**Chapter- 6**

**Investment, Multiplier, Accelerator & Business Cycle**

**Investment:** investment means the purchase of new machines, new buildings and other capital goods that add to the existing stocks of capital.

**Gross Investment:** The total purchase of new capital goods during a year is called gross investment.

**Net Investment:** Gross investment less replacement or depreciation is called net investment.

**Components of Investment:**

1. Plants and machinery;
2. Construction; and
3. Stocks.

**Private investment:** it refers to the expenditure incurred by the private entrepreneurs on the purchase of capital goods like plant and machinery, or construction of houses, factories, offices, shops, etc.

Public investment: investment expenditure by the government.

**Motivations for investment:** Expected profitability is the main motive for investment in private sector of the economy. In public sector, these decisions are motivated by profitability in terms of surplus of social benefits over social costs.

In the private sector, investment may be of two types:

1. Induced investment; and
2. Autonomous investment.

**Induced investment:** it takes place when the level of income and demand in the economy goes up.

**Autonomous investment:** it is that kind of investment which is not affected by the changes in income, rate of interest or rate of profit. This does not depend upon the growth of sales.

**Determinants of Private Investment:**

1. Prospective income from the capital asset;
2. Supply price of the capital asset; and
3. The rate of interest.

**Prospective Income:** it is defined as expected revenues from the use of the capital asset minus variable cost.

**Supply Price:** it refers to the cost of the asset. Suppose the machine costs SR 3000. This will be known as the supply price of the asset. Supply price is the current cost of the asset.

**Prospective yield:** it is the future return on the asset.

***Example:*** if you are given an option to accept SR 100 now or SR 100 five years hence, you will definitely like to have SR 100 now rather than five years afterwards. If you are to be asked to wait for five years, you will demand more than SR 100. Similarly, every person will evaluate SR 100 in present more than SR 100 in future. The present value of SR 100 in future will be less.

For t yearns, at a rate of interest of r per cent, the present value is calculated by this formula:

P = $\frac{A}{(1+r)^{t}}$

**Example:** on the basis of the above formula, the present value of the expected returns of a machine which costs SR 3,000 and which is expected to last for five years will be calculated as follows:

Present value of prospective yield = $\frac{A}{(1+r)^{t}}+\frac{A}{(1+r)^{t}}+\frac{A}{(1+r)^{t}}+\frac{A}{(1+r)^{t}}+\frac{A}{(1+r)^{t}}$

 = $\frac{1000}{(1+0.05)^{1}}+\frac{1000}{(1+0.05)^{2}}+\frac{1000}{(1+0.05)^{3}}+\frac{850}{(1+0.05)^{4}}+\frac{700}{(1+0.05)^{5}}$

= 952.75 + 907 + 863 + 700 + 550.25 = SR 3,973

The present value of the prospective yield of an asset that is expected to last for five years will be equal to SR 3,973 which is greater than the supply price of the asset (or the current cost). Therefore, it will be desirable to invest.

For calculation of Marginal Efficiency of Capital (MEC), the formula will be:

Cr = $\frac{R1}{(1+r)^{1}}+\frac{R2}{(1+r)^{2}}+\frac{R3}{(1+r)^{3}}+\frac{R4}{(1+r)^{4}}…….+\frac{Rt}{(1+r)^{t}}$

Where, *Cr* = replacement cost or supply price of an asset; *R1, R2, R2,….Rt*are the prospective annual yields for the periods *1, 2, 3, ….t,* respectively and *r* is the rate of discount.

**Marginal Efficiency of Capital (MEC):** The rate of discount (r) which equalizes the present value of the prospective yield of an asset with its supply price is known as marginal efficiency of capital (MEC).

With increase in investment, MEC falls. This is due to the following reasons:

1. The marginal revenue productivity of capital falls as more and more capital is employed;
2. The supply price of capital assets increases when more of them are demanded.
3. The increased output of the goods being produced with the help of capital will tend to drive down their prices.

Therefore, at higher rate of interest, less capital investment will take place. More private investment will take place at a lower rate of interest.

**Rate of Interest:** It refers to the cost of funds required to finance the project.

**Criterion for Investment:** Investors take decision on comparing MEC to rate of interest:

1. If the MEC > the rate of interest, the investors will be inclined to carry out investment;
2. If the MEC < the rate of interest, the investors will *not* be inclined to carry out investment; and
3. If the MEC = the rate of interest, the investors will be neutral to carry out investment;

**Question:** The supply price of a machine is SR 110 and its life is two years. In each year of its life it yields SR 72. Calculate its marginal efficiency of capital (MEC).

**Solution:** the marginal efficiency of capital can be found by equating the supply price (SR 110) and present value of expected yields (SR 72 in each year) with the help of this formula:

Cr = $\frac{R1}{\left(1+r\right)^{1}}+\frac{R2}{\left(1+r\right)^{2}}$

 110 = $\frac{72}{\left(1+r\right)^{1}}+\frac{72}{\left(1+r\right)^{2}}$

 110(1+r)2 = 72 + 72 + 72r

 110(1+2r+ r2) = 144 + 72r

 110 + 220r + 110r2 = 144 + 72r

 110r2 + 148r – 34 = 0

Which gives,

 r = 0.2 = 20%

Given the value of r as 20%, we can calculate the prospective yield per annum as follow:

I year: SR $\frac{R1}{\left(1+r\right)^{1}}$ = $\frac{72}{\left(1+0.20\right)^{1}}$ = $\frac{72}{1.20}$ = SR 60

II year: SR $\frac{R2}{\left(1+r\right)^{t}}= \frac{72}{\left(1+0.20\right)^{2}}$ = $\frac{72}{\left(1.2\right)^{2}}$ = SR 50

The rate of discount is 20%. The sum of discounted value of prospective annual yield (SR 60 + SR 50 = SR 110) equals the supply price of capital asset (SR 110). Investment in the asset is profitable if the cost of borrowing is less than 20%. In other words, if the rate of discount (MEC) exceeds the rate of interest (r), it will be desirable to invest.

**Role of Expectation in Private Investment**: Business expectations play a dominant role in determining the volume of private investment. The calculation of the MEC is full of uncertainty. If an investor is optimistic about the future, the net future income of a capital will be high, and vice versa.

**Determinants of Public Investment:** Public investment is motivated by social profitability considerations. The investment proposals in the public sector are subject to cost- benefit analysis.

**Multiplier**

**Meaning:** Multiplier shows the relationship between change in investment and the resulting change in income.

An increase in investment in an economy leads to an increase in income which is more than the proportionate increase in investment.

The multiplier coefficient (K) measures the change in income due to change in investment. In other words, K = $\frac{∆Y}{∆I}$ = $\frac{1}{1-MPC}$ = $\frac{1}{MPS}$

Higher the value of MPC, higher will be the value of multiplier.

Higher the value of MPS, lower will be the value of multiplier.

**Algebraic Derivation of Multiplier**:

Since, National Income = Consumption Expenditure + Saving

Or, Y = C + S = C + I (because S= I)

If there is change ($∆$) in investment, income and consumption also change.

So,

$∆Y$ = $∆C+ ∆I$

Dividing both side by $∆Y, we get,$

$\frac{∆Y}{∆Y}$ $= \frac{∆C}{∆Y}+\frac{∆I}{∆Y}$

1 = $\frac{∆C}{∆Y}+\frac{∆I}{∆Y}$

1 - $\frac{∆C}{∆Y}$ = $\frac{∆I}{∆Y}$

$\frac{∆Y}{∆I}$ = $\frac{1}{1 - \frac{∆C}{∆Y} }$

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

**Question:** What will be the value of multiplier if the marginal propensity to save is 0.4?

**Solution:** Multiplier, K = $\frac{1}{MPS }$ = $\frac{1}{0.4 }$ = 2.5

**Question:** Given MPC = 0.6, calculate the value of $∆Y, ∆C and ∆S$ when investment increases by SR 2000 million.

Solution: the calculation of these values is summarized in the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Round** | $$∆I$$ | $$∆Y$$ | $$∆C$$ | $$∆S$$ |
| 1 | 2000 | 2000 | 1200 | 800 |
| 2 |  | 1200 | 720 | 480 |
| 3 |  | 720 | 432 | 288 |
| 4 |  | 432 | 259.2 | 172.8 |
| Last | ↓ | ↓ | ↓ | ↓ |
|  | **Total** | **5000** | **3000** | **2000** |

$∆Y= \frac{∆I}{1 -MPC }$ = $\frac{2000}{1-0.6 }$ = 5000

$$∆C= ∆Y×MPC=5000×0.6=3000$$

$∆S= ∆Y×MPS= ∆Y(1- MPC)$ = 5000 $(1-0.6)=5000$ $×0.4=2000$

**Question:** An additional investment of SR 1000 million in the Saudi economy creates how much additional income, if MPC = (i) 1, (ii) 0, (iii) 0.5?

**Question:** An additional investment of SR 20,000 million in the Saudi economy will create how much additional income, if MPS = (i) 1, (ii) 2, (iii) 3?

**Question:** If the Saudi economy plans to generate SR 1000 million of additional income, how much additional investment will be required if MPS = (i) 0.5, (ii) 0.4?

**Question:** If the Saudi economy plans to generate SR 200 million of additional income, how much additional investment will be required if MPC = (i) 0.3, (ii) 0.4?

**Question:** Find the value of MPC and MPS if an additional investment of SR 100 million generated an additional income of SR 500 million.

**Accelerator**

The multiplier describes the relationship between investment and income, i.e., the effect of investment on income.

The multiplier concept is concerned with original investment as a stimulus to consumption and thereby to income and employment.  But in this concept, we are not concerned about the effect of income on investment.  This effect is covered by the *‘accelerator’*.

The term *‘accelerator’* is associated with the name of J.M. Clark in the year 1914.  It has been proved a powerful tool of economic analysis since then.

Keynes, astonishingly, has altogether ignored this concept.  That is why, the concept of accelerator is not considered the part of Keynesian theory.

According to the principle of accelerator, when income increases, people’s spending power increases; their consumption increases and consequently the demand for consumer goods increases.  In order to meet this enhanced demand, investment must increase to raise the productive capacity of the community.  Initially, however, the increased demand will be met by over-working the existing plants and machinery.  All this leads to increase in profits which will induce entrepreneurs to expand their plants by increasing their investments.

***Assumptions of the Accelerator:***

1. Under the principle of accelerator, it is assumed that ***there is no excess capacity existing in the consumer goods industries***.  No machines are lying idle and shift working is not possible.
2. ***In capital goods industries, it has been assumed that there is an existence of surplus capacity.***If there is no excess capacity in capital goods industries, increased demand for machines could not lead to increase in the supply of machines.
3. ***Output is flexible.***  The machine-making industry or capital goods industry can increase its output whenever desired.
4. ***The size of the accelerator does not remain constant over time.***  It value will be affected by the businessmen’s calculations regarding the profitability of installing new plants to make more machines on the basis of their probable working life.
5. ***The demand for machines will remain stable in the future,*** although the increase in demand has suddenly cropped up.

**Trade / Business Cycle**

Changes in aggregate demand bring about changes in the level of output, employment, income and price. These changes are generally cyclical in nature and follow a cycle of four different stages:

|  |  |
| --- | --- |
| 1. Prosperity or boom;
2. Recession;
3. Depression or slump; and
4. Recovery.
 | http://financeandcareer.com/wp-content/uploads/2014/03/business-cycle-graph.jpeg |

The cyclical nature of economic activity is known as a *trade cycle* or *business cycle*.

**Prosperity or boom or peak:** it is a phase of economic activity characterized by rising demand, rising prices, rising investment, rising employment, rising incomes, rising purchasing power and hence rising demand and so on. The investors, therefore, voluntarily undertake risks and go in for investment, this further fuels boom conditions through the working of the multiplier effect.

**Recession:** during the boom period, the economy may get over- heated and the monetary authorities, the financial institutions and the business itself may begin to play cautious. There may be cuts in investment, resulting in cuts in employment, fall in incomes, decline in purchasing power and demand. Prices may begin to fall.

**Depression or slump or trough:** if the effective corrective measures cannot be undertaken, the economy may find itself go into depression. It is a stage when the business confidence is at its lowest. Investment, employment, output, income and prices touch the bottom.

**Recovery or expansion:** as the economy moves out of depression, it enters the phase of recovery. Sustained recovery will find the level of investment, employment, output, income and prices moving upwards. This may finally results in boom conditions in the economy.