LESSON 20

CONCEPT OF CONSUMPTION FUNCTION, SAVING FUNCTION AND INVESTMENT FUNCTION

The classical economists believed that full employment exists in an economy. Say's law of market was also based on the same assumption. According to him, if there is a situation of unemployment in an economy and if there exists free and perfect competition in the economy, then some forces in the market will work in such a way that economy will achieve the situation of full employment.

During the period 1929-33, there was economic depression in countries like Great Britain, America and other countries, which caused increase in unemployment and fall in national income. Many factories were shut down and in many industries the production was below production capacity. The people had to face great economic problems because of widespread severe unemployment. The economic principles prevalent at that time could not provide any solution to this recession.

In this context, in the year 1936 Prof J.M. Keynes in his book "The General Theory of Employment, Interest and Money" criticized the classical theory of employment and propounded a new theory of income and employment which was helpful in solving the immediate economic problems. Keynes recognized the factors influencing employment and also described the factors accountable for unemployment in an economy. Keynes mentioned that full employment does not exist in capitalist economy and generally under-employment equilibrium situation exists in the economy.

The Keynesian theory of income and employment was a short run theory. According to Keynes, population, capital, labour force, technique, efficiency of workers does not change during a given period. Increase in income and production is only possible by employing more and more labour force.

Thus, in short run if the national income of a country is more, simultaneously employment will also be more. On the contrary, if the national income is less, then the employment will also be less. Thus, before analyzing the Keynesian theory of income and employment, it is necessary to understand the following determining functions:

Consumption Function

Consumption function is the main key component of Keynesian theory. It is also known as fundamental psychological law. According to this law, as income increases consumption also increases, but not in the same proportion as increase in the income. Thus, a part of increased income is consumed and another part of income is saved.

According to Keynes, income of consumers plays an important role in influencing the consumption of the consumer. Similarly, with increase in income, consumption also increases and with decrease in income, consumption also decreases. Consumption depends upon disposable income. Disposable income is derived by subtracting direct taxes from income. This disposable income is equal to consumption and saving (C+S). Consumption function may be expressed mathematically in the following form:

$C = f(Y_d)$

Where C = Consumption

Y_d = Disposable income.

When consumption function is linear then :

$C = a + bY_d$

Here a = autonomous consumption

b = marginal propensity to consumer

or

$$b = \frac{\Delta C}{\Delta Y_d}$$

(slope of consumption function) or $b = \frac{\Delta C}{\Delta Y_d}$

Change in consumption due to change in disposable income is called marginal propensity to consume.

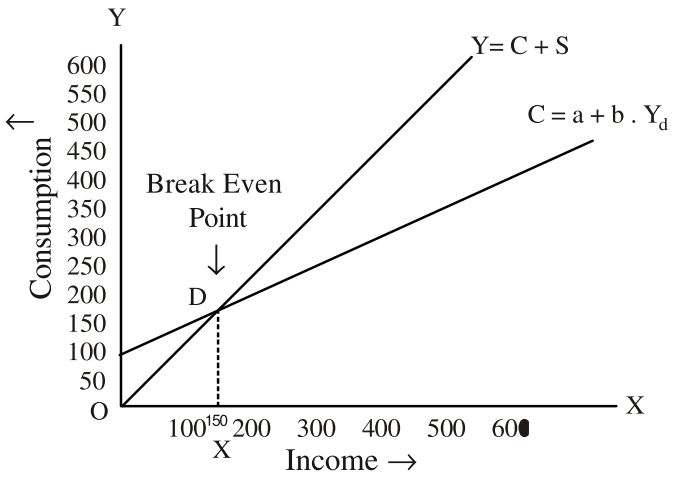

Figure 20.1 (a)

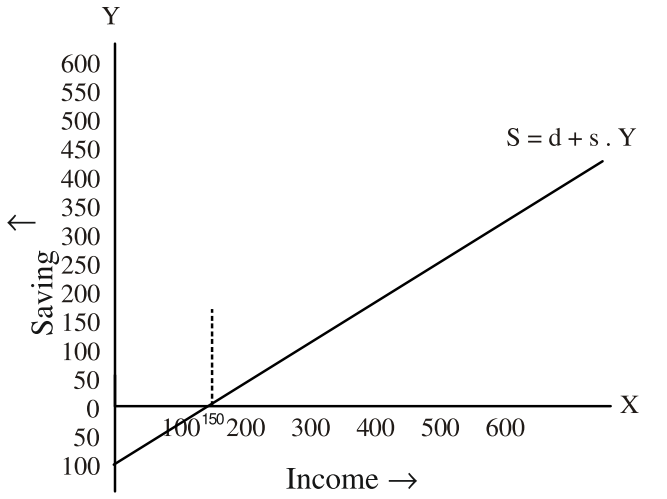

Figure 20.1 (b)

Figure 20.1(a) shows straight line consumption function. It tells us that consumption expenditure varies with the change in personal disposable income. This figure shows relationship between income and consumption expenditure, the other economic variable of consumption such as wealth, previous income, (distribution of income), tax rate etc. remain constant.

Shown in the figure 20.1(a), $C=a+bY_d$ is a straight line linear consumption function and equal proportion line of 45° (aggregate supply line). This line explains that total income is equal to consumption expenditure and savings, and also that Y=C+S.

According to Consumption function a consumer consumes something at zero level of income which is referred as autonomous consumption. In figure 20.1(a), the consumer consume 100 units at zero level of income.

Thus, at this level of income there is negative saving. This is represented by constant consumption variable (a).

At the income level of 150, savings are zero. At this level of income consumer neither saves nor dis-saves. This level is known as the Break Even point of income. Before Break Even point, society dis -saves because level of income of society is less than consumption.(shown in figure, area below OXD)

After Break Even level of income, society starts saving. This is based on the fact that the level of income is more than the level of consumption.

Average propensity to consume (APC): Average propensity to consume explains relationship between total income and total expenditure on consumption.

It is proportionate to consumption expenditure with total income at specific level of income.

Average propensity to consume (APC)

$$(APC) = \frac{C}{Y} = \frac{\text{Total consumption expenditure}}{\text{Total Income}}$$

Table 20.1

Income	Consumption	APC	MPC
0	100	$\frac{100}{0}=\infty$	-
100	150	$\frac{150}{100}=1.5$	$\frac{50}{100}=0.5$
200	200	$\frac{200}{200}=1.0$	$\frac{50}{100}=0.5$
300	250	$\frac{250}{300}=0.83$	$\frac{50}{100}=0.5$
400	300	$\frac{300}{400}=0.75$	$\frac{50}{100}=0.5$
500	350	$\frac{350}{500}=0.7$	$\frac{50}{100}=0.5$

By dividing total consumption by total income, we get average propensity to consume (APC). Average

propensity to consume changes along with change in various levels of income. With the help of schedule (20.1) average propensity to consume is explained. It is clear from the table that at different levels of income the value of APC changes. As income increases, value of APC decreases because the ratio of income spent on consumption declines.

Marginal Propensity to Consume (MPC)

By dividing the increase in consumption with increase in income, we get Marginal propensity to consume.

$$MPC = \frac{\Delta C}{\Delta Y} = \frac{\text{Change in consumption expenditure}}{\text{Change in income}}$$

Thus, the ratio between the change in consumption expenditure and change in income is known as marginal propensity to consume. Marginal Propensity to Consume also explains the additional increase in consumption expenditure due to additional increase in income. The coefficient value of MPC lies between 0 to 1. In mathematical equation form :

$$O<MPC<1$$

If MPC= 0.7,

It means that if income increases by one rupee, consumption expenditure will increases by 70 paise only. MPC tells us the slope of consumption function. Table 20.1can be used to explains the calculation of MPC.

It is clear from table 20.1 that in a linear consumption function, MPC remains unchanged at various levels of income. This is depicted in Figure 20.1(a) & 20.2 According to Keynes , MPC is constant

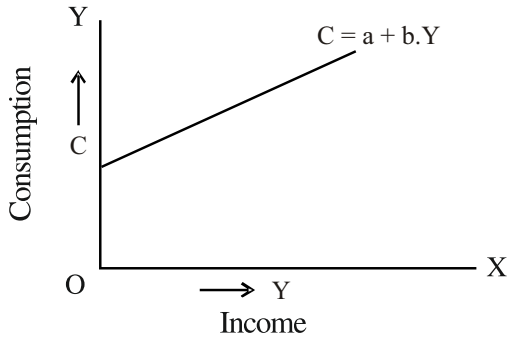

Figure = 20.2

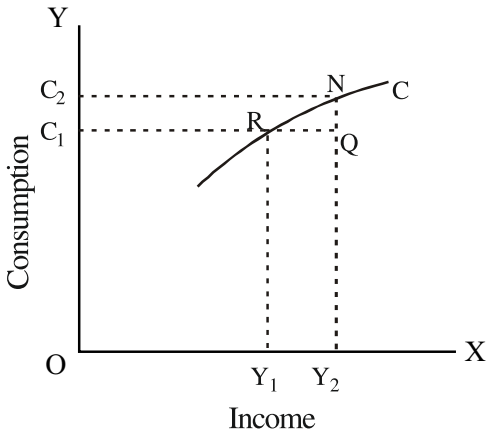

Figure = 20.3

in short run. In this condition APC>MPC. According to various economists, APC = MPC in the long run. The MPC for linear consumption function is equal to its slope.

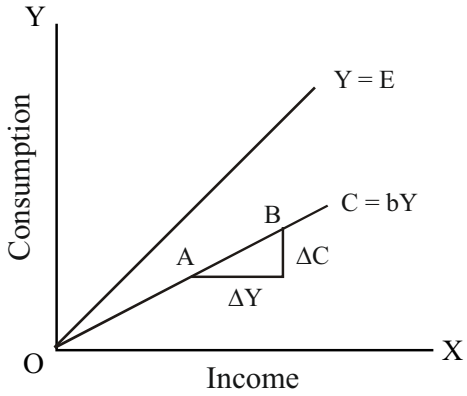

Figure 20.4

In figure- 20.3 $\frac{NQ}{RQ}$ depicts the slope of consumption curve. $\frac{C_1C_2}{Y_1Y_2}$

Here, NQ = change in consumption (ΔC) and RQ = Change in income (ΔY).In this figure, APC at R point is $\frac{OC_1}{OY_1}$ and at point N, $\frac{OC_2}{OY_2}$. The curve C is flatter towards right which depicts decreasing tendency of average propensity to consume.

Figure 20.4 is also a linear consumption function OC = bY, Both start at same point of origin O in long run, it is called a long run consumption function.

In the long run APC = MPC.

Saving Function :-

Saving is residual income after consumption i.e. to calculate the saving, total consumption expenditure is deducted from total income.

Since $Y=C+S$

therefore $S=Y-C$

We have already explained earlier and shown consumption and saving function together in the figure 20.1 (a) & (b). To find out the saving function, we shall have to deduct consumption from 45° line of equality at various level of income. Saving function has been shown in figure 20.1(b).

$\therefore \quad Y = C + S \quad \ldots (1)$

And $\quad C = a + bY \quad \ldots (2)$

Keeping the value of C as in (2) in equation (1)

$$Y = a + bY + S$$

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

Therefore, mathematically saving function can be represented as:

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

Average Propensity to Save :-

Average propensity to save shows the ratio between total saving and total income.

Average propensity to save

$$(APS) = \frac{S}{Y} = \frac{\text{Total Saving}}{\text{Total income}}$$

APS is obtained by dividing saving by income. APS is shown in following table 20.2

We know that

$$Y = C + S$$

The above equation divided by Y

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

$$1 = APC + APS$$

$$APS = 1 - APC$$

To find the value of APS, we have to subtract APC from 1.

Table 20.2

Income	Consumption	Saving	APS
0	100	0	-
100	150	-50	$\frac{-50}{100} = -0.5$
200	200	0	$\frac{0}{200} = 0$
300	250	50	$\frac{50}{300} = 0.16$
400	300	100	$\frac{100}{400} = 0.25$
500	350	150	$\frac{150}{500} = 0.3$

Marginal Propensity To Save :-

The Marginal Propensity to Save is the ratio of change in saving (ΔS) to change in income (ΔY)

$$MPS = \frac{\Delta S}{\Delta Y} = \frac{\text{Change in Saving}}{\text{Change in Income}}$$

We know that

$$Y = C + S$$

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

Dividing the above equation by ΔY

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

$$1 = MPC + MPS$$

$$\therefore \quad MPS = 1 - MPC$$

To find the value of MPS, MPC is subtracted from one.

Table 20.3 can be used to find marginal propensity to save.

Income	Consumption	Saving	MPS
0	100	0	-
100	150	-50	$\frac{-50}{100} = -0.5$
200	200	0	$\frac{50}{100} + = 0.5$
300	250	50	$\frac{50}{100} = 0.5$
400	300	100	$\frac{50}{100} = 0.5$
500	350	150	$\frac{50}{100} = 0.5$

Investment Function :-

In economics, investment means to acquire new productive assets and produce goods and services from these new productive assets. In layman language, investment means to purchase bonds, shares of company and land etc. but in economics, investment means to obtain new productive assets and to use it in the production of goods and services. If we obtain productive assets and do not use them to produce goods and services, then this will simply be called capital formation. But as soon as these assets are used in production of goods and services then capital formation turns into investment.

In an economy, investment is of three types:

1. **Public Investment**- This type of investment is made by Government and local bodies. Government invests in infrastructure like roads, bridges and dams etc.

2. Private Investment- This type of investment is undertaken by private investors, for establishing new factories, new buildings, new equipment etc. It is called private investment.

3. Autonomous Investment- This investment does not depend on change in income, rate of interest and rate of profit. It is shown as a parallel line to OX axis. (In Figure 20.5) Normally, this type of investment is made by government in form of public utility works like roads, dams and canals etc.

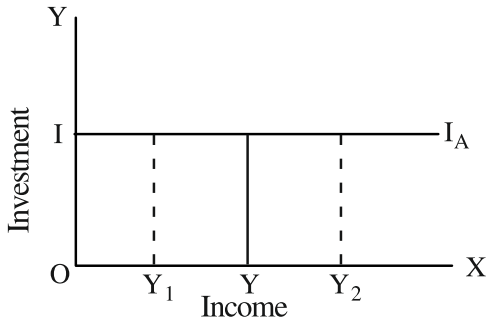

Figure 20.5

According to the above figure 20.5, autonomous investment I I_a is parallel to OX axis. This depicts that at all levels of income. i.e. OY, OY_1, OY_2 the level of investment is OI. Therefore autonomous investment is income inelastic. It is affected by independent factors like population, research, innovation etc.

(iv) Induced Investment :-

Induced investment is the investment expenditure incurred by the business sectors to earn profit or income. If income increases, investment also increases. Induced investment is positively co-related with income. It is income elastic.

Induced investment curve is an upward sloping curve. It increases along with increase in income. When income increases, consumption also increases which induces the increase in investment. Induced investment which is induced by profit is affected by prices, wages and rate of interest.

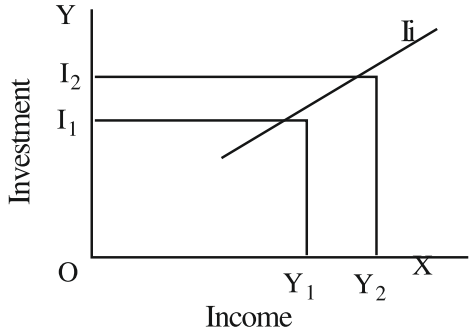

Figure 20.6

As per figure 20.6 when level of income is OY_1 then level of investment is OI_1 and when level of income increases to OY_2 then level of investment becames OI_2.

Two Aspects Of Saving and Ivestment-

(a) Ex-ante saving and Ex-ante investment-

The savings which are planned (intended) to be made by all the households in the economy for a year in beginning of period is called ex-ante saving.

Similarly, the investment which is planned to be made by the firms or entrepreneur in the economy for a year is known as ex-ante investment. If the firms have expectation of price rise and increase in sales, then to increase its stock it plans the investment. We know that savers and investors are two separate groups and both are influenced by different objectives. Therefore, ex-ante saving and ex-ante investment are not equal to each other.

There are two possibilities:-

1. When ex-ante investment is greater than ex-ante saving.

Suppose an entrepreneur is ready to invest ` 50,000 Crores. The Ex-ante savings of the household are ` 45,000 Crores. In this condition aggregate demand is greater than aggregate supply, (AD>AS). To fulfill this gap, entrepreneurs will employ more resources to increase production. This will lead to increase in national income which will increase savings and equilibrium will be attained by equalizing saving and investment.

2. Ex-ante investment is less than ex-ante savings.

Suppose entrepreneurs like to invest ` 45,000 Crores and household savings are ` 50,000 Crores. In this condition aggregate supply is greater than aggregate demand (AS>AD). In this situation, stocks of unsold goods pile up with entrepreneurs. Therefore, entrepreneurs will decrease the level of employment and produce less and as a result, the level of income will decrease. This in turn, will decrease the saving and ultimately the saving will be equal to investment.

(b)Ex-post savings and Ex-post investment-

Ex-post (actual) savings are those which the households actually save from their income. Ex-post (actual) investment- refers to actual investment made by the entrepreneur in an economy during a given period. At all levels of income, ex-post savings are equal to ex-post investment.

Marginal Efficiency Of Capital-

In a capitalist economy, investment is influenced by profit. So investment depends upon two fundamental things:

1. Marginal efficiency of capital and

2. Rate of interest.

The marginal efficiency of capital (MEC) is that rate of discount which would equate the price of fixed capital assets with its present discounted value of expected income. The MEC is the net rate of return that is expected from the purchase of additional capital.

According to Professor Kurihara, "Marginal efficiency of Capital is the ratio between the prospective yield of additional capital goods and their supply price." In a simple way, marginal efficiency of capital is expected rate of return on an additional unit of capital goods over its cost. It is determined by two economic factors- Expected income of capital and supply price. Expected profit (returns from project) means how much profit can be obtained from this capital in the future. Similarly, supply price of capital is the cost of capital.

$$C = \frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \ldots\ldots + \frac{R_n}{(1+r)^n}$$

C = Supply price of Capital

r = Discount rate

$R_1, R_2, R_3 \ldots\ldots R_n$ = Prospective yield from first, second and upto ....n...years

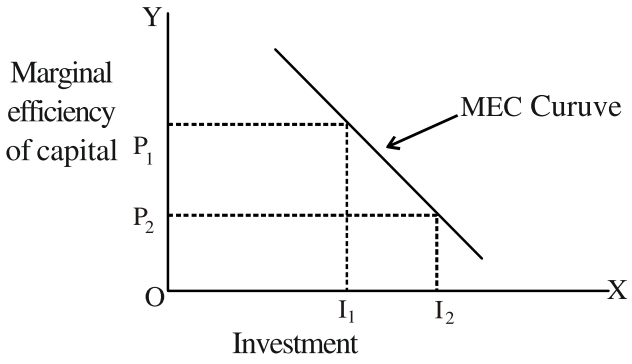

Figure20.7

Above figure 20.7 shows marginal efficiency of capital curve. OX axis shows investment and OY axis shows marginal efficiency of capital. When investment increases from OI_1 to OI_2, then marginal efficiency of

capital decreases from OP_1 to OP_2. It means marginal efficiency of capital decrease with increases in investment. There are two reasons which are responsible for this phenomenon:

1. With increasing production, demand for capital increases and volume of expected yield decreases because with increasing production the price gradually decreases.

2. Demand for capital increases and this increases its supply price i.e. increase in cost of production. Therefore as investment increases, MEC curves slope downwards towards the right.

An investor makes decision regarding investment, compares marginal efficiency of capital with rate of interest. Investment is done at the level when marginal efficiency of capital is greater than rate of interest. The equilibrium level of investment is at a point where marginal efficiency of capital is equal to present rate of interest.

IMPORTANT POINT

- Keynes psychological law of consumption – According to this law, with increase in income, consumption also increases but in less proportion to increase in income. So, part of an increased income is consumed and rest part of the income is saved.
- Consumption function can be expressed mathematically as $C=f(Y_d)$ or $C= a+ bY_d$

  (Simple linear consumption function)

  Here

  a = autonomous consumption

  b = marginal propensity to consume

  C = consumption expenditure

  Y_d = disposable income
- Average propensity to consume = total consumption expenditure , divided by total income

$$APC = \frac{C}{Y}$$

- Marginal propensity to consume = When change in consumption expenditure (ΔC) is divided by change in income (ΔY), we get MPC.

$$MPC = \frac{\Delta C}{\Delta Y}$$

Here MPC = Marginal propensity to consume

ΔY = Change in income

ΔC = Change in consumption

The value of MPC lies between 0 and 1

- **Saving function -** It is a functional relationship between saving and income

  $S = f(Y_d)$

  or $S = -a + (1- b)Y$
- Average propensity to save (APS) = total saving divided by the total income

  $APS = S/Y$

  $APC + APS = 1$ or $APS = 1 - APC$
- Marginal propensity to save ((MPS). It is the ratio between change in saving (ΔS), and change in income (ΔY)

$$MPS = \frac{\Delta S}{\Delta Y} \quad \text{and} \quad MPC + MPS = 1$$

$$MPS = 1 - MPC$$

- An investment is the purchase of new productive assets to produce goods and services is known as investment.
- **Public investment –** Investment made by government is known as Public Investment.
- **Private Investment –** This type of investment is made by private investors for establishing new factories, new building and new equipment. It is called private investment.
- **Autonomous investment -**This type of investment does not depend on production, income, rate of interest and profit.
- When investment undertaken with the aim of earning income or profit is known as induced investment.
- **Marginal efficiency of Capital-**Expectation rate of profitability on new investment is known as marginal efficiency of capital.

Exercise Questions

Objective Type Questions :-

1. Formula for marginal propensity to consume is:

   (A) $\frac{\Delta S}{\Delta Y}$ (B) $\frac{C}{Y}$

   (C) $\frac{\Delta C}{\Delta Y}$ (D) $\frac{Y}{C}$

2. Maximum value of MPC will be :

   (A) Zero (B) 1

   (C) Infinity (D) None of these

3. If APC=APS than what will be the respective value of APC and APS respectively

   (A) Zero (B) 1

   (C) 0.5 (D) 0.7

4. The value of MPC+MPS equal to :

   (A) Zero (B) Infinity

   (C) None of these (D) One

Very Short Answer Type Questions :-

1. What do you understand by Marginal propensity to consume?
2. What is consumption function?
3. If MPC = 0.5 what will be the value of MPS?
4. What is investment function?
5. What is average propensity to save?

Short Answer Type Questions :-

1. What is average propensity to consume? How is it measured?
2. What do you mean by investment?
3. Differentiate between – autonomous investment and induced investment.
4. What do you understand by MPS and MPC?

Essay Type Questions :-

1. Explain saving function with the help of a suitable table, figure and mathematical formula.
2. Explain in detail the Marginal efficiency of capital.
3. Explain consumption function with the help of suitable table, figure and mathematical formula.

Answer Table

1	2	3	4
C	B	C	D