

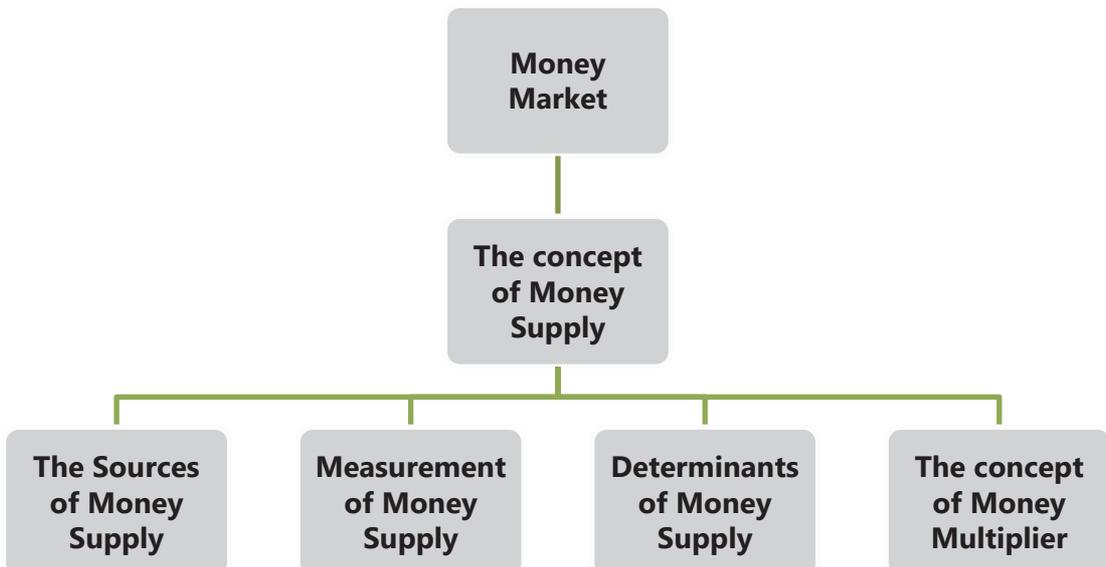
UNIT II: CONCEPT OF MONEY SUPPLY

LEARNING OUTCOMES

At the end of this unit, you will be able to:

- ❑ Define money supply and describe its different components
- ❑ List out the need for and rationale of measuring money supply
- ❑ Elucidate the different sources of money supply
- ❑ Illustrate the various measures of money supply
- ❑ Distinguish between money multiplier and credit multiplier, and
- ❑ Describe the different determinants of money supply

UNIT OVERVIEW





2.1 INTRODUCTION

In the previous unit, we have discussed the theories related to demand for money. Money plays a crucial role in the smooth functioning of an economy. Money supply is considered as a very important macroeconomic variable responsible for changes in many other significant macroeconomic variables in an economy and is therefore considered as a matter of considerable interest to the economists and policy makers.

Economic stability requires that the supply of money at any time should to be maintained at an optimum level. A pre-requisite for achieving this is to accurately estimate the stock of money supply on a regular basis and appropriately regulate it in accordance with the monetary requirements of the country. In this unit, we shall look into various aspects related to the supply of money.

The term money supply denotes the total quantity of money available to the people in an economy. The quantity of money at any point of time is a measurable concept. It is important to note two things about any measure of money supply:

- (i) The supply of money is a stock variable i.e. it refers to the total amount of money at any particular point of time. It is the change in the stock of money (say, increase or decrease per month or year,), which is a flow.
- (ii) The stock of money always refers to the stock of money available to the 'public' as a means of payments and store of value. This is always smaller than the total stock of money that really exists in an economy.

The term 'public' is defined to include all economic units (households, firms and institutions) except the producers of money (i.e. the government and the banking system). The government, in this context, includes the central government and all state governments and local bodies; and the banking system means the Reserve Bank of India and all the banks that accept demand deposits (i.e. deposits from which money can be withdrawn by cheque mainly CASA deposits). The word 'public' is inclusive of all local authorities, non-banking financial institutions, and non-departmental public-sector undertakings, foreign central banks and governments and the International Monetary Fund which holds a part of Indian money in India in the form of deposits with the RBI. In other words, while discussing the definition of 'supply of money' and the standard measures of money, interbank deposits and money held by the government and the banking system are not included.



2.2 RATIONALE OF MEASURING MONEY SUPPLY

The empirical analysis of money supply is important for two reasons:

1. It facilitates analysis of monetary developments in order to provide a deeper understanding of the causes of money growth.
2. It is essential from a monetary policy perspective as it provides a framework to evaluate whether the stock of money in the economy is consistent with the standards for price stability and to understand the nature of deviations from this standard. The central banks all over the world adopt monetary policy to stabilise price level and GDP growth by directly controlling the supply of money. This is achieved mainly by managing the quantity of monetary base. The success of monetary policy depends to a large extent on the controllability of the monetary base and the money supply.



2.3 THE SOURCES OF MONEY SUPPLY

The supply of money in the economy depends on:

- (a) the decision of the central bank based on the authority conferred on it, and
- (b) the supply responses of the commercial banking system of the country to the changes in policy variables initiated by the central bank to influence the total money supply in the economy.

The central banks of all countries are empowered to issue currency and, therefore, the central bank is the primary source of money supply in all countries. In effect, high powered money issued by monetary authorities is the source of all other forms of money. The currency issued by the central bank is 'fiat money' and is backed by supporting reserves and its value is guaranteed by the government.

The currency issued by the central bank is, in fact, a liability of the central bank and the government. Therefore, in principle, it must be backed by an equal value of assets mainly consisting of gold and foreign exchange reserves. In practice, however, most countries have adopted a 'minimum reserve system' wherein the central bank is empowered to issue currency to any extent by keeping only a certain minimum reserve of gold and foreign securities.

The second major source of money supply is the banking system of the country. The total supply of money in the economy is also determined by the extent of credit created by the commercial banks in the country. Banks create money supply in the process of borrowing and lending transactions with the public. Money so created by the commercial banks is called 'credit money'. The high powered money and the credit money broadly constitute the most common measure of money supply, or the total money stock of a country. (For a brief note on the process of creation of credit money, refer to Box 1, end of this chapter).

The Crypto currencies face significant legislative uncertainties and are not legally recognized in India as currency. Hence, these are not categorized as money.



2.4 MEASUREMENT OF MONEY SUPPLY

There is virtually a profusion of different types of money, especially credit money, and this makes measurement of money supply a difficult task. Different countries follow different practices in measuring money supply. The measures of money supply vary from country to country, from time to time and from purpose to purpose. Reference to such different measures is beyond the scope of this unit. Just as other countries do; a range of monetary and liquidity measures are compiled and published by the RBI. Money supply will change if the magnitude of any of its constituents changes.

In this unit, we shall be concentrating on the Indian case only and in the following discussion, we shall focus on the alternative measures of money supply prepared and published periodically by the Reserve Bank of India.

Since July 1935, the Reserve Bank of India has been compiling and disseminating monetary statistics. Till 1967-68, the RBI used to publish only a single 'narrow measure of money supply' (M_1) defined as the sum of currency and demand deposits held by the public. From 1967-68, a 'broader' measure of money supply, called 'aggregate monetary resources' (AMR) was additionally published by the RBI. From April 1977, following the recommendations of the Second Working Group on Money Supply (SWG), the RBI has been publishing data on four alternative measures of money supply denoted by M_1 , M_2 , M_3 and M_4 besides the reserve money. The respective empirical definitions of these measures are given below:

M_1 = Currency notes and coins with the people + demand deposits with the banking system (Current and Saving deposit accounts) + other deposits with the RBI.

M_2 = M_1 + savings deposits with post office savings banks.

M_3 = M_1 + time deposits with the banking system.

M_4 = M_3 + total deposits with the Post Office Savings Organization (excluding National Savings Certificates).

The RBI regards these four measures of money stock as representing different degrees of liquidity. It has specified them in the descending order of liquidity, M_1 being the most liquid and M_4 the least liquid of the four measures.

We shall briefly discuss the important components of each.

- Currency consists of paper currency as well as coins.
- Demand deposits comprise the current-account deposits and the demand deposit portion of savings deposits, all held by the public. These are also called CASA deposits and these are cheapest sources of finance for a commercial bank.
- It should be noted that it is the net demand deposits of banks, and not their total demand deposits that get included in the measure of money supply. The total deposits include both deposits from the public as well as inter-bank deposits. Money is deemed as something held by the 'public'. Since inter-bank deposits are not held by the public, they are netted out of the total demand deposits to arrive at net demand deposits.
- 'Other deposits' with the RBI are its deposits other than those held by the government (the Central and state governments), and include demand deposits of quasi-government institutions, other financial institutions, balances in the accounts of foreign central banks and governments, and accounts of international agencies such as IMF and the World Bank.

Empirically, whatever the measure of money supply, the 'other deposits' of the RBI constitute a very small proportion (less than one per cent) of the total money supply.

Following the recommendations of the Working Group on Money (1998), the RBI has started publishing a set of four new monetary aggregates on the basis of the

balance sheet of the banking sector in conformity with the norms of progressive liquidity. The new monetary aggregates are:

$$\begin{aligned} \text{Reserve Money} &= \text{Currency in circulation} + \text{Bankers' deposits with the RBI} + \text{Other deposits with the RBI} \\ &= \text{Net RBI credit to the Government} + \text{RBI credit to the Commercial sector} + \text{RBI's Claims on banks} + \text{RBI's net Foreign Exchange assets} + \text{Government's Currency liabilities to the public} - \text{RBI's net non - monetary Liabilities} \end{aligned}$$

$$\begin{aligned} \text{NM1} &= \text{Currency with the public} + \text{Demand deposits with the banking system} + \text{'Other' deposits with the RBI.} \\ \text{NM2} &= \text{NM1} + \text{Short-term time deposits of residents (including and up to contractual maturity of one year).} \\ \text{NM3} &= \text{NM2} + \text{Long-term time deposits of residents} + \text{Call/Term funding from financial institutions} \end{aligned}$$

In the monetary literature, money is usually defined in alternative ways ranging from narrow to broad money.

- Empirically M₁ (narrow money) is defined as the sum of currency held by the public, demand deposits of the banks and other deposits with the RBI. Banks include commercial and co-operative banks.
- Reserve money is comprised of the currency held by the public, cash reserves of banks and other deposits with the RBI.
- On comparison, we find that there is difference between M1 and reserve money. Bank reserves, which are a component of the monetary base, are not included in M1. In addition, bank deposits, which are a component of M1, are not a part of the monetary base. Reserves are commercial banks' deposits with the central bank for maintaining cash reserve ratio (CRR) and as working funds for clearing adjustments.

Reserve money, also known as central bank money, base money or high-powered money, needs a special mention as it plays a critical role in the determination of the total supply of money. Reserve money determines the level of liquidity and

price level in the economy and, therefore, its management is of crucial importance to stabilize liquidity, economic growth, and price level in an economy.

The central bank also measures macroeconomic liquidity by formulating various 'liquidity' aggregates in addition to the monetary aggregates. While the instruments issued by the banking system are included in 'money', instruments, those which are close substitutes of money but are issued by the non-banking financial institutions are also included in liquidity aggregates.

L1 = NM3 + All deposits with the post office savings banks (excluding National Savings Certificates).

L2 = L1 + Term deposits with term lending institutions and refinancing institutions (FIs) + Term borrowing by FIs + Certificates of deposit issued by FIs.

L3 = L2 + Public deposits of non-banking financial companies

2.5 DETERMINANTS OF MONEY SUPPLY

There are two alternate theories in respect of determination of money supply. According to the first view, money supply is determined *exogenously* by the central bank. The second view holds that the money supply is determined endogenously by changes in the economic activities which affect people's desire to hold currency relative to deposits, rate of interest, etc. The current practice is to explain the determinants of money supply based on 'money multiplier approach' which focuses on the relation between the money stock and money supply in terms of the monetary base or high-powered money. The monetary base is the sum of currency in circulation and bank reserves. This approach holds that total supply of nominal money in the economy is determined by the joint behaviour of the central bank, the commercial banks and the public. Before we discuss the determinants of money supply, it is necessary that we know the concept of money multiplier.

2.6 THE CONCEPT OF MONEY MULTIPLIER

The money supply is defined as

$$M = m \times MB$$

Where M is the money supply, m is money multiplier and MB is the monetary base or high powered money. From the above equation we can derive the money multiplier (m) as

$$\text{Money Multiplier (m)} = \frac{\text{Money supply}}{\text{Monetary base}} \dots$$

Money multiplier m is defined as a ratio that relates the changes in the money supply to a given change in the monetary base. It is the ratio of the stock of money to the stock of high powered money. It denotes by how much the money supply will change for a given change in high-powered money. The money-multiplier process explains how an increase in the monetary base causes the money supply to increase by a multiplied amount. For instance, if there is an injection of Rs.100 Cr through an open market operation by the central bank of the country and if it leads to an increment of Rs.500 Cr. of final money supply, then the money multiplier is said to be 5. Hence, the multiplier indicates the change in monetary base which is transformed into money supply.

The multiplier indicates what multiple of the monetary base is transformed into money supply. In other words, money and high powered money are related by the money multiplier. We make two simplifying assumptions as follows;

- Banks never hold excess reserves.
- Individuals and non-bank corporations never hold currency.

What determines the size of the money multiplier? The money multiplier is the reciprocal of the reserve ratio. Deposits, unlike currency held by people, keep only a fraction of the high-powered money in reserves and the rest is lent out and culminate in money creation. If R is the reserve ratio in a country for all commercial banks, then each unit of (say Rupee) money reserves generates $1/R$ money.

Therefore, for any value of R , the Money Multiplier is $\frac{1}{R}$

For example, if $R = 10\%$, the value of money multiplier will be 10. If the reserve ratio is only 5 %, then money multiplier is 20. Thus, the higher the reserve ratio, the less of each deposit banks loan out, and the smaller the money multiplier.

If some portion of the increase in high-powered money finds its way into currency, this portion does not undergo multiple deposit expansion. The size of the money multiplier is reduced when funds are held as cash rather than as

demand deposits. In other words, as a rule, an increase in the monetary base that goes into currency is not multiplied, whereas an increase in monetary base that goes into supporting deposits is multiplied.



2.7 THE MONEY MULTIPLIER APPROACH TO SUPPLY OF MONEY

The money multiplier approach to money supply propounded by Milton Friedman and Anna Schwartz, (1963) considers three factors as immediate determinants of money supply, namely:

- (a) the stock of high-powered money (H)
- (b) the ratio of reserves to deposits or reserve-ratio $r = \{\text{Reserves/Deposits } R/D\}$ and
- (c) the ratio of currency to deposits, or currency-deposit ratio $c = \{C/D\}$

You may note that these represent the behaviour of the central bank, behaviour of the commercial banks and the behaviour of the general public respectively. We shall now describe how each of the above contributes to the determination of aggregate money supply in an economy.

a) The Behaviour of the Central Bank

The behaviour of the central bank which controls the issue of currency is reflected in the supply of the nominal high-powered money. Money stock is determined by the money multiplier and the monetary base (H) is controlled by the monetary authority. If the behaviour of the public and the commercial banks remains unchanged over time, the total supply of nominal money in the economy will vary directly with the supply of the nominal high-powered money issued by the central bank.

b) The Behaviour of Commercial Banks

By creating credit, the commercial banks determine the total amount of nominal demand deposits. The behaviour of the commercial banks in the economy is reflected in the ratio of their cash reserves to deposits known as the 'reserve ratio'. If the required reserve ratio on demand deposits increases while all the other variables remain the same, more reserves would be needed. This implies that banks must contract their loans, causing a decline in deposits and hence in the money supply. If the required reserve ratio falls, there will be greater expansions of deposits because the same level of reserves can now support more

deposits and the money supply will increase. To sum up, smaller the reserve ratio larger will be the money multiplier.

In actual practice, however, the commercial banks keep only the required fraction of their total deposits in the form of cash reserves. However, for the commercial banking system as a whole, the actual reserves ratio may be greater than the required reserve ratio since the banks keep a higher than the statutorily required percentage of their deposits in the form of cash reserves as a buffer against unexpected events requiring cash.

The excess reserves (ER) which are funds that a bank keeps back beyond what is required by regulation form a very important determinant of money supply. 'Excess reserves' are the difference between total reserves (TR) and required reserves (RR). Therefore, $ER = TR - RR$. If total reserves are Rs 800 billion, whereas the required reserves are Rs 600 billion, then the excess reserves are Rs 200 billion.

The additional units of high-powered money that goes into 'excess reserves' of the commercial banks do not lead to any additional loans, and therefore, these excess reserves do not lead to creation of money. Therefore, if the central bank injects money into the banking system and these are held as excess reserves by the banking system, there will be no effect on deposits or currency and hence no effect on money supply.

When the costs of holding excess reserves rise, we should expect the level of excess reserves to fall; when the benefits of holding excess reserves rise, we would expect the level of excess reserves to rise. Two primary factors namely market interest rates and expected deposit outflows affect these costs and benefits and hence in turn affect the excess reserves ratio.

We know that the cost to a bank while holding excess reserves is in terms of its opportunity cost, i.e. the interest that could have been earned on loans or securities if the bank had chosen to invest in them instead of excess reserves. If interest rate increases, it means that the opportunity cost of holding excess reserves rises because the banks have to sacrifice possible higher earnings and hence the desired ratio of excess reserves to deposits falls. Conversely, a decrease in interest rate will reduce the opportunity cost of excess reserves, and excess reserves will rise. Therefore, we conclude that the banking system's excess reserves ratio r is negatively related to the market interest rate.

If banks fear that deposit outflows are likely to increase (that is, if expected deposit outflows increase), they will want more assurance against this possibility

and will increase the excess reserves ratio. Conversely, a decline in expected deposit outflows will reduce the benefit of holding excess reserves and excess reserves will fall.

As we know, money is mostly held in the form of deposits with commercial banks. Therefore, money supply may become subject to 'shocks' on account of behaviour of commercial banks which may present variations overtime either cyclically and more permanently. For instance, in times of financial crises, banks may be unwilling to lend to the small and medium scale industries who may become credit constrained facing a higher risk premia on their borrowings. The rising interest rates on bank credit to the commercial sector reflecting higher risk premia can co-exist with the lowering of policy rates by the central bank. The lower credit demand can lead to a sharp deceleration in monetary growth at a time when the central bank pursues an easy monetary policy. (Refer Box *1 below)

c) The Behaviour of the Public

We shall now turn to the next determinant viz. the behaviour of the public represented by the currency-deposit ratio c . The payment habits of the public determine how much currency is held relative to deposits. The public, by their decisions in respect of the amount of nominal currency in hand (how much money they wish to hold as cash) is in a position to influence the amount of the nominal demand deposits of the commercial banks. The behaviour of the public influences bank credit through the decision on ratio of currency to the money supply designated as the 'currency ratio'.

What would be the behaviour of money supply when depositors decide to increase currency holding, with all other variables unchanged? In other words, you decide to keep more money in your pocket and less money in your bank. That means you are converting some of your demand deposits into currency. If many people like you do so, technically we say there is an increase in currency ratio.

As we know, demand deposits undergo multiple expansions while currency in your hands does not. Hence, when bank deposits are being converted into currency, banks can create only less credit money. The overall level of multiple expansion declines, and therefore, money multiplier also falls. Hence, we conclude that money multiplier and the money supply are negatively related to the currency ratio c .

The currency-deposit ratio (c) represents the degree of adoption of banking habits by the people. This is related to the level of economic activities or the GDP

growth and is influenced by the degree of financial sophistication in terms of ease and access to financial services, availability of a richer array of liquid financial assets, financial innovations, institutional changes etc.

The smaller the currency-deposit ratio, the larger would be the money multiplier. This is because a smaller proportion of high powered money is being used as currency and therefore, a larger proportion is available to be reserves which get transformed into money.

The time deposit-demand deposit ratio i.e. how much money is kept as time deposits compared to demand deposits, also has an important implication for the money multiplier and, hence for the money stock in the economy. An increase in TD/DD ratio means that greater availability of free reserves and consequent enlargement of volume of multiple deposit expansion and monetary expansion.

To summarise the money multiplier approach, the size of the money multiplier is determined by the required reserve ratio (r) at the central bank, the excess reserve ratio (e) of commercial banks and the currency ratio (c) of the public. The lower these ratios are, the larger the money multiplier is. In other words, the money supply is determined by high powered money (H) and the money multiplier (m) and varies directly with changes in the monetary base, and inversely with the currency and reserve ratios. Although these three variables do not completely explain changes in the nominal money supply, nevertheless they serve as useful devices for analysing such changes. Consequently, these variables are designated as the 'proximate determinants' of the nominal money supply in the economy.

We may now rewrite the money multiplier including the above variables.

$$M = C + D \quad (1)$$

$$H = C + \text{reserves} \quad (2)$$

Where C is currency and D is deposits which are assumed to be demand deposits. We summarise the behaviour of the public, banks and the central bank by three variables namely, currency-deposit ratio $c = C/D$, reserve-ratio $r = \text{Reserves}/D$, and the stock of high-powered money (H)

Rewriting equation (1) and (2) above as

$$M = (c+1) D,$$

$$H = (c+ r) D$$

$$M = \frac{1+c}{r+c} \times H = m \times H$$

$$m = \frac{1+c}{r+c}$$

When there are excess reserves, the money multiplier m is expressed as

$$m = \frac{1+c}{r+e+c}$$

$$\text{Money Supply } M = \frac{1+c}{r+e+c} \times H$$

The money multiplier is a function of:

- the currency ratio set by depositors c which depends on the behaviour of the public
- excess reserves ratio set by banks e , and
- the required reserve ratio set by the central bank r , which depends on prescribed CRR and the balances necessary to meet settlement obligations.

A simple example will explain the concept

Numerical Illustration

- In Gladys land,

$$r = 10\% = 0.10$$

Currency = 400 billion

Deposits = 800 billion

Excess Reserves = 0.8 billion = 800 million

Money Supply is $M = \text{Currency} + \text{Deposits} = 1200$ billion

$c = C/D = 400 \text{ billion}/800 \text{ billion} = 0.5$ or depositors hold 50 percent of their money as currency

$e = 0.8 \text{ billion} / 800 \text{ billion} = 0.001$ or banks hold 0.1% of their deposits as excess reserves.

$$m = \frac{1 + c}{r + e + c}$$

Multiplier

$$, = 1 + 0.5 / 0.1 + 0.001 + 0.5 = 1.5 / 0.601 = 2.5$$

Therefore, a 1 unit increase in H leads to a 2.50 units increase in M.

The simple deposit multiplier in this example would be $1/r = 1/0.1 = 10$

The difference is due to inclusion of currency and excess reserves in calculating the multiplier.

- (b) If the reserve ratio is increased to 15 percent, the value of the money multiplier will be,

$$= 1 + 0.5 / 0.15 + 0.001 + 0.5 = 1.5 / 0.651 = 2.3$$

Obviously, r and m are negatively related: m falls when r rises, and m rises when r falls. The reason is that less multiple deposit creation can occur when r rises, while more multiple deposit creation can occur when r falls.

2.8 Monetary Policy and Money Supply

If the central bank of a country wants to stimulate economic activity it does so by infusing liquidity into the system. Let us take the example of open market operations (OMO) by central banks. Purchase of government securities injects high powered money (monetary base) into the system. Assuming that banks do not hold excess reserves and people do not hold more currency than before, and also that there is demand for loans from businesses, the credit creation process by the banking system in the country will create money to the tune of

$$\Delta \text{Money supply} = \frac{1}{R} \times \Delta \text{Reserves}$$

The effect of an open market sale is very similar to that of open market purchase, but in the opposite direction. In other words, an open market purchase by central bank will reduce the reserves and thereby reduce the money supply.

Is it possible that the value of money multiplier is zero? It may happen when the interest rates are too low and the banks prefer to hold the newly injected reserves as excess reserves with no risk attached to it.



2.9 EFFECT OF GOVERNMENT EXPENDITURE ON MONEY SUPPLY

Whenever the central and the state governments' cash balances fall short of the minimum requirement, they are eligible to avail of a facility called Ways and Means Advances (WMA)/overdraft (OD) facility. When the Reserve Bank of India lends to the governments under WMA /OD, it results in the generation of excess reserves (*i.e.*, excess balances of commercial banks with the Reserve Bank). This happens because when government incurs expenditure, it involves debiting the government balances with the Reserve Bank and crediting the receiver (for e.g., salary account of government employee) account with the commercial bank. The extra reserves thus created can potentially lead to an increase in money supply through the money multiplier process.

The Credit Multiplier

The Credit Multiplier also referred to as the deposit multiplier or the deposit expansion multiplier, describes the amount of additional money created by commercial bank through the process of lending the available money it has in excess of the central bank's reserve requirements. The deposit multiplier is, thus inextricably tied to the bank's reserve requirement. This measure tells us how much new money will be created by the banking system for a given increase in the high-powered money. It reflects a bank's ability to increase the money supply.

The credit multiplier is the reciprocal of the required reserve ratio. If reserve ratio is 20%, then credit multiplier = $1/0.20 = 5$.

$$\text{Credit Multiplier} = \frac{1}{\text{Required Reserve Ratio}}$$

The existence of the credit multiplier is the outcome of fractional reserve banking. It explains how increase in money supply is caused by the commercial banks' use of depositors' funds to lend money. When a bank uses the deposited money for lending, the bank generates another claim on a given amount of deposited money. For example, if A deposits ₹ 1000/ in cash at a bank (Bank X), this constitutes the bank's current total cash deposits. If the required reserve is 10 percent, the bank would lend ₹ 900/ to B. By lending B ₹ 900/, the bank creates a deposit for ₹ 900/ that B can now use. It is as though B owns ₹ 900/. This in turn means that A will continue to have a claim against ₹ 1000/ while B will have a claim against ₹ 900/. The bank has ₹ 1000/ in cash against claims of ₹ 1900/. In short, the bank has created ₹ 900/ out of "thin air" since these ₹ 900/ are not

supported by any genuine money. At any time, the fractional reserve commercial banks have more cash liabilities than cash in their vaults.

Now suppose B buys goods worth ₹ 900/ from C and pays C by cheque. C places the cheque with his bank, Bank Y. After clearing the cheque, Bank Y will have an increase in cash of ₹ 900/, which it may take advantage of and use to lend out ₹ 810/ to D which may again be deposited in another bank, say Bank Z. Again 10 per cent of ₹ 810 (₹ 81) has to be kept as required reserves and the remaining ₹ 719/ can be lent out, say to E. This sequence keeps on continuing until the initial deposit amount ₹ 1,000 grows exactly by the multiple of required reserves (in this case, 10%). Ultimately, the expanded credit availability would be $1000 + 900$ (90% of 1000) $+ 810$ (90% of 900) $+ 729$ (90% of 810) $+ (90\% \text{ of } 719) + \dots$. This summation would end with an amount which is equivalent to $1/10\%$ of 1000, which is ₹ 10,000. Thus, in our example, the initial deposit is capable of multiplying itself out 10 times. In short, we find that the fact that banks make use of demand deposits for lending it sets in motion a series of activities leading to expansion of money that is not backed by money proper. It is interesting to know that there is no difference between the type of money created by commercial banks and that which are issued by the central bank.

The deposit multiplier and the money multiplier though closely related are not identical because:

- a) generally banks do not lend out all of their available money but instead maintain reserves at a level above the minimum required reserve.
- b) all borrowers do not spend every Rupee they have borrowed. They are likely to convert some portion of it to cash.

We need to keep in mind that creating money through credit by banks does not mean creating wealth. Money creation is not the same as wealth creation.

* 1 NOTE

While the Reserve Bank of India was pursuing all possible measures to encourage lending to combat the negative outcomes of COVID pandemic, the banks were risk averse to lending and were comfortable parking funds under reverse repo despite the very low reverse repo rate of 3.35 per cent. The average deposit of funds in the overnight reverse repo window in India increased more than three times – from an average of Rs 2.4-lakh crore during the March quarter to Rs 7-lakh crores during the June quarter. In the month of May, banks parked nearly ₹ 8-lakh crores under reverse repo on a daily average basis.

Numerical illustrations

Illustration 1

Calculate Narrow Money (M_1) from the following data

Currency with public	₹ 90000 crore
Demand Deposits with Banking System	₹ 200000 crore
Time Deposits with Banking System	₹ 220000 crore
Other Deposits with RBI	₹ 280000 crore
Saving Deposits of Post office saving banks	₹ 60000 crore

Solution

$$\begin{aligned}
 M_1 &= \text{Currency with public} + \text{Demand Deposits with Banking System} + \text{Other Deposits with the RBI} \\
 &= 90000 \text{ crore} + 200000 \text{ crore} + 280000 \text{ crore} = \mathbf{57\ 0000\text{crore}}
 \end{aligned}$$

Illustration 2

Compute credit multiplier if the required reserved ratio is 10% and 12.5% for every ₹ 1, 00,000 deposited in the banking system. What will be the total credit money created by the banking system in each case?

Solution

Credit Multiplier is the reciprocal of required reserved ratio.

$$\text{Credit Multiplier} = \frac{1}{\text{Required Reserverd Ratio}}$$

$$\text{For RRR} = 0.10 \text{ i.e. } 10\% \text{ the credit multiplier} = \frac{1}{0.10} = 10$$

$$\text{For RRR} = 0.125 \text{ i.e. } 12.5\% \text{ the credit multiplier} = \frac{1}{0.125} = 8$$

$$\text{Credit creation} = \text{Initial deposits} * \frac{1}{RRR}$$

For RRR 0.10 credit creation will be $1, 00,000 \times 1/0.10 = \text{Rs, } 10, 00,000$

For RRR 0.125 credit creation will be $1, 00,000 \times 1/0.125 = \text{Rs, } 8, 00,000$

Illustration 3

Calculate currency with the Public from the following data (₹ Crore)

1.1 Notes in Circulation	2496611
1.2 Circulation of Rupee Coin	25572
1.3 Circulation of Small Coins	743
1.4 Cash on Hand with Banks	98305

Solution

Currency with the Public (1.1 + 1.2 + 1.3 - 1.4) = (2496611+25572+743) - 98305
 = **2424621**

Illustration 4

Calculate M2 from the following data

	(₹ Crore)
Notes in Circulation	2420964
Circulation of Rupee Coin	25572
Circulation of Small Coins	743
Post Office Saving Bank Deposits	141786
Cash on Hand with Banks	97563
Deposit Money of the Public	1776199
Demand Deposits with Banks	1737692
'Other' Deposits with Reserve Bank	38507
Total Post Office Deposits	14896
Time Deposits with Banks	178694

Solution

M2 = M1+ Post Office Saving Bank Deposits

where M1 = (Notes in Circulation + Circulation of Rupee Coin + Circulation of Small Coins - Cash on Hand with Banks) + Deposit Money of the Public

= (2420964+25572+743+97563- 97563) +1776199 = **4125915**

M2 = M1+ Post Office Saving Bank Deposits = 4125915 +141786= **4267701**

Illustration 5

If the required reserve ratio is 10 percent, currency in circulation is ₹ 400 billion, demand deposits are ₹ 1000 billion, and excess reserves total ₹ 1 billion, find the value of money multiplier

Solution

$$r = 10\% = 0.10$$

Currency = 400 billion

Deposits = 1000 billion

Excess Reserves = 1 billion

Money Supply is $M = \text{Currency} + \text{Deposits} = 1400$ billion

$$c = C/D =$$

$400 \text{ billion}/1000 \text{ billion} = 0.4$ or depositors hold 40 percent of their money as currency

$e = 1 \text{ billion}/1000 \text{ billion} = 0.001$ or banks hold 0.1% of their deposits as excess reserves.

Multiplier

$$= 1 + 0.4/0.1 + 0.001 + 0.4 = 1.5/0.501 = 2.79$$

Therefore, a 1 unit increase in MB leads to a 2.79 units increase in M.

SUMMARY

- The measures of money supply vary from country to country, from time to time and from purpose to purpose.
- The high-powered money and the credit money broadly constitute the most common measure of money supply, or the total money stock of a country.
- High powered money is the source of all other forms of money. The second major source of money supply is the banking system of the country. Money created by the commercial banks is called 'credit money'.
- Measurement of money supply is essential from a monetary policy perspective because it enables a framework to evaluate whether the stock of money in the economy is consistent with the standards for price stability, to

understand the nature of deviations from this standard and to study the causes of money growth.

- The stock of money always refers to the total amount of money at any particular point of time i.e. it is the stock of money available to the 'public' as a means of payments and store of value and does not include inter-bank deposits.
- The monetary aggregates are:
 - M1 = Currency and coins with the people + demand deposits of banks (Current and Saving accounts)+ other deposits of the RBI;
 - M2 = M1 + savings deposits with post office savings banks,
 - M3 = M1 + net time deposits of banks and
 - M4 = M3 + total deposits with the Post Office Savings Organization (excluding National Savings Certificates).
- Following the recommendations of the Working Group on Money (1998), the RBI has started publishing a set of four new monetary aggregates as: Reserve Money = Currency in circulation + Bankers' deposits with the RBI + Other deposits with the RBI, NM1 = Currency with the public + Demand deposits with the banking system + 'Other' deposits with the RBI, NM2 = NM1 + Short-term time deposits of residents (including and up to contractual maturity of one year), NM3 = NM2 + Long-term time deposits of residents + Call/Term funding from financial institutions
- The Liquidity aggregates are:
 - L1 = NM3 + All deposits with the post office savings banks (excluding National Savings Certificates).
 - L2 = L1 + Term deposits with term lending institutions and refinancing institutions (FIs) + Term borrowing by FIs + Certificates of deposit issued by FIs.
- The Reserve money, also known as central bank money, base money or high powered money determines the level of liquidity and price level in the economy.
- The money multiplier approach showing relation between the money stock and money supply in terms of the monetary base or high-powered money holds that total supply of nominal money in the economy is determined by

the joint behaviour of the central bank, the commercial banks and the public.

- $M = m \times MB$; Where M is the money supply, m is money multiplier and MB is the monetary base or high powered money. It shows the relationship between the reserve money and the total money stock.
- The money multiplier is a function of the currency ratio which depends on the behaviour of the public, excess reserves ratio of the banks and the required reserve ratio set by the central bank.
- The additional units of high-powered money that goes into 'excess reserves' of the commercial banks do not lead to any additional loans, and therefore, these excess reserves do not lead to the creation of deposits.
- When the required reserve ratio falls, there will be greater multiple expansions for demand deposits.
- Excess reserves ratio e is negatively related to the market interest rate i. If interest rate increases, the opportunity cost of holding excess reserves rises, and the desired ratio of excess reserves to deposits falls.
- An increase in time deposit-demand deposit ratio (TD/DD) means that greater availability of free reserves for banks and consequent enlargement of volume of multiple deposit expansion and monetary expansion.
- When the Reserve Bank lends to the governments under WMA /OD it results in the generation of excess reserves (*i.e.*, excess balances of commercial banks with the Reserve Bank).

TEST YOUR KNOWLEDGE

I. Multiple Choice Type Questions

1. Reserve money is also known as
 - (a) central bank money
 - (b) base money
 - (c) high powered money
 - (d) all the above

2. Choose the correct statement from the following
 - (a) Money is deemed as something held by the public and therefore only currency held by the public is included in money supply.
 - (b) Money is deemed as something held by the public and therefore inter-bank deposits are included in money supply.
 - (c) Since inter-bank deposits are not held by the public, therefore inter-bank deposits are excluded from the measure of money supply.
 - (d) Both (a) and (c) above.
3. Reserve Money is composed of
 - (a) currency in circulation + demand deposits of banks (Current and Saving accounts) + Other deposits with the RBI.
 - (b) currency in circulation + Bankers' deposits with the RBI + Other deposits with the RBI.
 - (c) currency in circulation + demand deposits of banks + Other deposits with the RBI.
 - (d) currency in circulation + demand and time deposits of banks + Other deposits with the RBI.
4. M1 is the sum of
 - (a) currency and coins with the people + demand deposits of banks (Current and Saving accounts) + other deposits of the RBI.
 - (b) currency and coins with the people + demand and time deposits of banks (Current and Saving accounts) + other deposits of the RBI.
 - (c) currency in circulation + Bankers' deposits with the RBI + Other deposits with the RBI
 - (d) none of the above
5. Under the ' minimum reserve system' the central bank is
 - (a) empowered to issue currency to any extent by keeping an equivalent reserve of gold and foreign securities.
 - (b) empowered to issue currency to any extent by keeping only a certain minimum reserve of gold and foreign securities.

- (c) empowered to issue currency in proportion to the reserve money by keeping only a minimum reserve of gold and foreign securities.
 - (d) empowered to issue currency to any extent by keeping a reserve of gold and foreign securities to the extent of ₹ 350 crores
6. The primary source of money supply in all countries is
- (a) the Reserve Bank of India
 - (b) the Central bank of the country
 - (c) the Bank of England
 - (d) the Federal Reserve
7. The supply of money in an economy depends on
- (a) the decision of the central bank based on the authority conferred on it.
 - (b) the decision of the central bank and the supply responses of the commercial banking system.
 - (c) the decision of the central bank in respect of high powered money.
 - (d) both a) and c) above.
8. Banks in the country are required to maintain deposits with the central bank
- (a) to provide the necessary reserves for the functioning of the central bank
 - (b) to meet the demand for money by the banking system
 - (c) to meet the central bank prescribed reserve requirements and to meet settlement obligations.
 - (d) to meet the money needs for the day to day working of the commercial banks
9. If the behaviour of the public and the commercial banks is constant, then
- (a) the total supply of nominal money in the economy will vary directly with the supply of the nominal high-powered money issued by the central bank
 - (b) the total supply of nominal money in the economy will vary directly with the rate of interest and inversely with reserve money

- (c) the total supply of nominal money in the economy will vary inversely with the supply of high powered money
 - (d) all the above are possible
10. Under the fractional reserve system
- (a) the money supply is an increasing function of reserve money (or high powered money) and the money multiplier.
 - (b) the money supply is an decreasing function of reserve money (or high powered money) and the money multiplier.
 - (c) the money supply is an increasing function of reserve money (or high powered money) and a decreasing function of money multiplier.
 - (d) none of the above as the determinants of money supply are different
11. The money multiplier and the money supply are
- (a) positively related to the excess reserves ratio e .
 - (b) negatively related to the excess reserves ratio e .
 - (c) not related to the excess reserves ratio e .
 - (d) proportional to the excess reserves ratio e .
12. The currency ratio represents
- (a) the behaviour of central bank in the issue of currency.
 - (b) the behaviour of central bank in respect cash reserve ratio.
 - (c) the behaviour of the public.
 - (d) the behaviour of commercial banks in the country.
13. The size of the money multiplier is determined by
- (a) the currency ratio (c) of the public,
 - (b) the required reserve ratio (r) at the central bank, and
 - (c) the excess reserve ratio (e) of commercial banks.
 - (d) all the above
14. ----- tells us how much new money will be created by the banking system for a given increase in the high-powered money.
- (a) The currency ratio

- (b) The excess reserve ratio (e)
 - (c) The credit multiplier
 - (d) The currency ratio (c)
15. The money multiplier will be large
- (a) for higher currency ratio (c), lower required reserve ratio (r) and lower excess reserve ratio (e)
 - (b) for constant currency ratio (c), higher required reserve ratio (r) and lower excess reserve ratio (e)
 - (c) for lower currency ratio (c), lower required reserve ratio (r) and lower excess reserve ratio (e)
 - (d) None of the above
16. The ratio that relates the change in the money supply to a given change in the monetary base is called the
- (a) required reserve ratio.
 - (b) money multiplier.
 - (c) deposit ratio.
 - (d) discount rate.
17. For a given level of the monetary base, an increase in the required reserve ratio will denote
- (a) a decrease in the money supply.
 - (b) an increase in the money supply.
 - (c) an increase in demand deposits.
 - (d) Nothing precise can be said
18. For a given level of the monetary base, an increase in the currency ratio causes the money multiplier to _____ and the money supply to _____.
- (a) decrease; increase
 - (b) increase; decrease
 - (c) decrease; decrease
 - (d) increase; increase

19. If commercial banks reduce their holdings of excess reserves
- (a) the monetary base increases.
 - (b) the monetary base falls.
 - (c) the money supply increases.
 - (d) the money supply falls.

II. Short Answer Type Questions

- (a) Explain the nature of currency issue under minimum reserve system
- (b) Define 'credit money'.
- (c) List the components of M1
- (d) Distinguish between M1 and M2
- (e) What is the rationale behind inclusion of net demand deposits of banks in money supply measurement?
- (f) Define 'Reserve Money'
- (g) Write a note on two major components Reserve money?
- (h) Describe the term 'cash reserve ratio' (CRR)
- (i) Write a note on the liquidity aggregates compiled by RBI
- (j) Define 'money multiplier'
- (k) What is the nature of relationship between money multiplier and the money supply?
- (l) What would be the effect on money multiplier if banks hold excess reserves?
- (m) What effect does government expenditure have on money supply?
- (n) What is the value of the money multiplier in a system of 100% reserve banking?
- (o) Define credit multiplier. How is it calculated?

III. Long Answer Type Questions

1. Define money supply. Describe the different components of money supply.
2. Explain the concept of money multiplier and bring out its impact on money supply.

3. Explain the factors which determine excess reserves held by banks? How do changes in each such factor affect the excess reserves, money multiplier, and money supply?
4. Explain the money multiplier approach to money supply?
5. Describe with illustrations how changes in high powered money, required reserves, excess reserves and currency ratio, influence the moneysupply in an economy?
6. Describe the different determinants of money supply in a country.

IV. Application Oriented Question (Just for Practice)

1. Prepare separate graphs using excel on 'Money Stock: Components and Sources' and 'Reserve Money: Components and Sources' for four previous months from the weekly statistical supplements published by Reserve Bank of India. Identify the trends in each.
2. Compute Reserve Money from the following data published by RBI

Components	(In billions of ₹) As on 7 July 2017
Currency in Circulation	15428.40
Bankers' Deposits with RBI	4596.18
'Other' Deposits with RBI	183.30

3. Compute M3 from the following data published by RBI

Components	(In billions of ₹) As on 31 March, 2017
Currency with the Public	12637.1
Demand Deposits with Banks	14,106.3
Time Deposits with Banks	101,489.5
'Other' Deposits with Reserve Bank	210.9

4. What will be the total credit created by the commercial banking system for an initial deposit of ₹ 1000/ for required reserve ratio 0.02, 0.05 and 0.10 percent respectively? Compute credit multiplier

5. How would each of the following affect money multiplier and money supply?
- (i) Commercial banks in India decide to hold more excess reserves
 - (ii) Fearing shortage of money in ATMs, people decide to hoard money
 - (iii) Banks open large number ATMs all over the country
 - (iv) E banking becomes very common and nearly all people use them
 - (v) During festival season , people decide to use ATMs very often
 - (vi) If banks decide to keep 100% reserves. What would be the effect on money multiplier and money supply?
 - (vii) Suppose banks need to keep no reserves only 0% reserves are there.

ANSWERS/HINTS

I. Multiple Choice Questions

1. (d) 2. (c) 3. (b) 4. (a) 5. (b) 6. (b)
 7. (b) 8. (c) 9. (a) 10. (a) 11. (b) 12. (c)
 13. (d) 14. (c) 15. (c) 16. (b) 17. (a) 18. (c)
 19. (c)

II. Short Answer Type Questions

- (a) Under the 'minimum reserve system' the central bank is empowered to issue currency to any extent by keeping only a certain minimum reserve of gold and foreign securities.
- (b) 'Credit money' refers to the fraction of money supply created by commercial banks in the process of borrowing and lending transactions with the public.
- (c) M1 is composed of currency and coins with the people, demand deposits of banks (current and saving accounts) and other deposits of the RBI.
- (d) M2 includes M1(as above) as well as savings deposits with post office savings banks

- (e) Money is deemed as something held by the 'public'. Since inter-bank deposits are not held by the public, they are netted out of the total demand deposits to arrive at net demand deposits.
- (f) Reserve Money is composed of currency in circulation, bankers' deposits with
- (g) the RBI and other deposits with the RBI
- (h) Reserve money has two major components – currency in circulation and reserves. Currency in circulation comprises currency with the public and cash in hand with banks. Reserves are bank deposits with the central bank.
- (i) Banks in the country are required to maintain deposits with the central bank to meet the central bank prescribed reserve requirements or cash reserve ratio (CRR) as also to meet settlement obligations. They represent balances maintained by banks in the current account with the Reserve Bank of India.
- (j) The liquidity aggregates are: L1 which is composed of NM3, all deposits with the post office savings banks (excluding National Savings Certificates), L2 which comprises of L1, term deposits with term lending institutions and refinancing institutions (FIs), term borrowing by FIs and certificates of deposit issued by FIs and L3 consisting of L2 and Public deposits of non-banking financial companies
- (k) The money supply is defined as $M = m \times MB$ where M is the money supply, m is money multiplier and MB is the monetary base or high powered money. Money multiplier m is defined as a ratio that relates the change in the money supply to a given change in the monetary base.
- (l) The multiplier indicates what multiple of the monetary base is transformed into money supply. The link from reserve money to money supply is through the money multiplier. The multiplier process operates as long as banks have excess reserves.
- (m) The additional units of high-powered money that goes into 'excess reserves' of the commercial banks do not lead to any additional loans, and therefore, these excess reserves do not lead to creation of deposits. In other words, excess reserves may be considered as an idle component of reserves and therefore has no effect on money multiplier.
- (n) When the Reserve Bank lends to the governments under WMA /OD it results in the generation of excess reserves (*i.e.*, excess balances of commercial

banks with the Reserve Bank). The excess reserves thus created can potentially lead to an increase in money supply through the money multiplier process.

- (o) If banks keep the whole deposits as reserve, deposits simply replace currency as reserves and therefore no new extra claims will be created and no new money will be created by banks.
- (p) The Credit Multiplier also referred to as the deposit multiplier or the deposit expansion multiplier, describes the amount of additional money created by commercial bank through the process of lending the available money it has in excess of the central bank's reserve requirements. It is the reciprocal of the required reserve ratio. If reserve ratio is 20%, then credit multiplier = $1/0.20 = 5$.

$$\text{Credit Multiplier} = \frac{1}{\text{Required Reserve Ratio}}$$

III Hints to Long Answer Type Questions

- I. The length of the answer should relate to the marks allotted.
- II. The answer should be structured in three parts in the following style.
 - (a) Explain the economic fundamentals underlying the action/issue by integrating the course material in innovative ways; not necessarily confined to one unit. This part provides an opportunity for students to explain their understanding of the underlying theory. The examiner may easily discern the level of cognition of the student. This should be a compulsory component with a reasonably high proportion of marks earmarked.
 - (b) Analyse the issue at hand (given the framework and tools) and explain the policy position by applying the fundamentals as explained in (a) above.
 - (c) Substantiate with illustrations from current economic scenario

IV Application Oriented Questions

- 1. From the RBI website, collect the relevant information from the 'publications (weekly) page.
- 2. Reserve Money = Currency in Circulation + Bankers' Deposits with RBI + 'Other' Deposits with

3. $RBI15428.40 + 4596.18 + 183.30 = \mathbf{20207.88}$
4. $M3 = 128,443.9$ Currency with the Public + Demand Deposits with Banks + Time Deposits with Banks + 'Other' Deposits with Reserve Bank
 $= 12637.1 + 14,106.3 + 101,489.5 + 210.9 = \mathbf{128,443.8}$
4. Credit Multiplier = $1 / \text{Required Reserve Ratio}$
 $1000 \times 1/0.02 = 50,000$
 $1000 \times 1/0.05 = 20,000$
 $1000 \times 1/0.10 = 10,000$
5. (i) Excess reserves are those reserves that the commercial banks hold with the central bank in addition to the mandatory reserve requirements. Excess reserves result in an increase in reserve-deposit ratio of banks; less money for lending reduces money multiplier; money supply declines.
- (ii) When people hold more money, it increases the currency-deposit ratio; reduces money multiplier; money supply declines.
- (iii) ATMs let people to withdraw cash from the bank as and when needed, reduces cost of conversion of deposits to cash and makes deposits relatively more convenient. People hold less cash and more deposits, thus reducing the currency-deposit ratio; increasing the money multiplier causing the money supply to increase
- (iv) See (iii) above
- (v) If people, for any reason, are expected to withdraw money from ATMs with more frequency, then banks will want to keep more reserves. This will raise the reserve ratio, and lower the money multiplier. As a result money supply will decline
- (vi) If banks decides to keep 100% reserves, then the Money multiplier = $1 / \text{required reserve ratio} = 1 / 100\% = 1$. No additional money supply as there is no credit creation
- (vii) If the required reserve ratio is 0 %, then money multiplier is infinite and there will be unlimited money creation. There will be chaos with spiraling prices as money supply is too much and real output cannot increase.