBI is known as **sterilisation**.

Money supply is, therefore, an important macroeconomic variable. Its overall influence on the values of the equilibrium rate of interest, price level and output of an economy is of great significance. We take up these issues in the next chapter.



Summary

Exchange of commodities without the mediation of money is called Barter Exchange. It suffers from lack of double coincidence of wants. Money facilitates exchanges by acting as a commonly acceptable medium of exchange. In a modern economy, people hold money broadly from two motives – transaction motive and speculative motive. Supply of money, on the other hand, consists of currency notes and coins, demand and time deposits held by commercial banks, etc. It is classified as narrow and broad money according to the decreasing order of liquidity. In India, the supply of money is regulated by the Reserve Bank of India (RBI) which acts as the monetary authority of the country. Various actions of the public, the commercial banks of the country and RBI are responsible for changes in the supply of money in the economy. RBI regulates money supply by controlling the stock of high powered money, the bank rate and reserve requirements of the commercial banks. It also sterilises the money supply in the economy against external shocks.

Key Concepts

Barter exchange	Double coincidence of wants
Money	Medium of exchange
Unit of account	Store of value
Transaction demand	Speculative demand
Bonds	Present value
Rate of interest	Capital gain or loss
Liquidity trap	Fiat money
Legal tender	Narrow money
Broad money	Aggregate monetary resources
Currency deposit ratio	Reserve deposit ratio
High powered money	Money multiplier
Lender of last resort	Deficit financing through central bank borrowing
Open market operation	Bank Rate
Cash Reserve Ratio (CRR)	Statutory Liquidity Ratio (SLR)
Sterilisation	

Exercises

1. What is a barter system? What are its drawbacks?
2. What are the main functions of money? How does money overcome the shortcomings of a barter system?
3. What is transaction demand for money? How is it related to the value of transactions over a specified period of time?
4. Suppose a bond promises Rs 500 at the end of two years with no intermediate return. If the rate of interest is 5 per cent per annum what is the price of the bond?
5. Why is speculative demand for money inversely related to the rate of interest?
6. What is 'liquidity trap'?
7. What are the alternative definitions of money supply in India?
8. What is a 'legal tender'? What is 'fiat money'?
9. What is High Powered Money?
10. Explain the functions of a commercial bank.
11. What is money multiplier? How will you determine its value? What ratios play an important role in the determination of the value of the money multiplier?
12. What are the instruments of monetary policy of RBI? How does RBI stabilize money supply against exogenous shocks?
13. Do you consider a commercial bank 'creator of money' in the economy?
14. What role of RBI is known as 'lender of last resort'?

Suggested Readings

1. Dornbusch, R. and S. Fischer. 1990. *Macroeconomics*, (fifth edition) pages 345 – 427, McGraw Hill, Paris.
2. Branson, W. H., 1992. *Macroeconomic Theory and Policy*, (second edition), pages 243 – 280, Harper Collins Publishers India Pvt. Ltd., New Delhi.
3. Sikdar, S., 2006. *Principles of Macroeconomics*, pages 77 – 89, Oxford University Press, New Delhi.

Appendix 3.1

The Sum of an Infinite Geometric Series

We want to find out the sum of an infinite geometric series of the following form

$$S = a + a.r + a.r^2 + a.r^3 + \cdots + a.r^n \cdots \infty$$

where a and r are real numbers and $0 < r < 1$. To compute the sum, multiply the above equation by r to obtain

$$r.S = a.r + a.r^2 + a.r^3 + \cdots + a.r^{n+1} \cdots \infty$$

Subtract the second equation from the first to get

$$S - r.S = a$$
$$or,\ (1 - r)S = a$$

which yields

$$S = \frac{a}{1-r}$$

In the example used for the derivation of the money multiplier, $a = 1$ and $r = 0.4$. Hence the value of the infinite series is

$$\frac{1}{1-0.4} = \frac{5}{3}$$

Appendix 3.2

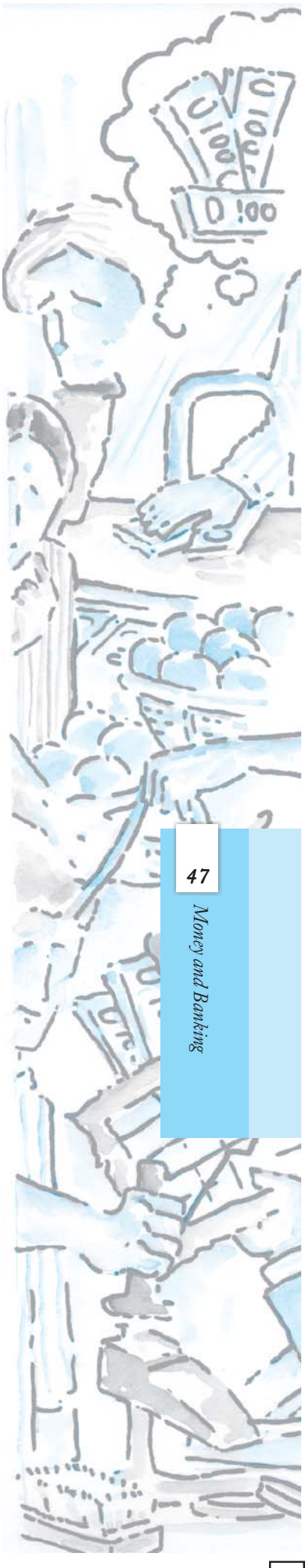
Money Supply in India

Table 3.5: Change in M1 and M3 Over Time

Year	*M1*	*M3*
1989-90	81,060	2,30,950
1990-91	92,892	2,65,828
1991-92	1,14,406	3,17,049
1992-93	1,24,066	3,64,016
1993-94	1,50,778	4,31,084
1994-95	1,92,257	5,27,496
1995-96	2,14,844	5,99,191
1996-97	2,40,615	6,96,012
1997-98	2,67,844	8,21,332
1998-99	3,09,128	9,81,020
1999-00	3,41,796	11,24,174
2000-01	3,79,450	13,13,220
2001-02	4,22,843	14,98,355
2002-03	4,72,827	17,25,222

Source: S. Sikdar, *Principles of Macroeconomics*, OUP, 2006. Unit: Rs crore.

The difference in values between the two columns is attributable to the time deposits held by commercial banks.



Appendix 3.3

Changes in the Composition of the Sources of Monetary Base Over Time

Table 3.6: Sources of Changes in the Monetary Base

Year	Percentage Changes in		
	Loan to GOI	*Loan to Banks*	*Foreign Assets*
1984-90	105.50	13.60	7.60
1991-92	44.00	– 34.00	92.50
1992-93	38.80	32.72	33.30
1993-94	3.10	14.90	103.90
1994-95	7.10	26.30	76.10
1995-96	79.30	34.90	– 2.50
1996-97	50.10	– 275.40	366.90
1997-98	41.80	7.70	80.30
1998-99	52.40	30.80	66.60
1999-00	– 20.20	31.00	131.80
2000-01	24.70	– 25.50	137.50
2001-02	1.70	– 27.70	193.50

Source: S. Sikdar, *Principles of Macroeconomics*, OUP, 2006.

Note that RBI has been tightening domestic credit to Government of India and commercial banks as part of sterilisation exercise whenever the inflow of foreign assets to the Indian economy has been on the rise.