UNIT 9: CONCEPT OF MULTIPLIER AND DERIVATION OF INVESTMENT MULTIPLIER

UNIT STRUCTURE

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9.1 LEARNING OBJECTIVES

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

- acquire an in depth knowledge about investment multiplier and its working process,
- know the assumptions on which multiplier theory rests upon,
- state the criticisms raised against the theory of multiplier, and
- discuss the relevence of multiplier in developing countries.

9.2 INTRODUCTION

We know that level of income, output and employment in an economy depends upon effective demand, which in turn depends upon expenditure on consumption and investment goods. To put symbolically:

Y=C+I, where Y stands for income, C for consumption and I for investment. We have already discussed that consumption depends upon propensity to consume, which during the short period remains more or less stable . So the main determinant of income is investment. Or we can say, the fluctuations in effective demand or income are to be traced through fluctuations in investment (consumption being stable). Investment increases income and production. Increased income leads to more investment that results in economic growth. However, the question arises how much income will increase as a result of initial increment in investment. Is the increased income exactly equal to the investment or more than that? The answer to these questions can be given by introducing the concept of multiplier or investment multiplier. Briefly multiplier is the number, which, when multiplied with initial increment in investment gives you the final increase in income.

9.3 CONCEPT OF MULTIPLIER

Multiplier or investment multiplier is one of the Keynes' pathbreaking contributions in the field of economic theory. However, the idea of multiplier was first introduced by R.F. Kahn, though the multiplier he told about was employment multiplier. J.M. Keynes, used the concept of multiplier in the field of investment. Investment multiplier is defined as the ratio of change in income to change in investment and is denoted by K

$$K = \frac{\Delta Y}{\Delta I}$$

Where $K \rightarrow$ multiplier

$\Delta Y \rightarrow$ Change in income

$\Delta I \rightarrow$ Change in investment

Thus, multiplier tells us how much change in income occurs as a result of initial change in investment.

For instance, if the initial increment in investment is ₹100 crore and as a result of it, the income in the economy increases by ₹400 crore, than the multipler is 4.



ACTIVITY 9. 1

In an economy, the investment in public sector increased by ₹50 crore. If the multiplier is 3, Find out the final increase in income.

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LET US KNOW

Whenever an investment is made in the economy, the effect is to increase total income not only by the amount of original investment but also by a multiple of it. The reason is that, the investment not only expands the income in the industries where the investment is originally made but also in other industries whose products are demanded by the people employed in the industries where investment is made.

You may be surprised to know that multiplier can decrease the income in multiplier times if initial investment decreases. This is known as the backward or reverse working of multiplier. The former, where income increases multipler times the original investment is known as forward working of the multiplier.



CHECK YOUR PROGRESS

Q 1: Define multiplier. (Answer in about 30 words)

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Q 2: What is forward working of multiplier? (Answer in about 30 words).....

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Q 3: Can multiplier work in backward direction? Answer in about 30 words. .....

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9.4 ALGEBRAIC DERIVATION OF THE INVESTMENT MULTIPLIER

Let us derive the multiplier from the following income- consumption and investment relationship.

We already have, $Y = C + I \quad - \quad (1)$

We know that in order to maintain equilibrium level of income consumption expenditure and investment expenditure must equal to the total income.Now change in income is also equal to change in consumption plus change in investment.

So

$\Delta Y = \Delta C + \Delta I \quad - \quad (2) \quad [\Delta - \text{change}]$

$\Rightarrow \frac{1}{\frac{\Delta I}{\Delta Y}} = \frac{1}{1-\frac{\Delta C}{\Delta Y}} \quad = \Delta I = \Delta Y - \Delta C$

Now deviding both sides by ΔY, we get

$\Rightarrow \frac{\Delta Y}{\Delta I} = \frac{1}{1-\frac{\Delta C}{\Delta Y}} \quad \frac{\Delta I}{\Delta Y} = \frac{\Delta Y}{\Delta Y} - \frac{\Delta C}{\Delta Y} \left[\because \frac{\Delta Y}{\Delta I} = K = multiplier\right]$

$\Rightarrow K = \frac{1}{1-\frac{\Delta C}{\Delta Y}} \Rightarrow \frac{\Delta I}{\Delta Y} = 1 - \frac{\Delta C}{\Delta Y}$

Taking reciprocal in both sides,

$\Rightarrow K = \frac{1}{1-MPC} = \frac{1}{MPS} \quad \left[\because \frac{\Delta C}{\Delta Y} = MPC\right]$

$\rightarrow (3) \quad [1 - MPC = MPS \Rightarrow MPC + MPS = 1]$

From equation (3) it is clear that the value of multiplier depends on marginal propensity to consume (MPC) or marginal propensity to save (MPS). Larger the value of MPC, large will be the multiplier and vice versa. Or you can say that multiplier is directly proportional to marginal propensity to consume.

In an economy where people spend more or MPC is high, the initial investment may lead to huge increase in final income as multiplier value is high.

On the other hand, multiplier is inversely proportional to MPS. This means that larger the value of MPS, small will be the multiplier and vice versa. So, in a society where people save more or MPS is high, multiplier value will be small and as a result initial investment may lead to small increase in income finally.



LET US KNOW

Marginal propensity to consume or mpc is related to consumption function. MPC is a ratio of change in consumption to change in income. We can also say that mpc is the addition to consumption as a result of incremental change in income. The value of mpc lies between 0 and 1.

Similarly, marginal propensity to save (MPS) is defined as a ratio of change in savings to change in income or else we say that MPS is the addition to savings as result of small change in income. The value of MPS also lies between zero and one. The relationship between MPC & MPS is opposite and MPC+MPS=1.



ACTIVITY 9.2

Complete the Chart:

MPC	MPS	multiplier
0	1	–
1	–	∞
	–	–
$\frac{3}{4}$	–	–
$\frac{1}{4}$	–	–

Since value of MPC & MPS lies between zero and one so the value of multiplier lies between 1 and $\propto$.

This is so, because if MPC=0.

if MPC = 1,

$$K = \frac{1}{1 = MPC} = \frac{1}{1 - 1} = \frac{1}{0} = \infty$$



LET US KNOW

In actual practice, MPC or MPS is neither equal to Zero, nor equal to one. Since consumption always increase with increased income, MPC never be equal to zero. So multiplier can not be equal to zero. Again, MPC in reality never be one. Because all the increased income is not spent on consumption, a part of it is saved. Therefore multiplier can not be equal to infinity.

$$K = \frac{1}{1 - MP}$$



CHECK YOUR PROGRESS

Q 4: High consumerism leads to higher income propagation. Justify (In around 30 words.)

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Q 5: Derive the mathematical relationship between marginal propensity to save and the multiplier. (Answer in about 30 words.)

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Q 6: Show that when MPC=0.5, the increased income due to increased investment is exactly double the initial investment.

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9.5 WORKING OF THE MULTIPLIER

As discussed in the previous section, multiplier works both in forward and backward direction. We shall however lay our emphasis on discussing the forward operaiton of the multiplier.

Let us now see the actual process whereby a multiple expansion of income is brought about by increased expenditure on consumption. The multiplier operation can be well explained with the help of an example. Let us suppose that an investment of ₹100 crore is made in the economy as public expenditure. Let us also suppose that marginal propensity to consume is 0.5. This implies that value of multiplier is:

$$K = \frac{1}{1 - MPC} = \frac{1}{1 - 0.5} = \frac{1}{0.5} = 2$$

So can you tell, how much increase of income will occur as a result of initial investment of ₹100 crore? Yes, the answer is that initial investment of ₹100 crore will lead to multiplier times increase in income i.e. ₹200 crore (as K=2). This process of increased income through multiplier can be shown in the table given below.

Table 9.1 : Working of the Multiplier (₹in crore)

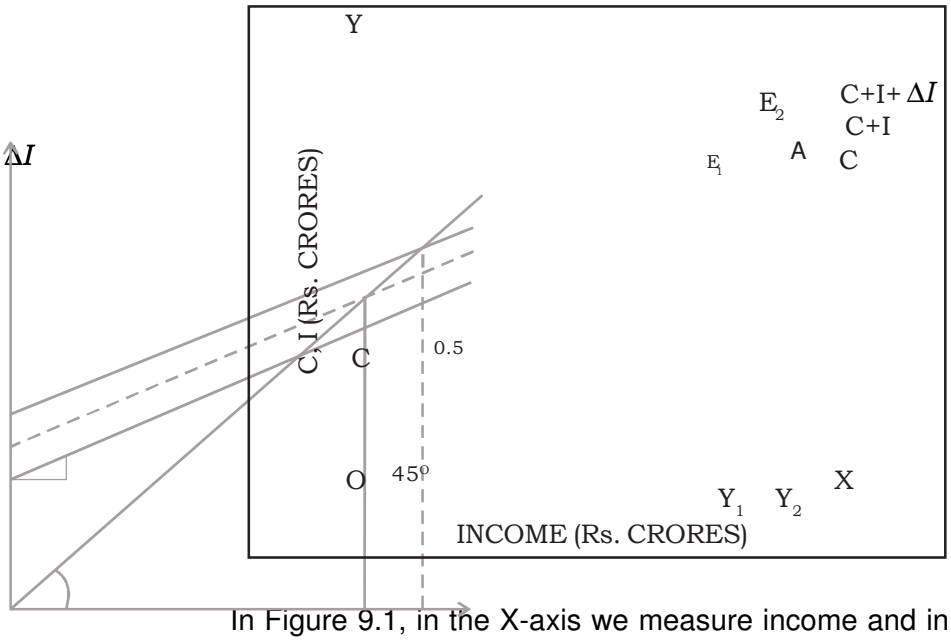
Round	ΔI			
0	0	---	---	---
1	100	100	50	50
2	.	50	25	25
3	.	25	12.5	12.5
4	.	12.5	6.25	6.25
5	.	6.25	3.125	3.125
.	.	.	.	.
.	.	.	.	.
		0	0	0
	100	200	100	100

In the first round, an increase in investment by ₹100 crore leads to an increased production which create income by ₹100 crore. Since marginal propensity to consume is 0.5, half of the increased income, i.e. ₹50 crore is spent on consumption and remaining ₹50 crore is saved. This increased consumption expenditure of ₹50 crore immediately increase the production

and income by same amount. Out of this newly increased ₹50 crores of income, ₹25 crore is spent on consumption goods and remaining ₹25 crore is saved. Again this consumption expenditure of ₹25 crore immediately increases the production and income by ₹25 crore and the process continues till no further increase in income and expenditure is possible. Finally the income increase by ₹200 crore as a result of initial increment in investment of ₹100 crore. So with a multiplier value equal to 2, an initial increment in investment of ₹100 crore leads to final increase in income which is exactly double the initial investment. This is the forward working of multiplier in a static framework with no time lag.

The process of income propagation as a result of increase in investment is shown with the Figure 9.1.

Figure 9.1: Working of the Multiplier



In Figure 9.1, in the X-axis we measure income and in Y axis we measure consumption and investment. Line C in the diagram represents consumption function and it is drawn on the assumption that MPC is 0.5. So the line C has a slope 0.5. C+I is the income curve which intersect 45° line at point E_1 where equilibrium is established. The equilibrium level of income is OY_1. Now with increment in investment by , the income curve C+I shifts upward to C+I+ . This new income curve intersect 45° line at point E_2. So the new equilibrium is established at E_2 and new equilibrium