UNIT 10: INVESTMENT FUNCTION AND MEC

UNIT STRUCTURE

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10.1 LEARNING OBJECTIVES

After going through this unit, you will be able to:

- state the meaning of autonomous and induced investment
- describe the concept of marginal efficiency of capital (MEC)
- explain the relation between MEC and the rate of interest
- describe the concept of marginal efficiency of investment (MEI) and distinguish between MEC and MEI
- discuss the relation between rate of interest, MEC and the volume of investment.

10.2 INTRODUCTION

This unit is concerned with familiarising you with some basic concepts of investment. Thus, through this unit, you will be able to derive

the meaning of investment and distinguish between autonomous and induced investment.

Autonomous investment is independent of the change in income. That is why it is known as autonomous investment. Induced investment depends upon change in the level of income. When there is change in income, there is a change in induced investment. Most of the private investment is of induced type.

Marginal efficiency of capital (MEC) describes the rate of discount which would make the present value of expected income from fixed capital assets equal to the present supply price of the asset. Apart from this, the concept of marginal efficiency of investment (MEI) has been discussed and the distinctions between MEC and MEI have been made. The relation between MEC, rate of interest and volume of investment has been explained at the last section of the unit.

10.3 INVESTMENT: BASIC CONCEPTS

In this section, we shall basically discuss meaning of investment, differences between gross investment and net investment and also the differences between induced investment and autonomous investment. Let us start with meaning of investment.

10.3.1 Meaning of Investment

In Economics, investment typically refers to real investment which adds to the exisiting stock of capital in the economy. Such investment leads to increase in the levels of income and production by increasing the production and purchase of capital goods. Thus, in Economics, investment includes new plant and equipment, construction of public works like dams, roads, buildings etc. 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.” The term capital here refers to the real assets like

factories, plants, equipmnment, and other inventories of finished and semi-finished goods. Capital also means any previously produced input that can be used in the process to produce other goods. The amount of capital available in the economy is nothing but the aggregate stock of capital in that economy. Thus, capital is a stock concept.

From the above discussion it follows that investment is the production or acquisition of real capital assets during any period of time. Say, for example, the capital assets of a company as on 31st March, 2011 is Rs.10,000 crores and it invests an amount of Rs.500 crores in the financial year of 2011-12. Thus, at the end of the financial year 2011-12 (i.e., on 31st March, 2012), the aggregate (i.e., gross) capital stock of the company will stand at Rs.10,500 crores. Symbolically, let *I* be the investment and *K* be the capital in year *t* (here, *t* is the current year, i.e., 2011-12), then $I_t = K_t - K_{t-1}$. Please note that t-1 denotes the previous year (i.e., 2010-11 ending on March, 31, 2011).

10.3.2 Gross Investment vs Net Investment

The inter-relationship between capital and investment is shown by net investment. In the above example, when we told about making an investment of Rs.500 crore during the year 2011-12, we told about gross investment. Thus, gross investment is the total amount of investment made on new capital asset in a particular year. It should be noted that some capital stock wears out every year and is used up as depreciation and obsolescence. To derive the net investment in a particular year, the amount of expenditure made as depreciation and obsolescence is deducted from the gross investment made in that particular year. When gross investment equals the cost of depreciation and obsolescence, net investment becomes zero, and there is no addition to the existing stock of capital in the economy. When gross investment is less than depreciation and obsolescence, there is disinvestment in the economy and the

capital stock decreases. In this sense, for an increase in the real capital stock in the economy, gross investment must exceed the cost of depreciation and obsolescence. This also implies that there is some net investment in the economy.

10.3.3 Induced Investment vs Automonous Investment

Investment may be categorised as induced or autonomous. Autonomous investment is independent of the level of income, output, and profit and sales of a business firm. Prof Alvin Hanson and some other economists are of the opinion that this type of investment is associated generally with the factors like the development of new resources, growth of population and labour force and technological innovations or invention like the introduction of new products into the market.

The investment expenditure which is related in some way with the current income, output and sales is termed as *induced investment*. If there is a change in income and output, it will result in change in induced investment. Since the incentive for such an investment is the direct consequence of the change in current income, output or demand.

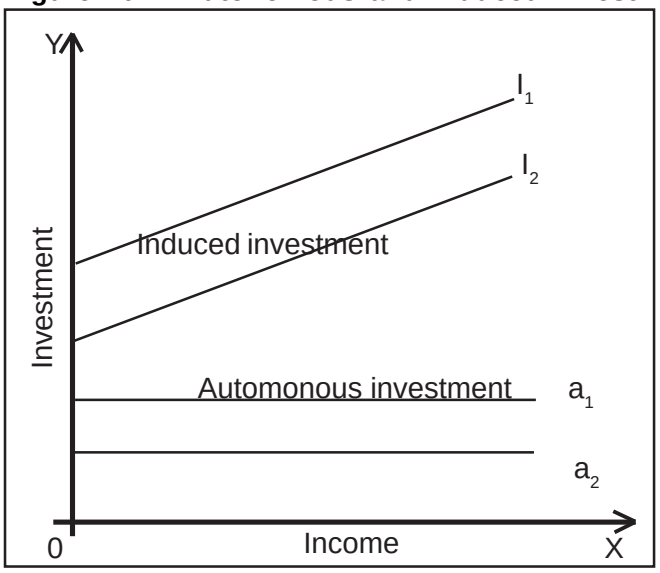
The autonomous investment is generally undertaken by the public authorities like Union, State or local governments. On the other hand, most of the induced investment is undertaken by private authorities. This is because people are driven by profit motive. Autonomous investment is generally not induced by profit, but induced investment is induced by profit.

From the above discussion, it seems like that there is no relation between induced and autonomous investment. They are totally different concepts. But autonomous investment and induced investment are related. It can be explained with the help of an example. Suppose there is increase in autonomous investment of 20 crores undertaken by the government. Assuming the multiplier

coefficient is 2, it will automatically lead to an increase in income of 40 crores. This increase in income or output of 40 crores encourages the private investors to undertake induced investment. It implies that autonomous investment has its effect upon induced investment.

The distinction between autonomous and induced investment has been shown with the help of Figure 10.1. In the figure, a_1 and a_2 represent autonomous investment while I_1 and I_2 represent induced investment.

Figure 10.1: Autonomous and Induced Investment





CHECK YOUR PROGRESS

Q 1: State whether True or False

i) Induced investment is undertaken by the government authority.

ii) Autonomous investment is motivated by profit motive.

Q 2: Differentiate between induced investment and automonous investment. (Answer in about 30 words).

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Q 3: What do you mean by induced investment? (Answer in about 50 words).

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10.4 FACTORS AFFECTING THE INVESTMENT FUNCTION

As we have already mentioned, induced investment (or, private investment) is basiclly driven by the profit motive. As private entrepreneurs are driven by the profit motive, their inducement to invest in capital goods is driven by two basic objectives, either to replace the depreciated machineries or to expand the existing plant capacity. Private investment depends upon marginal efficiency of capital and the rate of interest. The marginal efficiency of capital (MEC), in turn, depends upon future expectations which may be very fluctuating. As such, private investment becomes very much undependable.

The marginal efficiency of capital along with the rate of interest determines the amount of new investment. As has been discussed in the earlier units, in the Keynesian equation Y = C + I, given the propensity to consume and hence consumption being stable in the short-run, volume of investment determines the volume of empoyment. Investment, thus, is an essential requirement for attaining full employment in a capitalist economy. In fact, not only net investment, but also an increasing rate of net investment is necessary to maintain full employment for a longer period of time.

10.4.1 Marginal Efficiency of Capital

Keynes defined marginal efficiency of capital as the highest rate of return over cost expected from an additional unit of a capital asset during its life time. Thus, marginal efficiency of a particular

type of capital asset is the highest rate of return over cost expected from an additional or marginal unit of that type of asset. In general, however it may be regarded as the highest rate of return over cost expected from producing an additional unit of the most profitable of all categories of the capital assets. Thus, the prospective yield (y) is the aggregate net return from an asset during its life-time, while supply price (Sp) is the cost of producing that asset. We can express MEC mathematically as:

$$Sp = \sum_{z=1}^{n} \frac{R}{(1+i)^z}$$

where i= marginal efficiency of capital, R= perspective yields of a capital asset per unit of time and Sp = supply price of the asset.

For example, if the annual yield of a capital asset is Rs.22,000 and the supply price of the capital asset is Rs.20,000, and the asset lasts for 1 year then

$$20{,}000 = \frac{22{,}000}{1+\mathrm{i}}$$
$$\Rightarrow 20.000 + 20{,}000\mathrm{i} = 22{,}000$$
$$\Rightarrow 20{,}000\mathrm{i} = 22{,}000 - 20{,}000$$
$$\Rightarrow 20{,}000\mathrm{i} = 2{,}000$$
$$\therefore \mathrm{i} = \frac{2{,}000}{20{,}000}$$
$$= \frac{2}{20}$$
$$= \frac{1}{10}$$
$$\therefore \mathrm{i} = 10\%$$

An increase in the supply price (Sp) of the capital assets given the expected annual yield will reduce the marginal efficiency of capital (i). Similarly, a decrease in the supply price of the capital asset given the annual expected yield will raise the marginal efficiency of capital. Thus, i is directly related to the rise in R and inversely to the supply price of the capital assets (Sp).

In a more generalized sense, Keynes has defined marginal efficiency of capital as *"the rate of discount which would make the present value of the series of annuities given by the returns expected from the capital asset during its life just equal the supply price"*.

Symbolically, it can be expressed as:

$$Sp = \frac{R_1}{1+i} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3} + ... + \frac{R_n}{(1+i)^n}$$

where, Sp is the supply price or the cost of the capital asset, R_1, R_2……and R_n are the prospective yields or the series of annuities given by the returns expected from the capital asset in the years 1,2…..upto n and i is marginal efficiency of capital.

The marginal efficiency of capital of a particular type of capital asset is the highest rate of return over cost expected from an additional, or marginal unit of that type of capital asset.

10.4.2 Rate of Interest

The first element affecting inducement to invest is in fact the rate of interest. The Keynesian theory dealing with determination of rate of interest is known as the Liquidity Preference Theory. According to Keynes, demand for money (liquidity preference) arises out of three basic motives, viz., *transaction motive, precautionary motive* and *speculative motive. Transaction motive* relates to the need of the people to hold money for purchasing goods and services to fulfill the daily necessities of life. Apart from fulfilling the transaction purposes, people also have to hold money to take proper precautions against unforeseen future contingencies like sickness, unemployment, accidents, old age etc. Holding of money for such precautions is called the *precautionary motive*. According to Keynes, people also keep cash in hand to take advantage of the rise and fall of prices of bonds and securities. Keynes called this as speculative demand for money. This speculative demand for money arises, as Keynes argued, on account of the uncertainty regading the future rate of interest.

All the three motives of holding money, i.e., transaction motive, precautionary motive and speculative motive when added give us the total demand for money. The liquidity preference (i.e.,

demand for money) for transaction motive and precautionary motive is more or less stable and is interest-inelastic. They basically depend on the level of income. On the other hand, holding of money under the speculative motive is very much sensitive to the changes in the market rate of interest. If the rate of interest in investment instruments, e.g., bond is higher, say 10%, people would choose to hold less amount of money in hand or more to invest in bond. On the contrary, if the rate of interest on bond is lower, say 2%, people would be reluctant to invest more in bonds; they would choose to hold money in cash.

Let us suppose, we represent the demand for money for transaction and precautionary motives by M_1 and the demand for speculative motive by M_2, then we can write:

$M = M_1 + M_2$,

where M stands for total demand for money.

As we have already stated, the demand for money for transaction and precautionary motives are interest-inelastic and the demand for speculative motive as interest elastic, we can write:

$M = M_1(Y) + M_2(r)$

where $M_1(Y)$ indicates that M_1 is a function of income (Y) and $M_2(r)$ indicates that M_2 is a funciton of the rate of interest (r).

According to Keynes, the equilibrium rate of interest is determined at the point where the demand for money equals the supply of money.

10.4.3 Marginal Efficiency of Investment (MEI)

Another important concept relating to the investment function is the Marginal Efficiency of Investment (MEI). Please note that the MEI is nothing but MEC when the possibility of increasing supply price of capital is taken into account. In Keynesian MEC, the supply price of capital is constant. This implies that capital supply is perfectly elastic. But in the real world, capital is scarce. Thus, when the volume of investment increases causing an increase in the demand for

capital goods, the supply price of capital goes up. The MEI concept recognises this aspect of capital price. Hence, MEI is an improvement over the concept of MEC as it is far more realistic.

10.5 RELATIONSHIP BETWEEN RATE OF INTEREST, MEC AND VOLUME OF INVESTMENT

As we have already mentioned, MEC and the rate of interest are the two important factors that affect the volume of investment. We know that the rate of interest is the price paid for loanable funds and is determined, like any other price, by the demand for and supply of loanable funds. A potential investor will go on comparing the MEC on new investment against the rate of interest. As long as MEC is more than the rate of interest, investment will continue to be made, till MEC and the rate of interest are equalled. Once MEC becomes equated to the rate of interest, equilibrium investment is determined.

The relationship of MEC and the rate of interest in the determination of inducement to invest has been shown with the help of Table 10.1.

Table 10.1: Relationship of MEC, Rate of Interest and Effect on Investment

Supply price	Annual return	MEC	Rate of interest	Effect on investment
Rs. 25,000/-	Rs. 1,000/-	4%	4%	Neutral
Rs. 20,000/-	Rs. 1,000/-	5%	4%	Favourable
Rs. 50,000/-	Rs. 1,000/-	2%	4%	Adverse

In above Table 10.1 it has been assumed that the new capital asset gives a constant return of Rs. 1,000/- annually. Now it can be seen that when the rate of MEC (4%) is equal to the rate of interest, the effect on investment is neutral. When the rate of MEC (5%) is higher than the rate of interest (4%), there is a favourable affect on investment. On the contrary, when the rate of MEC (2%) is less than the rate of interest (4%), the affect on investment is unfavourable.



CHECK YOUR PROGRESS

Q 4: Choose the correct alternative from below:

Marginal Efficiency of capital can be defined as the ratio of:

(a) Supply price of the capital asset and its prospective yield

(b) Prospective yield and the supply price (c) Others

Q 5: Mention the three important criteria a business firm considers in making investment. (Answer in about 40 words).

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10.6 LET US SUM UP

- Investment refers to real investment which adds to the existing stock of capital in the economy.
- For an increase in the real capital stock in the economy, gross investment must exceed the cost of depreciation and obsolescence.
- Investment may be autonomous or induced. Autonomous investment is not induced by profit motive, but induced investment depends on profit.
- MEC is the rate of discount which will make the present value of the capital assets over the years equal to its supply price.
- MEI may be defined as the modified MEC that takes into account the change in supply price of capital.
- Keynes made no distinction between MEC and MEI. However, later economists have acknowledged that MEI is a more realistic concept as capital is scarce and its supply is not perfectly elastic.



10.7 FURTHER READING

1) Dillard, D. (2005). *The Economics of John Maynard Keynes*: *The Theory of a Monetary Economy.* USA: Kessinger Publishing, LLC.

2) Gupta, R.D., & Rana, A.S. (2009). *Keynes and Post-Keynesian Economics*. Jalandhar: Kalyani Publisher.

3) Rana, K.C. & Verma, K.N. (2009). *Macroeconomic Analysis*. Jalandhar: Vishal Publications.

10.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: (a) False (b) False

Ans to Q No 2: Autonomous investment is independent of change of income, but induced investment depends on level of income.



Ans to Q No 3: The investment expenditure which is related in some way with the current income, output and sales is termed as *induced investment*. If there is a change in income and output, it will result in change in induced investment, since the incentive for such an investment is the direct consequences of the change in current income, output or demand.

Ans to Q No 4: (b)

Ans to Q No 5: The three criteria that a business firm take into consideration in making an investment decision are:

- the cost of the capital asset,
- the expected rate of return from it during the life time, and/or
- the market rate of interest.



10.9 MODEL QUESTIONS

Short Questions (Answer each question in about 150 words)

Q 1: Write a short note on marginal efficiency of capital.

Q 2: What do you mean by autonomous investment and induced investment? Differentiate between the two.

Essay-type Questions (Answer each question in about 300-500 words)

Q 1: What do you mean by marginal efficiency of capital? How does marginal efficiency relate to the rate of interest?

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