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The Concept of Multiplier:

The theory of multiplier occupies an important place in the modern theory of income and employment. The concept of multiplier was first of all developed by F.A. Kahn in the early 1930s. But Keynes later further refined it. F.A. Kahn developed the concept of multiplier with reference to the increase in employment, direct as well as indirect, as a result of initial increase in investment and employment.

Keynes, however, propounded the concept of multiplier with reference to the increase in total income, direct as well as indirect, as a result of original increase in investment and income. Therefore, whereas Kahn's multiplier is known as 'employment multiplier', Keynes's multiplier is known as investment or income multiplier.

The essence of multiplier is that total increase in income, output or employment is manifold the original increase in investment. For example, if investment equal to Rs. 100 crores is made, then the income will not rise by Rs. 100 crores only but a multiple of it.

If as a result of the investment of Rs. 100 crores, the national income increases by Rs. 300 crores, multiplier is equal to 3. If as a result of investment of Rs. 100 crores, total national income increases by Rs. 400 crores, multiplier is 4. The multiplier is, therefore, the ratio of increment in income to the increment in investment. If ΔI stands for increment in investment and AY stands for the resultant increase in income, then multiplier is equal to the ratio of increment in income (Δy) to the increment in investment (ΔI). Therefore $k = \Delta Y/\Delta I$ where k stands for multiplier.

Now, the question is why the increase in income is many times more than the initial increase in investment. It is easy to explain this. Suppose Government undertakes investment expenditure equal to Rs. 100 crores on some public works, say the construction of rural roads.

For this Government will pay wages to the labourers engaged, prices for the materials to the suppliers and remunerations to other factors who make contribution to the work of road-building. The total cost will amount to Rs. 100 crores. This will increase incomes of the people equal to Rs. 100 crores.

But this is not all. The people who receive Rs. 100 crores will spend a good part of them on consumer goods. Suppose marginal propensity to consume of the people is 4/5 or 80%. Then out of Rs. 100 crores they will spend Rs. 80 crores on consumer goods, which would increase incomes of those people who supply consumer goods equal to Rs. 80 crores. But those who receive these Rs. 80 crores will also in turn spend these incomes, depending upon their marginal propensity to consume. If their marginal propensity to consume is also 4/5, then they will spend Rs. 64 crores on consumer goods.

Thus, this will further increase incomes of some other people equal to Rs. 64 crores. In this way, the chain of consumption expenditure would continue and the income of the people will go on increasing. But every additional increase in income will be progressively less since a part of the income received will be saved. Thus, we see that the income will not increase by only Rs. 100 crores, which was initially invested in the construction of roads, but by many time more.

Derivation of Investment Multiplier:

How much increase in national income will take place as a result of an initial increase in investment can be expressed in the following mathematical form:

Increase in income

Or

$\Delta Y = 100 + 100 \times 4/5 + 100(4/5)^2 + 100(4/5)^3 + 100(4/5)^4$

$= 100[1 + (4/5) + (4/5)^2 + (4/5)^3 + (4/5)^4]$

But the above series is one of geometric progression. Therefore, increase in income (ΔY)

$= 100\ 1/1\text{-}4/5$

$= 100 \text{ X } 1/1/5$

$= 100 \times 5$

$= 500$

It is thus clear that if the marginal propensity to consume is 4/5, the investment of Rs. 100 crores leads to the increase in the national income by Rs. 500 crores. Therefore, multiplier here is equal to 5. We can express this in a general formula.

If ΔY stands for increase in income, ΔI stands for increase in investment and MPC for marginal propensity to consume, we can write the equation (i) above as follows:

$\Delta Y = \Delta I\ 1/1\text{-MPC}$

$\Delta Y/\Delta I = 1/1\text{-MPC}$

$\Delta Y/\Delta I$ measures the size of the multiplier. Therefore,

Size of multiplier or $k = 1/1\text{-MPC}$

It is clear from above that the size of multiplier depends upon the marginal propensity to consume of the community. The multiplier is the reciprocal of one minus marginal propensity to consume. However, we can express multiplier in a simpler form. As we know that saving is equal to income minus consumption, one minus marginal propensity to consume will be equal to marginal propensity to save, that is, 1 – MPC = MPS. Therefore, multiplier is equal to

1/1 – MPC = 1/MPS

Algebraic Derivation of Multiplier:

The multiplier can be derived algebraically as follows:

Writing the equation for the equilibrium level of income we have

$Y = C + I$

As in the multiplier analysis we are concerned with changes in income induced by changes in investment, rewriting the equation (1) in terms of changes in the variables we have

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

In the simple Keynesian model of income determination, change in investment is considered to be autonomous or independent of changes in income while changes in consumption are function of changes in income. In the consumption function,

$C = a + bY$

where a is a constant term, b is marginal propensity to consume which is also assumed to remain constant. Therefore, change in consumption can occur only if there is change in income. Thus

Theory of Multiplier

$\Delta C = b\Delta Y$

Substituting (3) into (2) we have

$\Delta Y = b\Delta Y + \Delta I$

$\Delta Y – b\Delta Y = \Delta I$

$\Delta Y (1 – b) = \Delta I$

Or

$\Delta Y = 1/1\text{-}b\ \Delta I$

$\Delta Y/\Delta I = 1/1\ \text{-}b$

As b stands for marginal propensity to consume

$\Delta Y/\Delta I = 1/1 – MPC = 1/MPS$

This is the same formula of multiplier as obtained earlier. Note that the value of multiplier $\Delta Y/\Delta I$ will remain constant as long as marginal propensity to consume remains the same.