# Module 3

# MACRO MACROECONOMICS

## Aggregate Demand Consumption Function:

**AGGREGATE DEMAND** :

Aggregated demand means the total demand for final goods & services in an economy.

It is actually Total (Final) Expenditure of all the units of the economy i.e. Households, Firms, Government & Rest of the World.

THE VARIOUS COMPONENTS OF AGGREGATE DEMAND:

**AD = C + I + G + (X-M)**

**(a) PRIVATE (HOUSEHOLD) CONSUMPTION EXPENDITURE (C )**

It comprises households' expenditure on the consumption of goods and services.

These goods can be durable, semi-durable or non-durable.

Consumption of households depends upon their Disposable Income & MPC.

**(b) INVESTMENT EXPENDITURE ( I )**

It refers to the expenditure incurred by firms on the purchase of capital goods like machines, plant, equipment, etc. to increase the production capacity.

Investment decisions depend upon the relative values of MEI (Rate of Return) & ROI (Rate of Interest).

**(c) GOVERNMENT EXPENDITURE (G)**

It refers to expenditure incurred by the government on the purchase of consumer goods and
capital goods to satisfy the collective wants of the society. For example– Public parks, hospitals, Roads, etc. Government expenditure depends upon the priorities of the Government.

**(d) NET EXPORTS (X-M)**

It is the difference between exports and imports.

It reflects the net demand for a domestic product by the rest of the world.

Net exports depend upon many things like Foreign Trade Policy, Foreign Exchange Rate,
Comparative Prices & Quality, etc.

**AGGREGATE DEMAND IN A TWO SECTOR MODEL:**

In a two-sector Keynesian model, aggregate demand is composed of planned or desired consumption demand and planned investment demand. The total of planned expenditure (C + I) must be equal to the value of output or income for a simple economy to be in equilibrium.

**AGGREGATE SUPPLY:**

Aggregate supply is the money value of total output available in the economy for purchase during a given period. When expressed.

In physical terms, aggregate supply refers to the total production of goods and services in an economy. It is assumed that in the short run, prices of goods do not change and elasticity of supply is infinite.

**Aggregate Supply = Output = Income**

Main components of aggregate supply are two, namely, consumption and saving. A major portion of income is spent on consumption of goods and services and the balance is saved. Thus, national income (Y) or aggregate supply (AS) is the sum of consumption expenditure (C) and savings (S).

**AS = C + S, i.e., Y = C + S**

## Consumption function

Equation of **Consumption Function:**

**C = + MPC * Y** where C = Consumption, = Autonomous consumption.

MPC(b)= Marginal Propensity to consume

**Saving Function:**

Saving is that part of income which is not spent on current consumption. The The relationship between saving and income is called the saving function.

Symbolically, S = f (Y)

(i) Saving can be negative (-) at zero or low level of income .

(ii) As Income increases, savings also increase but more than the increase in income saving is residual income of households that is left after consumption.

**S = Y-C**

**Saving function equation:**

As saving function is corollary of consumption function, we can derive the corresponding saving function from consumption function equation C = c + bY by substituting it in the equation S = Y – C as shown below. Where C = Autonomous consumption (- C represents dissaving which is needed to finance autonomous consumption. Clearly, at zero level of income, amount of autonomous consumption = Amount of dissaving.), b = MPC (so that 1 – b represents MPS, i.e.. Marginal propensity to save), Y = Income.

Investment It refers to real investment which adds to capital equipment. It leads to increase in the levels of income and production by increasing the production and purchase of capital goods.

**Types of Investment:**

**1. Induced Investment**

Real investment may be induced. Induced investment is profit or income motivated. Factors like prices, wages and interest changes which affect profits influence induced investment. Similarly demand also influences it. When income increases, consumption demand also increases and to meet this, investment increases. In the ultimate analysis, induced investment is a function of income i.e., I = f(Y). It is income elastic. It increases or decreases with the rise or fall in income.

**2. Autonomous Investment**

Autonomous investment is independent of the level of income and is thus income inelastic. It is influenced by exogenous factors like innovations, inventions, growth of population and labour force, researches, social and legal institutions, weather changes, war, revolution, etc.

But it is not influenced by changes in demand.

Rather, it influences the demand. Investment economic and social overheads whether made by the government or the private enterprise is autonomous.Such investment includes expenditure on building, dams, roads, canals, schools, hospitals, etc. Since investment on these projects is generally associated with public policy, autonomous investment is regarded as public investment.

**Psychological Law of Consumption:**

The Keynesian concept of consumption function stems from the fundamental psychological law of consumption which states that there is a common tendency for people to spend more on consumption when income increases, but not to the same extent as the rise in income because a part of the income is also saved. The community, as a rule, consumes as well as saves a larger amount with a rise in income.

**Keynes' psychological law of consumption is based on the following propositions:**

- When the total income of a community increases, the consumption expenditure of the community will also increase, but less proportionately.
- It follows from this that an increase in income is always bifurcated into spending and saving.
- An increase in income will, thus, lead to an increase in both consumption and savings. This means that with an increase in income

in the community, we cannot normally expect a reduction in total consumption or a reduction in total savings.

A rising income will often be accompanied by increased savings and a falling income by decreased savings. The rate of increase or decrease in savings will be greater in the initial stages of increase or decrease of income than in the later stages.

The gist of Keynes‟ **law is that consumption mainly depends on income and that income recipients always do not tend to spend all of the increased income on consumption.**

**This is the fundamental maxim upon which Keynes‟** concept of consumption function is based.

## Absolute Income Hypothesis

Keynes' consumption function has come to be known as the 'absolute income hypothesis' or theory. His statement of the relationship between income and consumption was based on the **'fundamental psychological law'.**

He said that consumption is a stable function of current income (to be more specific, current disposable income—income after tax payment).

Because of the operation of the 'psychological law', his consumption function is such that

**$0 < MPC < 1$ and $MPC < APC$**.

Thus, a non proportional relationship (i.e., APC > MPC) between consumption and income exists in the Keynesian absolute income hypothesis. His consumption

function may be rewritten here with the form

**C = a + bY, where a > 0 and 0 < b < 1.**

It may be added that all the characteristics of Keynes' consumption function are based not on any empirical observation, but on 'fundamental psychological law', i.e., experience and intuition.

**(i) Consumption Function in the Light of Empirical Observations:**

Meanwhile, attempts were made by the empirically-oriented economists in the late 1930s and early 1940s for testing the conclusions made in the Keynesian consumption function.

**(ii) Short Run Budget Data and Cyclical Data:**

Let us consider first the budget studies data or cross-sectional data of a cross section of the population and then time-series data. The first set of evidence came from budget studies for the years 1935-36 and 1941-42. These budget studies seemed consistent with the Keynes' own conclusion on consumption income relationship.

**(iii) Long Run Time-Series Data:**

However, Simon Kuznets (the 1971 Nobel prize winner in Economics) considered a long period covering 1869 to 1929. His data may be described as the long run or secular time-series data. This data indicated no long run change in consumption despite a very large increase in income during the said period. Thus, the long run historical data that generated long run or secular consumption function were inconsistent with the Keynesian consumption function.

**RELATIVE INCOME HYPOTHESIS**

**INTRODUCTION**

- James Duessenberry
- Relative income hypothesis states that, consumption of an individual is not the function of his absolute income but of his relative position in the income distribution in the society
- Thus, consumption is not only based on the absolute income of the
- individual but also its relative income
- Consumption behaviour is not independent but interdependent
- Income consumption relations are irreversible

**Demonstration effect**

• People have a tendency to imitate consumption habits of other people

• This tendency of a family to imitate the consumption habits of rich neighbours or ‘ joneses’ is called demonstration effect

• It is also known as Duessenberry effect

• It shows consumption functions are interdependent

• Through Demonstration effect, Duesenberry explains the social character of consumption pattern

## Ratchet effect

• High level of consumption is irreversible

• Ratchet effect means that households will not reduce their consumption much, as their income falls

• This is partly due to demonstration effect

• This is also partly due to the fact that they become accustomed to their previous higher level of consumption, and it is quite hard and difficult to reduce their consumption expenditure when their income has fallen

• They maintain the earlier consumption level by reducing savings

Features of Relative Income Hypothesis

• Consumption is proportional to relative income

• If relative income falls, APC rises

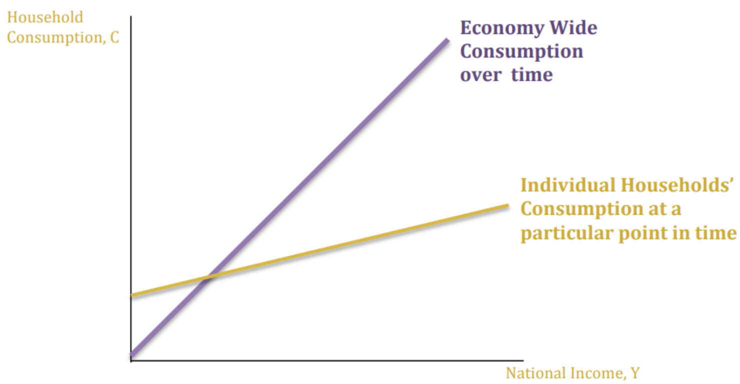
• If relative income rises, APC falls

• In the long run, APC =MPC

**Relative income hypothesis states that as income increases consumption function curve shifts above so that APC remains constant**

## The Kuznets Consumption Puzzle Kuznets

that’s actually a real name observed that consumption increases proportionately with national income over time, meaning that when the economy is £100 richer, consumption also increases by £100. However, if you tracked a particular individual,his consumption would increase by less and less as the economy grew richer. Therefore, each individualist spending less as the economy grows, but overall the economy is spending the same amount. This posed a conundrum,and the winner would receive a Nobel Prize.




## Irving Fisher and Intertemporal Choice

Keynes' absolute income hypothesis advocates that current consumption depends only on current income.

However, Irving Fisher argues that current consumption depends on lifetime income.

According to him, time of income is irrelevant as the consumer can borrow or lend between periods. On the basis of this argument, Irving Fisher developed a model to analyse how rational, forward-looking consumers make consumption choices over a period of time.

**Fisher's model takes two important assumptions as:**

- Consumers are forward-looking and choose consumption for the present and future to maximise lifetime satisfaction.
- Consumer's choices are subject to an intertemporal budget constraint-a measure of the total resources available for present and future consumption.

Given the above assumptions, Fisher's model of intertemporal choice illustrates the following three things:

(1) The budget constraints faced by consumers.

(2) The preferences between current and future consumption.

(3) How constraints and preferences conjointly determine consumer's decision regarding optimal consumption and saving over an extended period of time.

**The Intertemporal Budget Constraint:**

Rational individuals always prefer to increase the quantity or quality of the goods and services they consume. However, most people cannot consume as much as they like due to limited income called budget constraints. For the sake of simplicity let us assume that our representative consumer lives for two periods:

**(a) Period-1 represents consumer's youth life**

**(b) Period -2 represents the consumer's old age.**

Consumer's income and consumption in the two periods are Y1, and C1 and Y2 and C2, respectively.

In the first period, saving (S) is the difference between income and consumption which is
expressed as:

$$S = Y1 - C1 \ldots (1)$$

In the second period consumption equals the accumulated saving (which includes the interest(r) earned on that saving), plus second-period income which is expressed as:

$$C2 = (1 + r)S + Y2 \ldots (2)$$

## Permanent Income hypothesis

due to Milton Friedman (1957)

**Y = YP + YT**

**Y = current income**

**YP = permanent income**

Where average income, which people expect to persist into the future

YT = transitory income temporary deviations from average income

Consumers use saving & borrowing to smooth consumption in response to transitory changes in income.

The PIH consumption function:

$$C = \alpha YP$$

where $\alpha$ is the fraction of permanent income that people consume per year.

The PIH can solve the consumption puzzle:

The PIH implies

**APC = C/Y = $\alpha$ YP/Y**

If high-income households have higher transitory

income than low-income households,

APC is lower in high-income households.

Over the long run, income variation is due mainly (if not solely) to variation in permanent income, which implies a stable APC.

## Life cycle hypothesis

due to Franco Modigliani (1950s) Fisher's model says that consumption depends on lifetime income, and people try to achieve smooth consumption.

The LCH says that income varies systematically over the phases of the consumer's **"life cycle,"** and saving allows the consumer to achieve smooth consumption.

The basic model:

**W = initial wealth**

**Y = annual income until retirement**

**(assumed constant)**

**R = number of years until retirement**

**T = lifetime in years**

**Assumptions:**

- zero real interest rate (for simplicity)
- consumption-smoothing is optimal

Lifetime resources = W + RY

To achieve smooth consumption,

consumer divides her resources equally over time:

**$C = (W + RY)/T$, or**

**$C = \alpha W + \beta Y$**

where

**$\alpha = (1/T)$** is the marginal propensity to consume out of wealth

**$\beta = (R/T)$** is the marginal propensity to consume out of income

The LCH can solve the consumption puzzle:

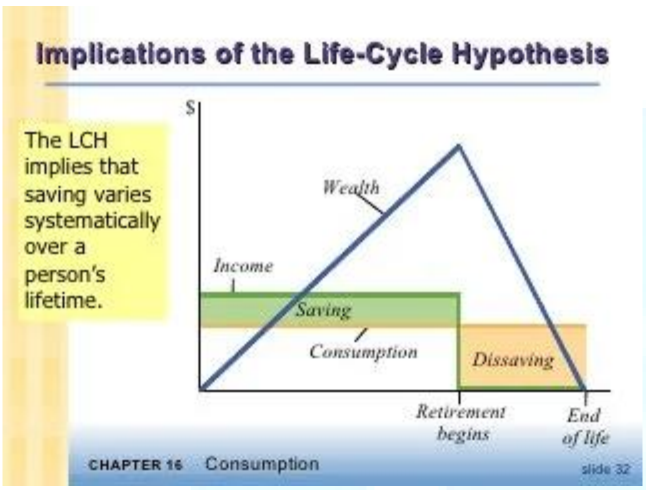
The life-cycle consumption function implies

**$APC = C/Y = \alpha(W/Y) + \beta$**

Across households, income varies more than wealth, so high-income households should have a lower APC than low-income households.

Over time, aggregate wealth and income grow together, causing APC to remain stable.

**Implications of the Life-Cycle Hypothesis**




## Investment Function

- In ordinary parlance, investment means to buy shares, stocks, bonds and securities which already exist in the stock market. But this is not real investment because it is simply a transfer of existing assets. Hence this is called financial investment which does not affect aggregate spending. In Keynesian terminology, investment refers to real investment which adds to capital equipment.

- It leads to increase in the levels of income and production by increasing the production and purchase of capital goods. Investment thus includes new plant and equipment, construction of public works like dams, roads, buildings, etc., net foreign investment, inventories and stocks and shares of new companies.
- In the words of Joan Robinson, "By investment is meant an addition to capital, such as occurs when a new house is built or a new factory is built. Investment means making an addition to the stock of goods in existence."
- Capital, on the other hand, refers to real assets like factories, plants, equipment, and inventories of finished and semi-finished goods. It is any previously produced input that can be used in the production process to produce other goods. The amount of capital available in an economy is the stock of capital. Thus capital is a stock concept.
- To be more precise, investment is the production or acquisition of real capital assets during any period of time. To illustrate, suppose the capital assets of a firm on 31 March 2004 are Rs 100 crores and it invests at the rate of Rs 10 crores during the year 2004-05. At the end of the next year.
- its total capital will be Rs 110 crores. Symbolically, let I be investment and K be capital in year t, **then $I_t = K_t - K_{t-1}$.**

**Marginal Efficiency of Capital:**

- The marginal efficiency of capital is the highest rate of return expected from an additional unit of a capital asset over its cost. In the words of Kurihara, “It is the ratio between the prospective yield to additional capital goods and their supply price.”
- The prospective yield is the aggregate net return from an asset
- during its lifetime, while the supply price is the cost of producing this asset.
- If the supply price of a capital asset is Rs. 20,000 and its annual yield is Rs. 2,000, the marginal efficiency of this asset is 2000/20000 × 100/1 = 10 per cent. Thus the marginal efficiency of capital is the percentage of profit expected from a given investment on a capital asset.
- Keynes relates the prospective yield of a capital asset to its supply price and defines the MEC as “equal to the rate of discount which would make the present value of the series of annuities given by the returns expected from the capital assets during its life just equal to its supply price.”

Symbolically, this can be expressed as:

**SP =R1/ (1+i) + R2 (1+i)2 + Rn/(1+i)n**

Where Sp is the supply price or the cost of the capital asset, R1 R2... and Rn are the prospective yields or the series of expected annual returns from the capital asset in the years, 1, 2... and n, i is the rate of discount which makes the capital asset exactly equal to the present value of the expected yield from it.

This i is the MEC or the rate of discount which equates the two sides of the equation. If the supply price of a new capital asset is Rs 1,000 and its life is two years, it is expected to yield Rs 550 in the first year and Rs 605 in the second year.

Its MEC is 10 per cent which equates the supply price to the expected yields of this capital asset. Thus

(Sp) Rs 1000 = 550/(1.10) + (605)/(1.10)2 = Rs. 500 + 500

In equation (1), the term R1/(1+i) is the present value (PV) of the capital asset. The present value is "the value of payments to be received in the future." It depends on the rate of interest at which it is discounted.

Suppose we expect to receive Rs 100 from a machine in a year's time and the rate of interest is 5 percent. The present value of this machine is

**R1 / (1+ i) =100/(1.05) = Rs 95.24**

If we expect Rs 100 from the machine after two years then its present value is100/ (1.05)2 = Rs 90.70. The present value of a capital asset is inversely related to the rate of interest. The lower the rate of interest, the higher is the present value, and vice versa. For instance, if the rate of interest is 5 percent, PV of an asset of Rs 100 for one year will be Rs 95.24; at 7 percent interest rate, it will be Rs 93.45; and at 10 percent interest rate, it will be Rs 90.91.

The relation between the present value and the rate of interest is where the rate of interest is taken on the horizontal axis while the present value of the project on the vertical axis. The curve PR shows the inverse relation between the present value and the rate of interest. If the current rate of interest is ii the present value of the project is P1 On the other hand, a higher rate of interest (i2) will lead to a lower present value (P2) when the present value curve (PR) cuts the horizontal axis at point (Z), the net present value becomes zero.

The relation between the present value and the rate of interest

As a matter of fact, the MEC is the expected rate of return over cost of a new capital asset. In order to find out whether it is worthwhile to purchase a capital asset it is essential to compare the present value of the capital asset with its cost or supply price. If the present value of a capital asset exceeds its cost of buying, it pays to buy it. On the contrary, if its present value is less than its cost, it is not worthwhile investing in this capital asset.

The same results can be had by comparing the MEC with the market rate of interest.

If the MEL of a capital asset is higher than the market rate of interest at which it is borrowed, it pays to purchase the capital asset, and vice versa. If the market interest rate equals the MEC of the capital asset, the firm is said to possess the optimum capital stock.

If the MEC is higher than the rate of interest, there will be a tendency to borrow funds in order to invest in new capital assets. If the MEC is lower than the rate of interest, no firm will borrow to invest in capital assets. Thus the equilibrium condition for a firm to hold the optimum capital stock is where the MEC equals the interest rate.

**The Marginal Efficiency of Investment (MEI):**

The marginal efficiency of investment is the rate of return expected from a given investment on a capital asset after covering all its costs, except the rate of interest. Like the MEC, it is the rate which equates the supply price of a capital asset to its prospective yield.

The investment on an asset will be made depending upon the interest rate involved in getting funds from the market.

If the rate of interest is high, investment is at a low level. A low rate of interest leads to an increase in in-vestment. Thus the MEI relates the investment to the rate of interest. The MEI schedule shows the amount of investment demanded at various rates of interest.

That is why it is also called the investment demand schedule or curve which has a negative slope, as shown in. At Or1 rate of interest, investment is OF. As the rate of interest falls to Or2, investment increases to 0I".

- The investment demand schedule or curve which has a negative slope To what extent the fall in the interest rate will increase investment depends upon the elasticity of the investment demand curve or the MEI curve.
- The less elastic is the MEI curve, the lower is the increase in investment as a result of fall in the rate of interest, and vice versa.
- The vertical axis measures the interest rate and the MEI and the horizontal axis meas-ures the amount of investment. The MEI and MEI' are the investment demand curves.
- The MEI curve in Panel (A) is less elastic to investment which increases by I'I". This is less than the increase in investment 2

shown in Panel (B) where the MEI' curve is elastic. Thus given the shape and position of the MEI curve, a fall in the interest rate will increase the volume of investment.

- The vertical axis measures the interest rate and the MEI and the horizontal axis meas-ures the amount of investment. On the other hand, given the rate of interest, the higher the MEI, the larger shall be the volume of investment.
- The higher marginal efficiency of investment implies that the MEI curve shifts to the right. When the existing capital assets wear out, they are replaced by new ones and level of investment increases.
- But the amount of induced investment depends on the existing level of total purchasing. So more induced investment occurs when the total purchasing is higher.
- The higher total purchasing tends to shift the MEI to the right indicating that more induce-ment to investment takes place at a given level of interest rate.
- This is explained in, where MEI1 and MEI2 curves indicate two different levels of total purchasing in the economy. Let us suppose that the MEI curve indicates that at Rs 200 crores of total purchasing, OI1 (Rs 20 crores) investment occurs at Or1 interest rate. If total purchasing rises to Rs 500 crores, the MEI1 curve shifts to the right as MEI2 and the level of induced investment increases to OI2 (Rs 50 crores) at the same interest rate Or1.

**Tobin's q James Tobin,** another Nobel-prize winner, formulated an investment theory based on financial markets.

- Tobin argued that firms' investment level should depend on the ratio of the present value of installed capital to the replacement cost of capital. This ratio is Tobin's q.
- The q theory of investment argues that firms will want to increase their capital when $q > 1$ and decrease their capital stock when $q < 1$. If $q > 1$, a firm can buy one dollar's worth of capital (at replacement cost) and earn profits that have present value in excess of one dollar.
- Under those conditions, firms increase profits by investing in more capital, so we expect investment to be high. If $q < 1$, then the present value of the profits earned by installing new capital are less than the cost of the capital, so more investment lowers profit. We expect investment to be near zero if $q < 1$. When $q < 1$,
- Someone seeking to enter a particular industry can acquire the necessary capital assets more cheaply by buying an existing firm than by building a new one with new capital. This is true because the value of installed capital (i.e., the cost of buying an existing firm) is less than the replacement cost (the cost of building a new firm). Romer's analysis shows that Tobin's q is exactly the costate variable (or Lagrange multiplier) q.

➢ The key to understanding the connection between the costate variable and Tobin's market interpretation of q is Romer's equation .

➢ This equation shows that q(t) is equal to the present value (as of time t) of the stream of real profits per unit of capital that will be earned from time t into the infinite future. Since a prospective buyer of a share in a firm has a claim on this stream of profits, she will be willing to pay exactly this present value of the stream for each unit of capital she implicitly buys when she buys shares in the firm.

➢ Because we are normalising the real cost of new capital at one, q will thus equal the ratio of the market value of a firm's stock (qκ) to the replacement cost of its capital (κ). If q > 1, then firms can sell a share of new stock for more than a dollar, buy a dollar's worth of capital, and pocket the difference as profit.

➢ Hence investment will be high when q > 1. When we solve the model for the optimal rate of investment, it turns out to be an increasing function of q, K ( ) ( ( )), t f qt = with f ′ > 1 and f (1) = 0. If the adjustment cost function is quadratic, as we suggested earlier, then the f function is linear and investment is a linear function of q.

## The Modigliani-Miller theorem

You would expect that the leverage decision of a firm would affect the firm's attractiveness to potential buyers of its stock and to potential lenders and, in practice, investors often do pay attention to leverage ratios. However, in a perfect capital market where everyone has full information about the probabilities of good and bad years and where everyone borrows and lends at the same interest rate, the value of the firm and the attractiveness of its equity turn out to be totally independent of how it is financed.

Franco Modigliani and Merton Miller demonstrated this most remarkable result .

The Modigliani-Miller theorem demonstrates that under conditions In perfect capital markets, the cost of investment to firms is the same regardless of which of the three methods of finance it chooses.

**The Modigliani-Miller theorem** shows that under some conditions the decision about how much to invest is independent of the decision about how to finance that investment, since the value of the firm is the same regardless of whether the firm issues bonds (becoming highly levered) or uses accumulated profit or the proceeds from issuing new equity. This independence allows macroeconomists to focus only on the firm's investment decision, leaving analysis of the decision about how to raise the required funds to specialists in finance. Of course the assumptions underlying the Modigliani-Miller theorem, like those of most macroeconomic theories, are unlikely to be completely fulfilled. The world is full of information asymmetries and other capital-market imperfections that lead to some important exceptions to the Modigliani-Miller result.

## Assumptions of the M&M Model

- Homogeneous Expectations
- Homogeneous Business Risk Classes
- Perpetual Cash Flows
- Perfect Capital Markets:
- Perfect competition
- Firms and investors can borrow/lend at the same rate
- Equal access to all relevant information
- No transaction costs
- No taxes

### MM Proposition I (No Taxes)

We can create a levered or un levered position by adjusting the trading in our own account.

This homemade leverage suggests that capital structure is irrelevant in determining the value of the firm:

**$VL = VU$**

**Proposition II**

Leverage increases the risk and return to stockholders

$Rs = R0 + (B / SL)(R0 - RB)$

RB is the interest rate (cost of debt)

Rs is the return on (levered) equity (cost of equity)

R0 is the return on un levered equity (cost of capital)

B is the value of debt

SL is the value of levered equity

## MM Propositions I & II (With Taxes)

**Proposition I (with Corporate Taxes)**

Firm value increases with leverage

$VL = VU + TCB$

**Proposition II (with Corporate Taxes)**

Some of the increase in equity risk and return is offset by the interest tax shield

$RS = R0 + (B/S)\times(1-TC)\times(R0 - RB)$

RB is the interest rate (cost of debt)

RS is the return on equity (cost of equity)

R0 is the return on un levered equity (cost of capital)

B is the value of debt

S is the value of levered equity

# Classical approach to demand for money

A central relationship in the classical model of the Money Market is the Classical Quantity Theory of Money (QTM). The classical quantity theory of money has two formulations under it:

- Velocity Formulation
- Cash balance formulation

**VELOCITY FORMULATION:**

Classical QTM explains the relationship between Quantity of Money and general price level. According to it there is a direct and equi –proportional relationship between quantity of money and general price level. The basic equation of QTM is expressed by equation of exchange which is expressed as

**MVt = PtT**

where M is the Quantity of Money, V is the velocity of money which may be defined as the rate at which money turns over in GDP transactions during a given period. P is the price index of items traded and T is the volume of transactions. Another expression of the equation of exchange focuses on income transaction i.e. MV = PY where V is the income velocity of money. MV represents the supply of money which is given and in equilibrium equals the demand for money. Thus, the equation now becomes:

**Md = PY.**

This transaction's demand for money, in turn, is determined by the level of full employment income. This equation is also called the Fisher's Equation of Exchange.

According to classical QTM, output is constant at full employment level because the labour market is always in equilibrium, so V also remains constant. So if V is fixed and output i.e.

If Y is constant then there exists a direct and equi-proportional relation between M and P. Also, the demand for money in Fisher's approach is a constant proportion of the level of transactions, which in turn, bears a constant relationship to the level of national income.

Further, the demand for money is linked to the volume of trade going on in an economy at any time. Thus the underlying assumption here is that people hold money to buy goods.

**CASH BALANCE FORMULATION:**

It is another version of the QTM that focuses on the demand for money and says that demand for money is a fraction of nominal income i.e.

Md = k(PY) where 'k' is the Cambridge constant measuring the amount of nominal GDP kept in cash form.

This approach partly overcomes the limitation of the first approach under which demand for money was not clear and the focus was how rapidly money is spent and that is why it is called the velocity formulation approach.

So, in equilibrium the exogenous supply of money must equal quantity of money demanded

i.e.

**M/k = PY or MV = PY , where V = 1/k**

Several versions of classical Quantity Theory of Money are popular. One version, also known as the transactions version, is due to Fisher. It is also called **Fisher equation of exchange**:

**M.V = P.T**

Where

T is number of transaction of average size

M is defined as quantity money,

V is velocity of circulation of money, and

P is the average price level.

where T is a proxy for level of income.

The classical macroeconomic theory relies on the QTM as the theory of demand for money.

This theory says that it is the quantity of money in the hands of the public that determines how high or low the price level will be. Such a conclusion has been reached since the level of output in the classical model is always at the full capacity (or full employment) level.

It is assumed that output in a classical system is ‘given’ or constant for the duration of the analysis.

There T is fixed and it is a proxy for national income.

Velocity of circulation of money (V) is dependent on the payment behaviour of people and is, therefore, a long term constant. It is defined as a number of times a rupee changes hands during a given accounting period.

Given the above definitions, product PT will represent the product of number of average sized transactions and average price, which is equal to the total amount of money needed to help facilitate sale/purchase of total output. On the other hand, components of the product MV show how many rupees are in circulation and how many times each is used for payments.

Thus, MV equals the amount of money available for transaction. When money available equals money needed, then there will be equilibrium in the system.

Rearranging the terms of the equation of exchange, MV = PT we get:

$$P = \left(\frac{V}{T}\right) M$$

Since V and T are both constants, this form of equation gives us a direct relationship between money supply and price level. If M doubles, P will also double. If M is reduced by half, Price level will also be halved. In this sense, classical quantity theory of money can be called a theory of price level.

According to another approach the classical QTM the demand for money can be described as the following relationships with 'nominal output'

$$M . v = P . y$$

# Cambridge Quantity theory

The Cambridge approach , named after Cambridge University, the academic home of its originators, Alfred Marshall and A. C. Pigou, also demonstrated a proportional relationship between the quantity of money and the aggregate price level. The foundation of this relationship was, however, less mechanistic than the transactions, or the Fisherian (after Irving Fisher), version of the quantity theory. Marshall began by focusing on the individual's decision on the optimal amount of money to hold. Some money will be held because of the convenience that money provides in transactions compared with other stores of value. Money also provides security by lessening the possibility of inconvenience or bankruptcy from failing to meet unexpected obligations. But as Pigou noted,

> "Currency held in the hand yields no income," so money will be held only insofar as its yield in terms of convenience and security outweighs the income lost from not investing in productive activity or the satisfaction lost by not simply using the money to purchase goods to consume. On these criteria, how much money will it be optimal to hold?

Marshall and the other Cambridge economists assumed that the demand for money would be a proportion of income. The Cambridge equation is written as

**Md = kPY**

Money demand ( Md ) is assumed to be a proportion ( k ) of nominal income, the price level ( P ) times the level of real income ( Y ).

The desirable property of money is its usefulness for transactions, so it follows that the demand for money depends on the level of transactions, which may be supposed to vary closely with income. The proportion of income that would be optimal to hold in the form of money ( k ) is assumed to be stable in the short run, depending, as in the Fisherian formulation, on the payment habits of the society.

In equilibrium, the exogenous supply of money must equal the quantity of money demanded:

**M = Md = kPY**

With k fixed in the short run and real output (Y ) determined, as before, by supply conditions, the Cambridge equation also reduces to a proportional relationship between the price level and the money supply. As in the Fisherian approach, the quantity of money determines the price level.

The formal equivalence of the Cambridge equation and Fisher's version of the equation of exchange can be seen by rewriting equation as

$$M\frac{1}{k} = P\overline{Y}$$

By comparing this with Fisher's equation we can see that the two formulations are equivalent, with V equal to 1>k . For example, if individuals wish to hold an amount equal to one-fourth of the nominal income in the form of money, the number of times the average dollar is used in income transactions will be four.

Although the two formulations of the quantity theory are formally equivalent, the The proportional relationship between the quantity of money and the price level resulted

from the fact that the proportion of nominal income people wished to hold in the form of money ( k ) was constant and the level of real output was fixed by supply conditions. Following up on Pigou's analysis of the alternatives to holding wealth in the form of money,

Keynes attacked the quantity theory by providing a new theory of money demand.

The Cambridge version represents a step toward more modern monetary theories. The Cambridge focus was on the quantity theory as a theory of the demand for money.

## Keyne's liquidity Preference approach

The term "Liquidity preference" is coined by J M Keynes in his famous book 'The General Theory' to explain the functional relation between the quantity of money demanded and the factors determining it. Everyone prefers to hold money for various reasons including its convertibility.

Money held in cash form is the most easy and most convenient form as it can be Used to meet our needs directly. As mentioned above, holding money as cash does not involve any loss or risk as an asset.

To induce people to invest it in other assets such as bond, debentures, bills of exchange, they need to be rewarded for the risk they are taking and for the sacrifice they are taking in putting away their preference.

According to Keynes, people prefer to keep at least a part of the money in liquid form for various reasons.

**He listed the reasons under three broad motives, viz., transaction motive, precautionary and speculative motive.**

**Transaction motive**:

Every individual/ economic agent need money in liquid form to meet his day to day transactions such as to buy food, medicines, transportation and other needs. The amount of money one prefer to keep in liquid form to meet his/her day to day transaction is determined by:, the size of personal income :

the higher the size of the income, the higher the demand for money. the length of the time between pay days: if payment is given on a daily basis, the less is the demand for money Spending habit: a spendthrift will demand more money than a person who spends each penny with caution.

the method of payment: The method of payment prevailing in a society also determines the amount of money to be kept in liquid form. If society converses more with modern means of payments such as online payment, bank transactions including payments through cheques, etc the amount of money individuals keep in liquid form will be less. Thus, we can put transaction motive of money as

**Tdm = f (Y)**

where,Tdm means transaction demand for money and Y Stands for money income.

The transaction motive is broken down into two parts:

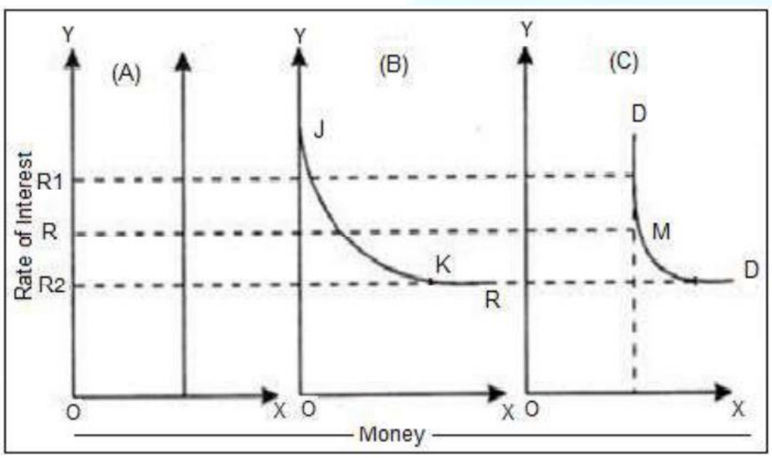
(i)income motive

(ii) business motive. Under income motive, the preference of an individual to meet day to day expenditure is included whereas under business motive, the preference of a business man to meet his business requirements such as wage payment to workers, cost of raw materials, etc. are included.

**Precautionary motive**: Individuals being rational in their behaviour, keep some money to meet unforeseen situations and emergencies. Keynes included the balances not earmarked for some definite expenditure in the near future but held instead to "provide for contingencies requiring sudden expenditure and for unforeseen opportunities of advantageous purchases" under this heading.People are uncertain about the fluctuations arise in the spending and so to meet this uncertain and unforeseen expenditure, they keep a part of their income in liquid form. The demand for money arise from people to meet some unforeseen emergencies,contingencies and accidents and the business firms to safeguard their future as well as to take advantage of an unanticipated advantage or opportunity is called demand for the precautionary motive.

**Speculative motive**: The third source of demand for money arises from the speculative motive of the economic agents. The notion of holding money for speculative purposes was a new and revolutionary Keynesian idea. For instance, people may expect a decrease in the price of bonds (an increase in the interest rate) in future and to take advantage of that situation they hold money in liquid form. While holding money in liquid form, they do not get any interest but they assume that the future interest rate can offset the present loss of holding money. Given the expectations about the changes in the rate of interest in future, less money will be held under the speculative motive at a higher current rate of interest and more money will be held at a lower current rate of interest. Thus there exists an inverse relationship between the money held for speculative purposes and the rate of interest.

**The Demand for Money and the Liquidity PreferenceCurve**

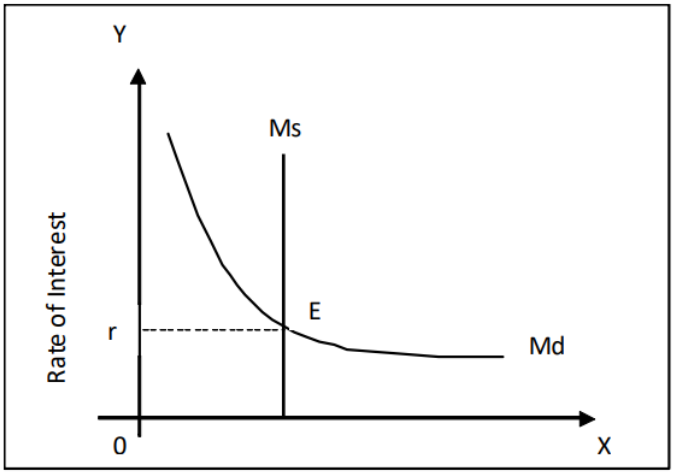



**The total demand for money is the summation of demand of the transaction motive, precautionary motive and speculative motive.**

**That is, Dm**

**= Tdm + Pdm+ Sdm.** The demand for money has a negative slope because of the inverse relationship between the speculative demand for money and the rate of i**nterest.**

**Figure 10.2: Determination of the rate of Interest:Keynes' Approach**




The equilibrium rate of interest is determined by the demand and supply of money. Given the supply of money and the income level, and sum of the transactions demand, precautionary demand and speculative demand for money will equal the supply of money at a particular rate of interest. This equating rate of interest thus becomes the equilibrium rate of interest. This has been represented with the help of Figure 10.2.

According to Keynes, monetary forces alone determine the rate of interest whereas for classical school the real forces such as productivity of capitaland thrift determine it. Further, taking a different view from the classical thinkers who were of the opinion that interest is the reward for postponing consumption for Keynes, it is the reward for 'parting with liquidity'

# Post Keynesian approaches to demand for money

## Friedman’s restatement of Quantitytheory of money

Milton Friedman in his essay (1956), “The Quantity Theory of Money – A Restatement”, reformulated the quantity theory of money. Friedman treated money as one type of asset. Economic agents such as households, firms and the government wants to hold a certain portion of their wealth in the form of money. Thus, money is an asset or capital which has a positive return. Hence Friedman's Demand for money theory is essentially a part of wealth theory. Friedman takes permanent income as a proxy for wealth.

### Money Demand Function

Wealth can be held in five different forms:

**(i) Money, (ii) Bonds, (iii) Equities,(iv) Physical Goods, and (v) Human Capital.**

Each form of wealth has unique

characteristics. Each form of wealth yields certain returns. The first four forms can be categorised as non-human wealth while the last one is human wealth. Non-human wealth can easily be converted into money. Human wealth (it refers to the income generating productive capacity of human beings such as education, skill or good health) can neither be liquidated easily nor can it be used as security to borrow money.

According to Friedman demand for money depends on the following variables:

**(i) Total wealth:** An individual's total stock of wealth is the most important determinant of his money demand. Greater the wealth of an individual, the more money he would demand for transactions and other purposes. Estimates of total wealth of an individual are seldom accurately available. Friedman used discounted value of permanent income $y_p$ as an index of wealth. The permanent income is the aggregate expected yield from wealth during the agent's lifetime.

**(ii) The proportion of human to non-human wealth:**

The proportion $(w)$ in which the wealth (permanent income) of the agent is divided between these two forms of assets is an important factor in determining the money demand in real terms. Friedman in his Permanent Income Hypothesis suggested a relatively lower MPC out of human wealth. Due to this,although the ratio of human wealth to non-human wealth remains relevant, it does not play an important role in Friedman's theory.

**(iii) The expected rate of return on money and other financial assets:**

Unlike other theories demand for money, Friedman takes broad definition of money. Thus, he includes time deposits along with the demand deposits and currency. So, money too has expected nominal return $(R_m)$ like other forms of assets. As permanent income of an individual is stable, his wealth (which is surrogate by permanent income) is stable. Money and other financial assets are competing with each other to get their share out this fixed wealth. Thus, demand for money depends on the incentives for holding other assets relative to money ( Bonds : $(R_b - R_m)$, Equities: $(R_e - R_m)$). If the return on financial assets (bonds and equities) decreases vis-à-vis money, individual agent would want to hold more money.

**(iv) Price and expected inflation:** Rising price level due to inflation has two opposing effects. Inflation erodes the purchasing power of money (in nominal terms). In such situations, an individual will want to hold higher nominal money balances to keep his real money balances constant. Further, there is an increase in the relative return on non-human assets such as real estate, gold, unique art pieces, etc. This will influence people to hold less money. Thus it will depend on the relative return ($\pi^e$- $R_m$) of physical goods.

**(v) Other variables:** Variables such as taste and preference, expected economic instability (global financial crisis, phases of business cycle), and institutional factors (method of wage payment system, payments of bills) too affect the demand for money. All these factors are captured in the variable ( $z$).

Friedman's demand for money function can be written in the following form:

$$\frac{M^d}{P} = \varphi\,(y_p\,, w,\ (R_b - R_m),\ (R_e - R_m),\ (\pi^e - R_m),\ z)$$

$\frac{M^d}{P}$ = Demand for real money balances

$y_p$ = Real permanent income

$w$ = ratio of human wealth to nonhuman wealth

$R_m$= Expected nominal return from money

$R_b$= Expected nominal return from bonds

$R_e$ = Expected nominal return from equity

$\pi^e$= Expected rate of inflation =

proxy for expected nominal return from non financial good

$z$ = Any other variables which seem to have power to affect the utility derived from real money

## Baumol-Tobin Model of Transaction Demand for Money

Here we would present a simpler version of the model which was independently developed by William Baumol (1952) and James Tobin (1956). It emphasises the cost and benefit of holding money using inventory theoretic approach. The model was originally developed to provide micro-foundations for aggregate money demand functions commonly used in Keynesian and monetarist macroeconomic models.

The following are the salient features of the model:

- Money is held for transaction purposes. Thus, it serves as a medium of exchange.
- Holding of cash is considered as an inventory on the part of the individual or economic agent. The individual would minimise the cost of holding the cash.
- Alternative to holding money in cash (which does not yield interest) is to hold interest-yielding bonds.
- For an individual, the time of receiving income and the time of spending

- money is not synchronised. Income is received once a month while
- purchases/expenditures are spread evenly throughout the month.
- Money is held in cash to bridge the time gap between the income receipt and flow of expenditure.
- Individual will exchange bond into cash to facilitate his evenly spread expenditure stream, use the cash, and again go for exchange.
- Each time the agent exchanges bonds to cash, there is some transaction cost/ brokerage fee which is fixed and independent of the volume of exchange. We call these exchanges as transactions.
- As each of this type of exchange (transaction) involves cost, the individual will keep in mind the trade-off between the interest earnings on bonds and the cost of transaction(exchange).
- Individual's average cash/money holding is determined by the number of transactions (exchanges) made.
- A rational individual would minimise his cost of exchange (transactions) and decide about his optimum number of transactions.
- Aggregate demand for money will reflect this representative individual's demand for average money holding.

Let us use the following notations:

$y$ **= periodical real income [time period could be a month or a year]**

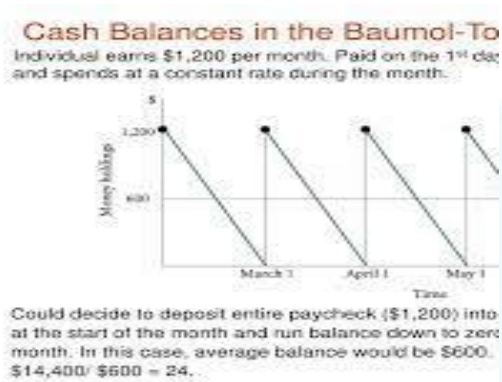
$T$ **= length of the entire period ( month or year) in days**

$n$ **= number of exchanges ( transactions) during the time period**

$b$ **= brokerage fee per transactions**

$r$ **= real interest rate**

As n number of exchanges are being made in the entire period (which has T days), the period is split into n intervals and each interval's length in days is T/n days. To facilitate the smooth, evenly distributed expenditure stream, the agent's real periodical income y is equally distributed in these n intervals and each of these interval's expenditure requirement is y/n




## Money multiplier process

The money multiplier framework postulates a relationship between ordinary M and high powered money H where M is the money produced by the RBI and the Government and held by the public in the form of currency C and Demand deposits DD.

While High powered Money H is money produced by the RBI and the Government and held by the public in the form of currency C and by the banks in the form of reserves R.In the case of Broad Money M3 we will also include Time Deposits TD.

Ignoring other deposits OD we have

**M1 = C + DD    M3 = C + DD +TD**

**Demand deposit multiplier =1/[c +(r r+e)(1+ t )]**

**Total Deposit multiplier =(1 + t) /[c + (r r + e) ( 1 + t )]**

**Currency multiplier = c /[c +(r r + e ) ( 1 + t )]**

**Narrow Money multiplier =( 1+c) /[c +(r r +e ) (1+ t)**

**Broad Money multiplier =(1 +c +t )/[c + (r r + e)(1 + t )]**

These expressions tell us the amount by which, The Demand Deposits, Total Deposits, TotalCurrency, Narrow Money and Broad Money will increase when there is a certain increase in H in the economy

**GRAPHICAL EXPOSITION OF EQUILIBRIUM AND STABILITY ANALYSIS IN THE MONEY MULTIPLIER FRAMEWORK**

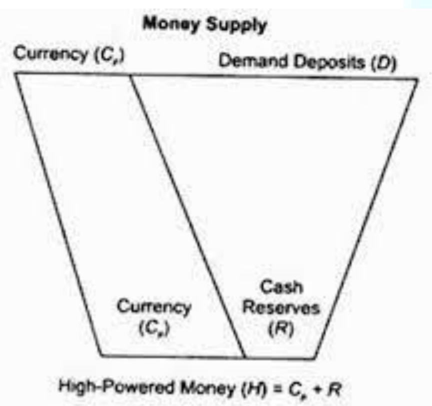


**Fig. 16.1.** *The High-Powered Money and the Stock of Total Money Supply*

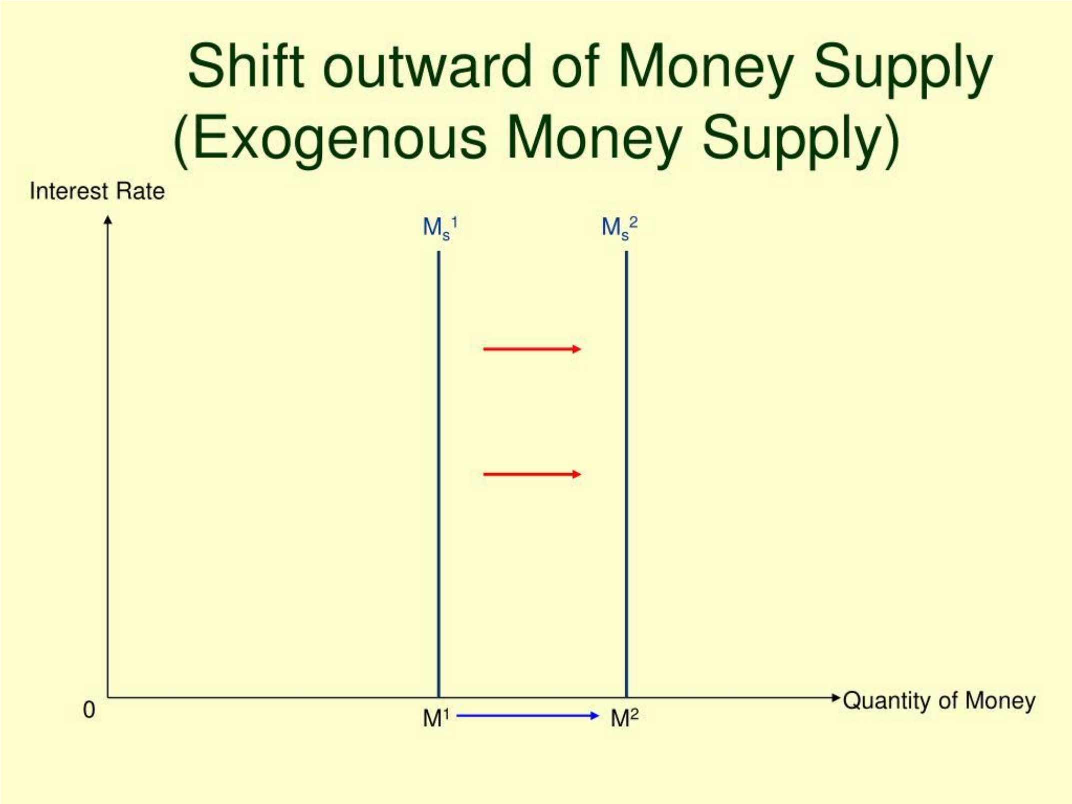
**The Money Supply Curve**

We saw that the amount of money in the economy ultimately depends on the monetary base H, the excess reserve ratio, the required reserve ratio and the currency to deposit ratio. We can depict this money supply process through two money supply curves depending on the impact of interest rates on the determinants of money supply.

**The exogenous money supply curve**

It refers to the situation where the supply of money in the economy is determined by banks' preference for excess reserves and depositors, preference for holding cash and this preference is not affected by interest rates. Here the complete money multiplier is constant, with the money supply curve vertical.

In this situation cd ,ed and r r shift the money supply curve to the left, since a rise in any of these variables leads to a lower complete money multiplier and thus a lower money supply and a decrease in any of these variables has the opposite effect. The Monetary Base has a direct effect on the Money Supply, an increase in H shifts the money supply curve to the right, whereas a decrease shifts it to the left

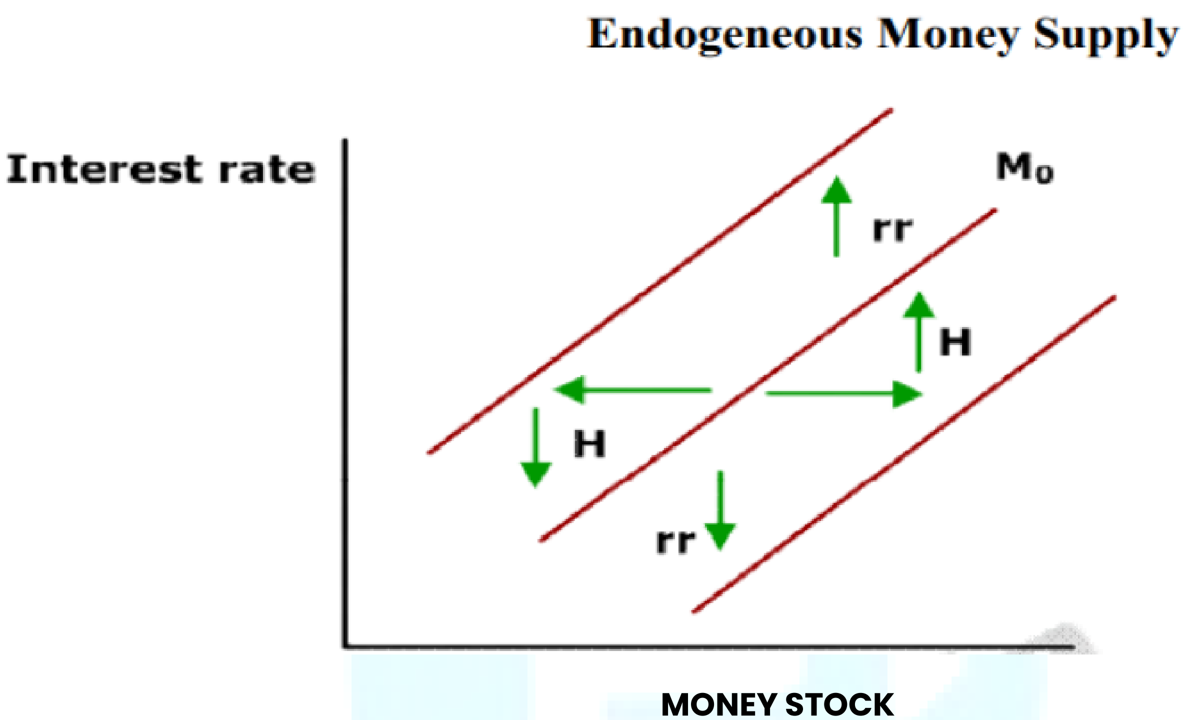



**The Endogenous Money supply curve**:

As interest rates rise, many banks decrease their excess reserves (to be able to lend out additional funds at higher rates.)

This leads to an increase in the amount of money in the economy because the complete money multiplier increases. Similarly, higher interest rates lead to a lower currency to deposit ratio, which works through the complete money multiplier to increase the Money Supply.

This results in an upward sloping endogenous money supply curve because higher interest rates lead to a greater quantity of Money supplied. Changes in the required reserve ratio r r or the monetary base H will shift the endogenous money supply curves in the same direction as was the case with the exogenous money supply curve, An increase in r r or a decrease in H shifts the Money supply curve to the left, resulting in a lower stock of Money at each interest rate.




**What is the Fisher Effect?**

The Fisher Effect refers to the relationship between nominal interest rates, real interest rates, and inflation expectations. The relationship was first described by American economist Irving Fisher in 1930.

The relationship is described by the following equation:

**$(1+i) = (1+r) * (1+\pi)$**

Where:

**i = Nominal Interest Rate**

**r = Real Interest Rate**

**$\pi$ = Expected Inflation Rate**

The Fisher Effect is an important relationship in macroeconomics. It describes the causal relationship between the nominal interest rate and inflation. It states that an increase in nominal rates leads to a decrease in inflation. The key assumption is that the real interest rate remains constant or changes by a small amount.