CHAPTER - 9

CONSUMPTION, SAVING AND INVESTMENT FUNCTION

Consumption and Consumption Function:

Referring the Keynesian theory of employment, increase in aggregate demand leads to increase in effective demand which increase employment level and output. The major components of aggregate demand are consumption and investment. So, Keynes has given importance to consumption which Increases in aggregate demand, effective demand, output level and employment level to get rid of the depression. Thus, consumption has greater role in macroeconomics.

C↑ → AD↑ → ED↑ → N↑ → Y↑ → Living Standard↑

Consumption is defined as the amount spent by people for buying goods and services to satisfy wants. In macroeconomics, aggregate or total consumption is considered. Consumption function is the mathematical or quantitative relationship between consumption and determinants of consumption. The major determinants of consumption (C) are disposable income (Yd), accumulated wealth (W), future income or expected income (Ye), price level (P), interest rate (r), etc.

C = f(C, Yd, W, Ye, P, r …)

Out of these determinants, disposable income (Yd) is the most influencing determinant. Thus, in simply, consumption function is taken as quantitative relationship between consumption and disposable income which can be mathematically expressed as: C = f(Yd)

If the slope of consumption curve remains constant throughout its length it is said to be linear consumption function. In other words, if both disposable income and consumption changes at a constant rate, consumption function will be linear. Consumption function can be expressed in linear form as: C = a + bYd.

Where,

- C = consumption
- Yd = disposable income (Y – T)
- a = autonomous consumption
- bYd = induced consumption
- b = marginal propensity to consume or rate of change of consumption with respect to income

Keynes' Psychological Law of Consumption Function:

This law was propounded by J.M. Keynes which forms the basis of the consumption function. It explains the nature of propensity to consume schedule. In other words, the law implies that people have a tendency to spend more to some extent as the increase in income, because a part of income is saved.

Assumption:

1. The psychological and instructional factors (or complexes) such as income distribution, price level, population growth, taste, preferences and fashion, etc. remain unchanged in the short period.
2. It assumes the existence of a laissez-fair capitalist economy. The law operates only in a developed and free capitalist economy. People are free to spend their increased income in such type of economy. This law is not applicable in socialist and government regulated economy.
3. It assumes the existence of normal circumstances. It implies that operation of the law is possible only under normal circumstances and not under extraordinary circumstances, like war, hyperinflation, depression, or civil war, etc.

The law is based on following propositions:

Proposition 1st:

When aggregate income increases, consumption expenditure also increases but by a smaller amount. It is because that as income increases, people are able to satisfy their wants side by side, so that the need to spend more on consumer goods diminishes. It does not mean that the consumption expenditure falls with the increase in income. In fact, consumption expenditure varies positively with income, but not in the same proportion in which income increases [i.e. C = f(Y) or and].

Proposition 2nd:

The increased income will be divided in some ratio between saving and consumption (i.e. $\Delta Y = \Delta C + \Delta S$). This proposition is followed from the first proposition because when the whole of increased income is not spent on consumption, the remaining is saved. Hence, consumption and saving move together.

Proposition 3rd:

Increase in income always leads to an increase in both consumption and saving.

The three propositions of the law can be described with the help of following schedule:

Income (Y)	Consumption (C)	Saving (S = Y - C)
0	40	-40
100	120	-20
200	200	0
300	280	20
400	360	40
500	440	60

Proposition 1st:

Income increases at each stage by Rs. 100 crores (for example from Rs. 100 to Rs. 200, Rs. 200 to Rs. 300, and so on), consumption increases at each stage by Rs. 80 crores (for example from Rs. 120 to Rs. 200, Rs. 200 to Rs. 280, and so on). Here, $\Delta C < \Delta Y$. Thus, when aggregate income increases, aggregate consumption also increases, but by a somewhat smaller amount.

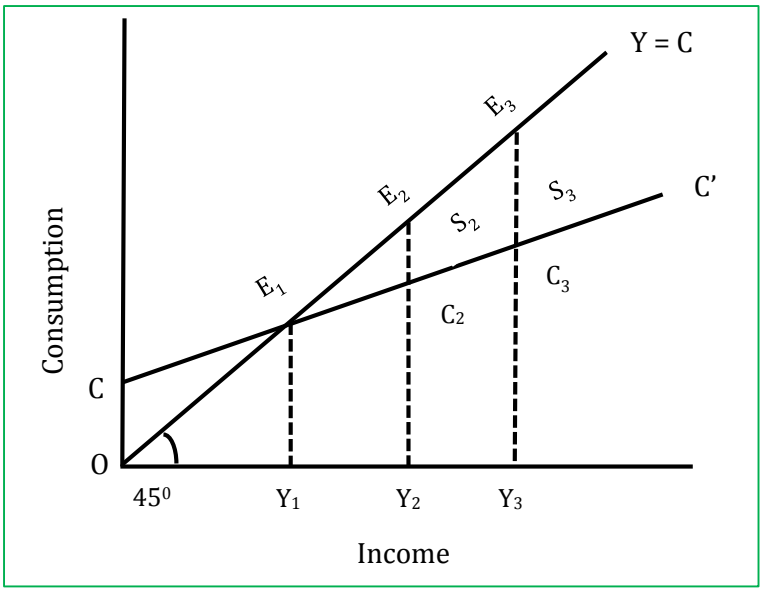
Proposition 2nd:

At any two consecutive periods, $\Delta Y = 100$, $\Delta C = 80$, $\Delta S = 20$. Hence, the increased income of Rs. 100 in each stage is divided in some ratio between consumption and saving [i.e. Rs. 80 crores and Rs. 20 crores or ΔY (100) = ΔC (80) + ΔS (20)]. Hence, increased income is divided into consumption and saving.

Proposition 3rd:

As income increases from Rs. 200 to Rs. 300, Rs. 400 and Rs. 500 crores consumption increases from Rs. 200 to Rs. 280, Rs. 360 and Rs. 440 along with increase in saving from Rs. 0 to Rs. 20, Rs. 40 and Rs. 60 crores, respectively. Hence, both consumption and saving increase with an increase in income.

The psychological law of consumption can also be explained with the help of figure:



The 45^0 line Y = C represents income. It also indicates that at all the points lying on this line, whole of income is consumed and nothing is saved. The CC' line is the consumption line which is drawn according to the consumption function and psychological law of consumption function. It slopes upwards to the right indicating, that as income increases, consumption also increases, but at less proportion than income.

Proposition 1st:

When income increases from OY_1 to OY_2 and OY_2 to OY_3 then consumption also increases from Y_1E_1 to Y_2C_2 and Y_2C_2 to Y_3C_3. Here, consumption increases at less proportion than income [i.e. $Y_2C_2 < Y_2E_2$ and $Y_3C_3 < Y_3E_3$].

Proposition 2nd:

When income increases from OY_1 to OY_2 (Y_2E_2) or increases by S_2E_2 and OY_2 to OY_3 (Y_3E_3) or increases by S_3E_3, it is divided in some proportion between consumption Y_2C_2 and Y_3C_3 and saving S_2E_2 and S_3E_3 respectively [i.e. ΔY (Y_2E_2) = ΔC (Y_2C_2) + ΔS (S_2E_2) and ΔY (Y_3E_3) = ΔC (Y_3C_3) + ΔS (S_3E_3)].

Proposition 3rd:

Increase in income to OY_2 (Y_2E_2) and OY_3 (Y_3E_3) leads to increase in consumption (i.e. $Y_3C_3 > Y_2C_2$) and increase in saving (i.e. $S_3E_3 > S_2E_2$). It is clearly shown by the widening area between the income line (i.e. 45^0 line) and consumption curve (or the gap between income and consumption lines is increasing).

ATTRIBUTES OF CONSUMPTION FUNCTION (APC AND MPC):

☑ Average Propensity to Consume (APC):

It is the outcome of aggregate consumption expenditure divided by aggregate income. It is also defined as the ratio of absolute consumption to absolute income i.e. APC= C/Y. Total income earned by any individual is either consumed or saved or both. If income is denoted by Y, consumption is denoted by C and saving is denoted by S, then

$$Y = C + S$$

Or, $\frac{Y}{Y} = \frac{C}{Y} + \frac{S}{Y}$ (Dividing both side by Y)

Or, 1 = APC + APS and 0 < APC < 1; 0 < APS < 1

Where,

- APC = average propensity to consume = consumption for one rupee income
- APS = average propensity to saving = saving for one rupee income

☑ Marginal propensity to consume (MPC):

It is the outcome of change in aggregate consumption expenditure divided by change in aggregate income. It is also defined as the ratio of change in consumption to change in income i.e. MPC = ΔC/ΔY. ΔY, ΔC and ΔS are the increased income, increased consumption and increased saving respectively, then

$$\Delta Y = \Delta C + \Delta S$$

Or, $\frac{\Delta Y}{\Delta Y} = \frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y}$ (Dividing both sides by ΔY)

Or, 1 = MPC + MPS and 0 < MPC < 1; 0 < MPS < 1

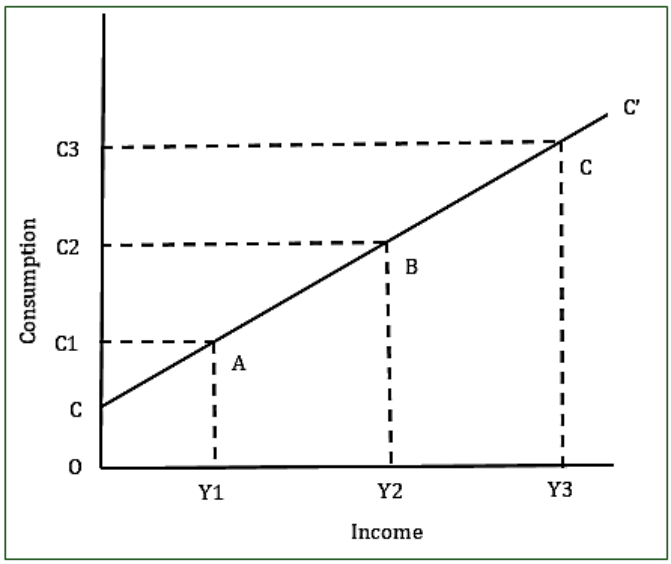
Where,

- MPC = marginal propensity to consume (c) = change in consumption for one unit change in income
- MPS = marginal propensity to saving (s) = change in saving for one unit change in income

Income (Y)	Consumption (C)	APC = C/Y	MPC = ΔC/ΔY
200	200	1 or 100%	-
300	280	0.93 or 93%	0.8 or 80%
400	360	0.90 or 90%	0.8 or 80%
500	440	0.88 or 88%	0.8 or 80%

When both income and consumption increase at constant rate i.e. by Rs. 100 and Rs. 80 respectively as shown in table above, APC declines continuously i.e. 1, 0.93, 0.9 and 0.88.

It reflects the rate of change in APC or slope of consumption curve. When both income and consumption increase at constant rate. MPC remains constant. when income increases from Rs. 200 to Rs. 300 crores and consumption increases from Rs. 200 to Rs. 280 crores, then MPC = $\Delta C/\Delta Y = 80/100 = 0.8$ or 80%. Here, the value 80% or 0.8 indicates that 80% increased income is spent on consumption.



In the above figure:

- APC at point A = $OC_1/OY_1 = 200/200 = 1$
- APC at point B = $OC_2/OY_2 = 280/300 = 0.93$
- APC at point C = $OC_3/OY_3 = 360/400 = 0.90$
- Hence, $OC_1/OY_1 > OC_2/OY_2 > OC_3/OY_3$

This expression reflects that APC decline continuously with an increase in both income and consumption at constant rate.

Similarly, geometrically, the marginal propensity to consume is computed by the slope or gradient of the consumption curve.

- MPC between point A and B = C1C2/Y1Y2 = 80/100 = 0.8
- MPC between point B and C = C2C3/Y2Y3 = 80/100 = 0.8

This expression implies that when both income and consumption increases at constant rate, MPC remain constant.

PROPERTIES OF MPC:

1. The value of MPC is always positive and less than one. ($0 < C < 1$)
2. In short-run, MPC is stable (constant). It is because the psychological and other factors on which MPC depends do not change in the short-run.

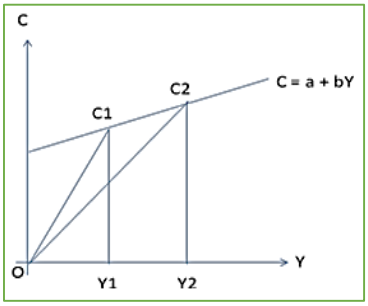
3. MPC of the poor is greater than rich. ($MPC_{poor} > MPC_{rich}$). Generally, poor people are unable to satisfy even their basic needs. So, they tend to spend larger amount of their increased income on consumption.

Difference between APC and MPC:

1. $APC = \frac{C}{Y}$ and $MPC = \frac{\Delta C}{\Delta Y}$

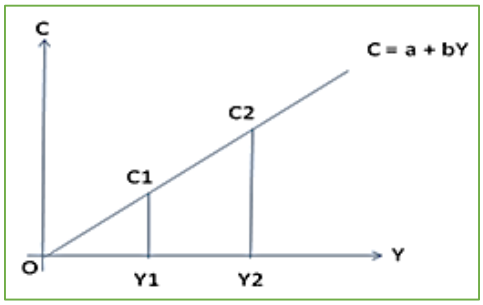
APC is the ratio of absolute consumption to absolute income at particular point of time. MPC is the ration of change in consumption to change in income for a particular period of time.

2. For linear consumption function not passing through origin, when income increases APC falls but MPC remains constant. APC is always greater than MPC.



APC at Y_1 and Y_2 income level are respectively C_1Y_1/OY_1 and C_2Y_2/OY_2 which are also the slopes of the lines OC_1 and OC_2. Slope of OC_1 is greater than slope of OC_2, i.e. APC at Y_1 level of income is greater than at Y_2 level of income. Also MPC is constant. Similarly, slope of OC_1 and OC_2 is greater than the slope of consumption line or b.

3. For linear consumption function passing through origin, APC = MPC = constant



Determinants of Consumption:

According to Keynes, there are two types of factors which determine the consumption function. They are subjective factor (or internal factor) and objective (external factor). Subjective factor is related to psychological behavior which changes the slope (or b), whereas objective factor causes shift in consumption function or change in slope (or a).

Subjective Determinants:

Subjective determinants are related to human behavior and social system. Followings are the subjective determinants of consumption function.

a. **Security Motive:** People save more for unforeseen and future needs. Programs such as old age allowance, unemployment allowance, medical insurance, etc. reduce saving pattern and increase consumption.

b. **Demonstration effect:** People in lower and middle class income groups imitate the life style of or consumption pattern of higher class income group. It increases the consumption.

c. **Increasing Social Status:** People are motivated to save more and accumulate large wealth which will increase their social status. This helps to reduce consumption.

d. **Financial Prudence:** Business fir desires to save more (increase undistributed corporate profit) for the expansion and modernization of business. If the business firm keeps relatively larger amount of its profit for financial prudence and pay smaller amount of profit as dividends to the shareholders, this will generally reduce the propensity to consume of the society.

Objective Determinants

a. **Income of the people:** Income of the people is the most influencing factor for consumption and there is positive relationship between income and consumption. Similarly, past income also influences consumption.

b. **Income Distribution:** If there is a large disparity between rich and poor, the consumption is low, because, rich people have a low propensity to consume than poor people. Similarly, a community with a very equal distribution of income tends to have high propensity to consume and low propensity to save.

c. **Price Level:** The price level affects the consumption level. When the price falls, this will induce people to consume more and propensity to consume of the society increases.

d. **Wage Level:** Increased wage has direct effect in consumption which increases the propensity to consume in the economy.

e. **Interest rate:** Rate of interest also affects the propensity to consume of the community. Higher rate of interest induces people to save more and reduces consumption.

f. **Fiscal Policy:** When government reduces the tax, the propensity to consume of the community increases. The progressive tax system increases the propensity to consume of the people by altering the income distribution.

Measures to Raise Consumption:

Increase in consumption expenditure increases aggregate demand, then increases effective demand and employment level. Propensity to consume should be increases in any economy. Followings are the important measures to increase propensity to consume.

a. **Income Redistribution:** Redistribution of income in favor of poor tends to raise the propensity to consume, because MPC for poor people is high than rich people. The progressive tax should be levied on income, wealth, capital gains, etc. for the redistribution.

b. **Wage Policy:** When the wages of labors increase, they consume more goods and services as it leads to increase the propensity to consume. But, policy of high wage should be along with the increase in marginal productivity of labor, otherwise it reduces employment level.

c. **Social Security:** Social security like unemployment allowance, old age allowance, health facility, etc. remove the future uncertainty and tendency to save is reduced. It leads to increase propensity to consume.

d. **Credit Facilities:** When loans are easily and cheaply available to the people, they buy more goods and services as it increases propensity to consume.

e. **Advertisement:** Consumers get information about the goods and services through the advertisement and attracts consumer which raises their propensity to consume.

Saving and Saving Function:

Saving is the excess of income over consumption expenditure. It is the part of income which is not spent on consumption. Saving depends on income and higher the income, higher will be the saving and vice-versa.

Saving function is the quantitative relationship between saving and determinants of saving. Since, income is the most important determinant of saving, it is generally defined as the quantitative relationship between saving and income.

$$S = f(Y)$$

Where,

- S = saving
- F = function
- Y = income

If the slope of saving curve remains constant throughout its length, it is said to be linear saving function. In other words, if both saving and disposable income changes at a constant rate, saving function will be linear. Saving function can also be derived as linear form with the help of linear consumption function.

$$Y = C + S$$

Or, $S = Y - C$

Or, $S = Y - (a + bY)$

Or, $S = -a + (1 - b)Y$

Or, $S = -a + sY$

Where, S = saving

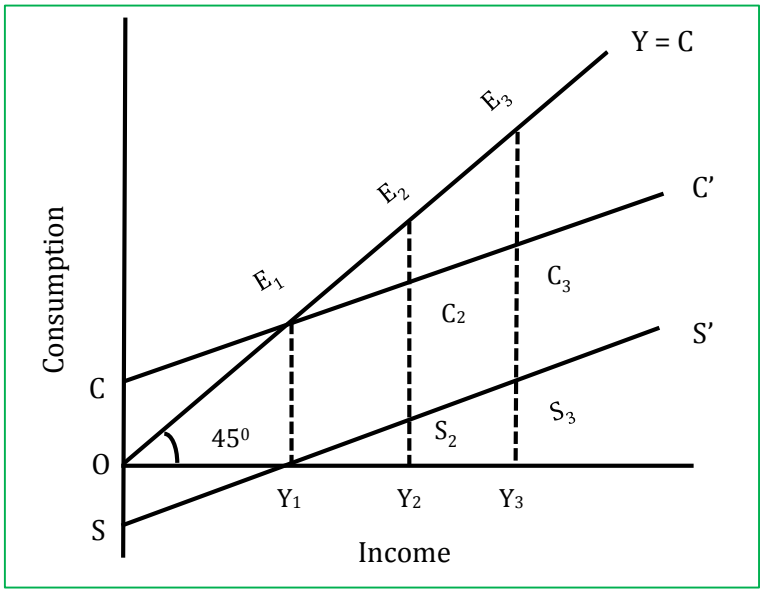
- Y = income
- s = (1 – b) = marginal propensity to saving

- –a = autonomous negative saving which implies until income is not more than a, which is autonomous consumption, there will be no saving. Thus, saving starts when Y > a.
- The income (Y – a) is partly consumed (= cY) and partly saved (= sY).

Derivation of Saving Curve:

Income (Y)	Consumption (C)	Saving (S = Y - C)	APS = S/Y	MPS = ΔS/ΔY
0	40	-40	∞	-
100	120	-20	-0.2	0.2
200	200	0	0	0.2
300	280	20	0.07	0.2
400	360	40	0.10	0.2
500	440	60	0.12	0.2

The table above shows the saving function. When income increases from Rs. 0 to Rs. 100, Rs. 100 to Rs. 200 and so on then consumption also increases from Rs. 40 to Rs. 120, Rs. 120 to Rs. 200 and so on, similarly saving increases from Rs. -40 to Rs. -20, Rs. -20 to Rs. 0 and so on. It implies that when income and consumption increase at constant rate (i.e. by 100 and 80 respectively), saving also increase at constant rate (i.e. by 0.2).



Saving curve can be derived with the help of consumption curve as shown in above figure. The 45^0 line (or, Y = C) indicates income equals to consumption or zero saving at all points of the line. CC' is the consumption line and SS' is the saving curve. At zero level of income, autonomous consumption is OC. It implies that there is negative saving equals to -OS and is also called as dissaving. At OY_1 income level, the whole of income is consumed and nothing is saved. It is denoted by point E_1 which is also called break-even point or zero saving. At OY_2 income level consumption and saving are S_2C_2 and Y_2S_2 respectively. Similarly, at OY_3 income level consumption and saving will be S_3C_3 and Y_3S_3. Join S, Y_1, S_2, S_3 extend it to S'. Thus SS' is the saving curve showing different amount of saving at various level of income.

Technical Attributes of Saving function:

☑ Average Propensity to Save (APS):

It is the ratio between total saving and total income. When both income and consumption increase at constant rate, saving also increases at constant rate. Hence, APS increases continuously. It is expressed as APS = S/Y

Where,

- APS = average propensity to saving
- S = total saving
- Y = total income

As disposable income is partly consumed and partly saved, we have, C + S = Y. Dividing both sides by Y, we get:

$$\frac{C}{Y}+\frac{S}{Y}=\frac{Y}{Y}$$

$\therefore$ APC + APS = 1

According to above table income, consumption and saving increase at constant rate at each stage (i.e. -0.2, 0, 0.07, 0.10 and 0.12 respectively).

According to above graph, $APS = \frac{OS}{OY} < \frac{Y2S2}{OY2} < \frac{Y3S3}{OY3}$

This expression implies that APS increases continuously with an increase in income and saving at constant rate. Since, APC + APS = 1

☑ Marginal Propensity to Save (MPS):

It is the ratio of the change in saving, with the change in income. Algebraically, it is written as MPS = ΔS/ΔY.

Where,

- MPS = Marginal Propensity to Save
- ΔS = Change in total save
- ΔY = Change in total income

It reflects the rate of change in saving. When both income and consumption increase at constant rate, saving also increase at constant rate. Hence, MPS also remains constant. As change in income goes either to change in consumption or to change in saving, we have ΔY = ΔC + ΔS. dividing both sides by ΔY, we get:

$$\frac{\Delta C}{\Delta Y}+\frac{\Delta S}{\Delta Y}=\frac{\Delta Y}{\Delta Y}$$

$\therefore$ MPC + MPS = 1

It gives the precise relationship between MPC and MPS. As MPC increases MPS declines and vice versa.

According to above table income, consumption and saving increase at constant rate at each stage MPC remains constant (i.e. 0.2).

According to above graph, $MPS = \frac{Y1S2}{Y1Y2} = \frac{S2S3}{Y2Y3}$

This expression implies that MPS remains constant at any level of income. In other words, when income and saving increase at constant rate, MPS remains constant.

Relationship between APC and MPC, APS and MPS:

1. Short-run consumption function is considered as non-proportional consumption function. Hence, APC > MPC at all levels of income but APS < MPS.
2. Since, APC + APS = 1. This expression implies that if APC decreases steadily as disposable income increases APS must increases steadily as income rises.
3. If autonomous consumption is zero, all values i.e. APC, MPC, APS and MPS remain constant, positive and less than one [i.e. 0 < APC (=MPC) < 1 and 0 < APS (=MPS) < 1].

These relationship are presented below with the help of previous table:

Y	C	S	APC	APS	MPC	MPS
0	40	-40	∞	∞	-	-
100	120	-20	1.2	-0.2	0.8	0.2
200	200	0	1	0	0.8	0.2
300	280	20	0.93	0.07	0.8	0.2
400	360	40	0.9	0.10	0.8	0.2
500	440	60	0.88	0.12	0.8	0.2

Above table shows:

- Y = C + S at all level of disposable income.
- APC + MPC = 1 at all level of disposable income except Y = 0.
- MPC + MPS = 1 at all level of disposable income except Y = 0.
- When disposable income, consumption and saving increase at constant rate, both MPC and MPS remain constant and
- When disposable income, consumption and saving increase at constant rate, APC decreases, but APS increases.

Types of Saving:

There are four major types of savings:

1. **Personal Saving:** The saving made by individuals and households is called personal saving. People sacrifice present consumption and save for or future purpose.
2. **Corporate Saving:** The saving made by business firms is called corporate saving or business saving. When business firms earn corporate profit, they retain undistributed corporate profit for the expansion and development of the organization.

3. **Government Saving or Public Saving:** The positive gap between government income and expenditure is government saving or public saving. If government income is greater than government expenditure, then only public saving occurs.
4. **Forced Saving Or Compulsory Saving:** If government compels individual and firms to investment in government securities, it is forced saving or compulsory saving.

Determinants of Saving:

a. **Income:** There is positive relationship between income and saving. When income increases, saving also increases and vice-versa. With the increase of income, consumption increases slower and saving increases faster according to Keynes.

b. **Interest Rate:** Interest is the reward for saving. When interest rate increases one can earn more by saving more. So, if rate of interest increases, people save more and if rate of interest decreases, people spend more.

c. **Price Level:** If price level increases in the society, people have to spend more income for consumption and they cannot save more. On the other hand, if price level decreases, people can save more. It is because, they spend less than before for the same commodity.

d. **Fiscal Policy:** If taxes are imposed on necessary commodities, people cannot save more. Similarly, if taxes are reduced on the basic goods it leads to increase the level of saving.

e. **Distribution of Income:** If income distribution is more equal, the level of saving will be low and if it is more unequal the level of saving will be high.

Paradox of Thrift:

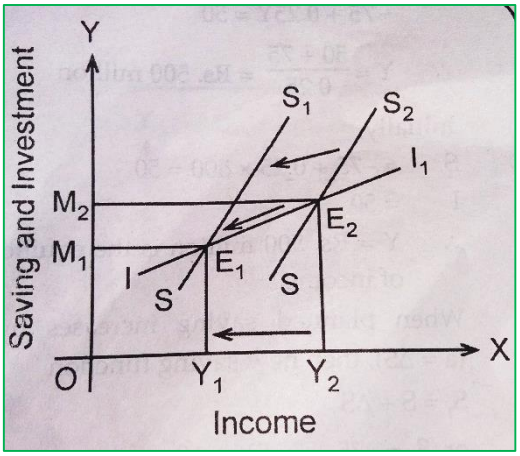
The term "Paradox of Thrift" refers to the situation where increase in savings ultimately reduces to productive capacity, employment and saving itself. J.M. Keynes introduced the concept of paradox of thrift while discussing the great depression of the 1930s.

Thriftiness means the tendency of saving more. The classical economists regarded the saving as a great social virtue. According to them, investment is determined by the saving. They thought that individual savings would create national saving and this saving would be converted into national investment. Therefore, saving is virtue or good for the economy.

J.M. Keynes does not accept the concept of savings described by the classical economists. Keynes said that saving, which is good or bed depends upon its use. Savings in the forms of hoarding would decrease the consumption of the society. From individual point of view, saving may be virtue but from economy point of view, saving is social vice or evil.

Keynes said that savings reduce the expenditure. But in society, the expenditure of one person is the income of other person. So, saving in the form of hoardings decreases the consumption. This would lead to the situation of decrease in effective demand. As a result of this, there will be over-production, unemployment and economic crisis in the economy. It reduces the profit and the investors will be discouraged for investment i.e. Investment will also decrease. Ultimately, it reduces the national income and saving.

Therefore, low investment reduces the income. When income is low, the amount of saving will also low. Thus, the process of reduction in savings due to an increase in savings in the beginning is called Paradox of Thrift.



In the figure shown in right, the economy position at point E_2 where investment curve (II_1) intersects saving curve (SS_2). This equilibrium shows that equilibrium level of income is OY_2. At this income level, equilibrium saving and investment is Y_2E_2.

When saving in the community is increases, the saving curve shifts upwards from SS_2 to SS_1. It leads to decrease in consumption, investment and income. As a result, a new equilibrium is established at point E_1 where new saving curve SS_1 intersects investment curve (II_1). This equilibrium shows the new equilibrium level of income and equilibrium saving and investment are OY_1 and Y_1E_1. Here, income decrease from OY_2 to OY_1. It implies that increase in saving at current period leads to decrease in both income and saving in future.

Investment Function:

Meaning of Capital and Investment

The term capital and investment are the two different concepts. Capital is a stock concept and it refers to the accumulation of capital assets over a period of time. The term capital means stock of productive assets including business fixed investment in machinery and equipment; residential land and buildings; and inventories. Investment is a flow concept and it is addition to the stock of capital at t period of time. Thus, capital at time t is the accumulated investment until this time and is given as:

$$K_t = \sum_{t=0}^{t} I_t \text{ and } I_t = K_t - K_{t-1}$$

Where,

K_t = Capital at time period t

I_t = Investment at time period t

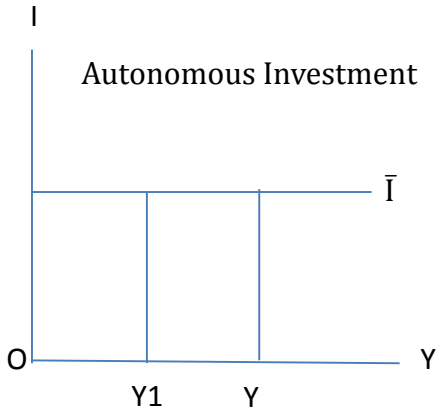
Investment is the addition to the nation's capital stock in one year which generates income, employment and output. Purchase of existing shares, bonds, debentures, properties, etc. are merely transfer of ownership of assets from one person to another person. These purchases do not increase the nation's physical stock of capital thus are not considered as investment. It may be an investment from one's point of view but not from nation's point of view.

Types of Investment

Generally investment can be classified into two types. They are autonomous and induced investment.

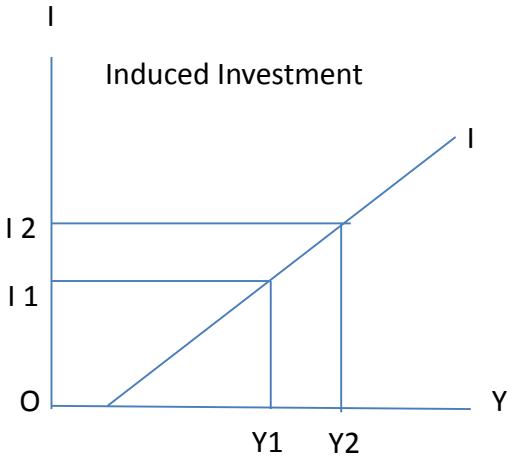
1. **Autonomous Investment:**

Autonomous investment refers to the investment which does not depend upon changes in the income level. This investment generally takes place in houses, roads, public undertakings and economic infrastructure such as water supply, electricity, transport and communication. Most of the autonomous investment is undertaken by the government. Autonomous investment can be explained graphically as follows:



2. **Induced Investment:**

Induced investment is that investment which is affected by the changes in the level of income. Induced investment depends upon the level of income. Higher the level of income, higher will be the induced investment. The induced investment is income elastic. In general, induced investment is made by the private sector with profit motive. Graphically this investment is explained as follows:



There are other types of investment also which are as:

1. **Gross and Net Investment:**

Gross investment means aggregate investment. It includes net investment as well as depreciation. It refers to total expenditure on capital goods in the given period of time. Net investment is the difference between gross investment and depreciation. So, net investment occurs due to increase in capital stock. The relationship between gross investment and net investment is expressed as GI = NI + Depression

2. **Private and Public Investment:**

The investment which is made by private sector or individual with main objective of maximizing profit or direct benefit is private investment. In other hand, public investment means the investment which is made by public or government sectors to increase public utilities. To fulfill the demand of social overheads, public investment plays the crucial role. This type of investment has indirect benefits, because it stressed public benefits than that of profit maximizing. Investment in construction of roads, bridges, hospitals, educational institutions etc. is the example of public investment.

3. **Ex-ante and Ex-post Investment:**

The estimated or planned investment is called ex-ante investment. The actual investment or the realized investment is called ex-post investment. These are also known as estimated and actual investment.

Marginal Efficiency of Capital (MEC):

The concept of marginal efficiency of capital was developed by Keynes in 1936. It is the important determinant of autonomous investment. The marginal efficiency of capital is the highest rate of return expected from an additional unit of capital asset over its cost.

Example – If supply price of capital assets or the amount of money that any entrepreneur invests on capital goods such as machine is Rs 40000 and its annual yields is Rs 4000, then MEC becomes

$$MEC = \frac{4000}{40000} \times 100 = 10\%$$

Thus, MEC is the percentage of profit expected from given investment.

Kurihara defines MEC is the ration between the prospective yield of additional capital assets and its supply price. Keynes defines MEC is the rate of return from the employment of a marginal or additional unit of a capital asset over cost or supply price of the assets. MEC is equal to the discount rate when present value of expected returns from capital asset during its life is just equal to its supply price. The MEC measurement includes prospective yields or the income expected from the capital and supply price or the cost of capital assets. It is given by the equation as

$$SP = \frac{Q_1}{1+r} + \frac{Q_2}{(1+r)^2} + \frac{Q_3}{(1+r)^3} + \cdots$$

Where,

SP = supply price;

Q1, Q2, Q3 … are the series of prospective annual returns; and

r = discount rate or MEC

Example 1: Supply price of capital asset is Rs 2000 and its life span is two years. The expected yields for first year and second year are respectively Rs 1100 and 1210. MEC can be calculated as:

$$SP = \frac{Q_1}{1+r} + \frac{Q_2}{(1+r)^2}$$

Or, $2000 = \frac{1100}{1+r} + \frac{1210}{(1+r)^2}$

Or, $2000\,(1+r)^2 - 1100\,(1+r) - 1210 = 0$

Or, $(1+r) = \frac{1100 \pm \sqrt{1100^2 + (4 \times 2000 \times 1210)}}{(2 \times 2000)} = 1.1 \rightarrow r = 0.1$ = MEC

This result implies if the expected future returns are discounted at 10%, sum of the discounted future returns will be equal to the supply price. In the example, present values of first year's return is 1000 and second year's return is 1000 and sum of these values is 2000 which is equal to the supply price.

In general, MEC refers to the discount rate at which the expected returns of capital in different times are discounted so that sum of discounted values is equal to supply price of that capital. Once MEC is estimated, investment decision can be taken by comparing MEC with the market rate of interest (i). The general investment decision rules are:

- If MEC > I then the investment project is acceptable.
- If MEC = I then the project is acceptable on nonprofit consideration.
- If MEC < I then the project is rejected.

Classical economists considered that investment mainly depends upon interest rate. Keynes emphasized MEC. Since, interest rate in a country generally remains stable, changes in MEC mainly determines changes in investment. So, MEC is assumed to be more important determinant of investment. In fact, MEC represents the return part and interest rate represents the expense part of the investment. Thus, investment decision depends upon both the determinants interest rate and MEC.

Determinants of Investment:

Induced investment is influenced by endogenous factors and autonomous investment is influenced by exogenous factors. Thus, gross investment in the economy is the sum of induced investment and autonomous investment. Keynes argues investment rate in the economy is mainly influenced by the two factors – marginal efficiency of capital and rate of interest. Besides, there are other determinants of investment. Followings are the major determinants of investment:

1. **Cost of Capital Assets:** The cost of capital assets is also called the supply price of the capital. The supply price of capital is the original cost of the capital asset. Higher is the supply price of capital, lower is the inducement to investment and vice-versa.
2. **Marginal Efficiency of Capital:** Marginal efficiency of capital means the productivity or the efficiency of capital. In general, MEC shows the possible income from the additional capital investment. Any entrepreneur, before investment, compares the prospective yield from the investment and the interest for the investment loan taken. If the rate of return from the investment is more than the rate of interest for the capital, then he will invest, otherwise not. According to the Keynes, MEC is the most important factor of investment capital.

3. **Rate of Interest:** The current market rate of interest influences the inducement or motive to investment because, an investor always compares between MEC and current market rate of interest while making investment.
4. **Income Level:** If the level of income increases, it leads to increase the demand for consumption of goods through increasing purchasing power and finally induces to increase investment.
5. **Propensity to Consume:** The demand for capital good is high where the propensity to consume is high. The increased demand for capital good leads to an increase in investment demand.
6. **Growth of Population:** The growth of population causes increase in demand for good which finally increases the investment level.
7. **Technological Progress:** If there is improvement in the technique of production, it reduces the supply price or cost of capital and increases MEC which finally induces for more investment.

Investment Multiplier:

The concept of multiplier is a component of Keynesian theory of employment. It is an important tool of income propagation and business cycle analysis. The concept of multiplier as a form of 'employment multiplier' was first developed by F.A. Kahn in his article "The Relation of Home Investment to Unemployment" in the Economic Journal of June 1931. But Keynes, later further refined it and propounded the concept of 'investment multiplier' with reference to the increase in employment and output.

According to Keynes, "*Investment multiplier tells us that when there is an increment of aggregate investment income will increase by an amount which is K times the increment of investment*".

In short, the multiplier refers to the effects of changes to investment outlays on aggregate income through induced consumption expenditures. Thus, the multiplier establishes a quantitative relationship between an initial increment of investment and the resulting increase to aggregate income. In other words, it tells us how many times the income increase as a result of an increase in investment. Mathematically, it is expressed as: $K = \Delta Y/\Delta I$ where, K = multiplier, ΔY = change in income, ΔI = change in investment.

The basic idea behind the theory of multiplier is that of the induced consumption as a result of increased investment. Whenever an investment is made, the effect is to increase income not only by the amount of original investment but by a multiple of it. The initial effect of an increase in investment expenditure is the increase in income by the same amount. But as income increases, consumption also increases.

Consumption expenditure, in turn, becomes additional income of those employed in the consumer goods industries. Thus, there is a further increase in income due to induced consumption and so on. To sum up, the investment does not increase income in the industries where investment is originally made, but also in other industries whose products are demanded by the men employed in the investment industries.

Assumption:

1. The original propensity to consume remains constant during the process of income propagation.
2. There is change in autonomous investment and that induced investment is absent.
3. There is a closed economy unaffected by foreign influence.
4. There are no changes in prices.
5. The accelerator effect of consumption on investment is ignored.
6. There is less than full employment level in the economy.
7. Consumption is a function of current income.
8. There is net increase in investment.

Relation between MPC and Multiplier:

The size of multiplier depends upon the size of Marginal Propensity to Consume (MPC). In other words, the size of multiplier varies positively with the size of MPC. Higher the value of MPC, higher the value of multiplier and vice versa. The formula of multiplier which highlights the close relationship between the MPC and the size of multiplier can be derived in the following manner.

Let, a two sector economy is in equilibrium. It is expressed as: Y = C + I ------ (1)

When there is increase in investment, equilibrium condition of the economy will be changed. It is expressed as: Y + ΔY = C + ΔC + I + ΔI ---------- (2)

Subtracting equation (1) from equation (2), we get

$\Delta Y = \Delta C + \Delta I$

$or, \frac{\Delta Y}{\Delta Y} = \frac{\Delta C}{\Delta Y} + \frac{\Delta I}{\Delta Y}$ $[Dividing\ by\ \Delta Y\ on\ both\ sides]$

$or, 1 = MPC + \frac{1}{K}$ $\left[\because \frac{\Delta C}{\Delta Y} = MPC\ and\ \frac{\Delta Y}{\Delta I} = K(multiplier)\right]$

$or, 1 - MPC = \frac{1}{K}$

$\therefore K = \frac{1}{1 - MPC}$

$or, K = \frac{1}{MPS}$ $[\because MPC + MPS = 1]$

Leakage of Multiplier:

Leakages are the potential diversions from the income stream which tend to weaken the multiplier effect of new investment. The process of income propagation peters out because of these leakages which are discussed below:

1. **Saving:**

Saving is the most important leakage of the multiplier process. Since the marginal propensity to consume is less than one, the whole increment in income is not spent on consumption. A part of it is saved which peters out of the income stream and the increase in income in the next round declines. Thus, the higher the marginal propensity to save, the smaller the size of the income stream and vice versa. For instance, if MPS = 1/6, the multiplier is 6, according to formula K = 1/MPS and the MPS of 1/3 gives a multiplier of 3.

2. **Undistributed Profits:**

If profits accruing to joint stock companies are not distributed to the shareholders in the form of dividend but are kept in the reserve fund, it is a leakage from the income stream. Undistributed profits with the companies tend to reduce the income and hence further expenditure on consumption goods thereby weakening the multiplier process.

3. **Taxation:**

Taxation policy is also an important factor in weakening the multiplier process. Progressive taxes have the effect of lowering the disposable income of the taxpayers and reducing their consumption expenditure. Similarly commodity taxation tends to raise the prices of goods, and a part of increased income may be dissipated on higher prices. Thus, increased taxation reduces the income stream and lowers the size of the multiplier.

4. **Debt Cancellation:**

If people use a part of the increment of income to repay old bank debts, then instead of spending it for further consumption that part of the income disappears from the income stream.

5. **Purchase of Old Shares and Securities:**

If a part of the newly earned income is spent on buying old stocks, shares and securities or on the financial investments, consumption will be less and correspondingly the multiplier will be lower.

6. **Hoarding of Cash Balance:**

If people prefer to hoard cash balance in the form of inactive bank deposits, with a strong liquidity preference to satisfy transaction, precautionary or speculative motives, there will be a leakage from the income stream. This type of leakage will be greater if business prospectus are bad and smaller when business prospects are good. Whenever, new-created money income is hoarded, it cannot reappear as income in the next round, and the multiplier effect will be arrested.

7. **Inflation:**

When there is a rise in the price of consumption goods, a good part of the increased money expenditure out of the increased will be dissipated on higher prices instead of promoting consumption, income and employment.

8. **Net Imports:**

A leakage in the domestic stream also occurs when there is excess of imports over exports, causing a new outflow of funds to foreign countries.

Importance of Multiplier:

1. **To Evaluate Extent of Business Cycles:** It is of great importance for evaluating the extent of different phases of trade cycles and for its accurate forecasting and control.
2. **To Highlight Role of Public Spending:** The concept of multiplier highlights special significance of public investment or government development expenditure in achieving high level of employment and growth rate.
3. **To Highlight Role of Deficit Financing:** It also highlights the significance of deficit financing to accelerate the process of economic expansion.
4. **To Understand the Process of Equilibrium:** The multiplier process helps to understand how equality between saving and investment is brought about. An increasing investment leads to increases and becomes equal to investment.
5. **To Formulate Economic Policies:** The concept of multiplier is very useful tool for formulating suitable economic policies.
6. **To Examine Role of Investment in Income Propagation:** The concept of multiplier highlights the importance of investment as the major dynamic element in the process of income generation in the economy.

Accelerator Principle:

The principle of acceleration was first introduced by J.M. Clark in 1917. Later on the economists like, Hicks, Samuelson and Harrod, further developed this principle to explain the business cycle. The principle of acceleration is based on the fact that the demand for capital goods is derived from the demand for consumer goods. It explains the process by which a change in demand for consumption goods leads to a change in investment on capital goods. According to Kurihara, "*the accelerator coefficient is the ratio between induced investment and an initial change in consumption"*.

Symbolically, the coefficient of acceleration is expressed as $V = \Delta I/\Delta C$ or $\Delta I = V\Delta C$, where V is the acceleration coefficient, ΔI is net change in investment and ΔC is the net change in consumption expenditure. Hicks has broadly interpreted the concept of acceleration as the ration of induced investment (ΔI) to change in income or output (ΔY). Thus, the accelerator $V = \Delta I/\Delta C$ (or the capital output ratio). This implies that the demand for capital goods is not derived from consumer goods alone, but from any demand for output. Now it has become customary to explain the principle of acceleration in terms of final output (Y).

The production of any given demand for output generally requires for technical reasons an amount of capital several times larger than the output produced with it. Therefore, an increase in the demand for final output will give rise to an additional demand for capital goods several times larger than the new demand for output. If for example, a machine worth Rs. 3 lakh produces output worth Rs. 1 lakh, the accelerator (V) will be 3 (i.e. $V = \Delta I/\Delta C$ = 3 lakh/1 lakh = 3 lakh).

Equational Model:

The principle of acceleration can be expressed in the form of Equational model given below:

$I_{gt} = V(Y_t - Y_{t-1}) + R$

$I_{gt} = V\Delta Y + R - - - - - - - - (i)$

Equation (i) tells that gross investment during period t (i.e. I_{gt}) depends on the change inoutput from period t - 1 to period (i.e. Y_t - Y_{t-1} or ΔY) multiplied by the accelerator (V) plus replacement investment (R) in order to know net investment (I_{nt}), replacement (R) must be deduced from gross investment. Thus, net investment in period it is:

$I_{nt} = V\ (Y_t - Y_{t-1})$

Or, $\Delta I = V\Delta Y$

Or, $V = \Delta I/\Delta Y$ ---------- *(ii)*

Thus, it is clear from equation (i) and (ii) that the gross investment in the economy is equal to net investment plus replacement investment. Assuming replacement investment to be constant, gross investment varies with the level of net investment at each level of output.