INVESTMENT MULTIPLIER IN 2 SECTOR CLOSED ECONOMY

(NOTE-LECTURE IS COMPILED FROM INTERNET FOR TEACHING PURPOSE)

The Concept of Multiplier

The concept of multiplier was first developed by R.F. Kahn in his article "The Relation of home Investment, to Unemployment" in the Economic Journal of June 1931. Kahn's multiplier was the Employment Multiplier. Keynes took the idea from Kahn and formulated the Investment Multiplier.

Assumptions of Multiplier

Keynes's theory of the multiplier works under certain assumptions which limit the operation of the multiplier. They are as follows:

1. There is change in autonomous investment and that induced investment is absent.
2. The marginal propensity to consume is constant.
3. Consumption is a function of current income.
4. There are no time lags in the multiplier process. An increase (decrease) in investment instantaneously leads to a multiple increase (decrease) in income.
5. The new level of investment is maintained steadily for the completion of the multiplier process.
6. There is net increase in investment.
7. Consumer goods are available in response to effective demand for them.
8. There is surplus capacity in consumer goods industries to meet the increased demand for consumer goods in response to a rise in income following increased investment.
9. Other resources of production are also easily available within the economy.
10. There is an industrialized economy in which the multiplier process operates.
11. There is a closed economy unaffected by foreign influences.
12. There are no changes in prices.
13. The accelerator effect of consumption on investment is ignored.
14. There is less than full employment level in the economy.

THE INVESTMENT MULTIPLIER (2 SECTOR ECONOMY)

Keynes considers his theory of multiplier as an integral part of his theory of employment. The multiplier, according to Keynes, "establishes a precise relationship, given the propensity to consume, between aggregate employment and income and the rate of investment. It tells us that, when there is an increment of investment, income will increase by an amount which is K times the increment of investment."
In the multiplier theory, the important element is the multiplier coefficient, K which refers to the power by which any initial investment expenditure is multiplied to obtain a final increase in income. The value of the multiplier is determined by the marginal propensity to consume. The higher the marginal propensity to consume, the higher is the value of the multiplier, and vice versa. The relationship between the multiplier and the marginal propensity to consume is as follows:

\[
\Delta Y = \Delta c + \Delta I \\
\Delta Y = c\Delta Y + \Delta I \quad \text{[ } \Delta c = c\Delta Y \text{ ]} \\
\Delta Y - c\Delta Y = \Delta I \\
\Delta Y(1-c) = \Delta I \\
\Delta Y = \Delta I / (1-c) \\
\frac{\Delta Y}{\Delta I} = 1 / (1-c)
\]

\[
K = \frac{1}{1-c} \quad \text{[ } K = \frac{\Delta Y}{\Delta I} \text{ ]}
\]

Since c is the marginal propensity consume, to multiplier K is, by definition, equal to 1-1/ c. The multiplier can also be derived from the marginal propensity to save (MPS) and it is the reciprocal, of MPS, K=d/MPS.

The size of the multiplier varies directly with the MPC and inversely with the MPS. Since the MPC is always greater than zero and less than one (i.e., 0<MPC<1), the multiplier is always between. One and infinity (i.e., 1<K < infinity). If the multiplier is one, it means that whole increment of income is saved and noting is spent because the MPC is zero. On the other hand, an infinite multiplier implies that MPC is equal to one and the entire increment of income is spent on consumption. It will soon lead to full employment in the economy and then create a limitles inflationary spiral. But these are rare phenomena. Therefore, the multiplier coefficient varies between one and infinity.

**Working of the Multiplier**
The multiplier works both forward and backward. First, we study its forward working. The multiplier theory explains the cumulative effect of a change in investment on income via its effect on consumption expenditure.

Suppose that in an economy MPC is 1/2 and investment is raised by Rs100 crores. This will immediately lead to a rise in production and income by Rs100 crores. One-half of this new income will be immediately spent on consumption goods which will lead to increase in production and income by the same amount, and so on. The process is set out in Table 1. It reveals that an increment of Rs 100 crores of investment in the primary round leads to the same increase in income. Of this, Rs 50 crores are saved and Rs 50 crores are spent on consumption which go to increase income by the same amount in the second round. This dwindling process of income generation continues in the secondary rounds till the total income generated from Rs 100 crores of investment rises to Rs 200 crores.

<table>
<thead>
<tr>
<th>Period</th>
<th>Increase in invest.</th>
<th>Change in Income</th>
<th>Consumption</th>
<th>Saving // Leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>12.5</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td>3</td>
<td>12.5</td>
<td>6.25</td>
<td>6.25</td>
<td>6.25</td>
</tr>
<tr>
<td>4</td>
<td>6.25</td>
<td>3.125</td>
<td>3.125</td>
<td>3.125</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

The same results can be obtained if MPS is taken so that when income increases, savings also increase to equal the new investment at a new equilibrium level of income.

**Backward Operation.** The above analysis pertains to the forward operation of the multiplier. If, however, investment decreases, instead of increasing, the multiplier operates backward. A reduction in investment will lead to contraction of income and consumption which, in turn, will lead to cumulative decline in income and consumption till the contraction in aggregate income is the multiple of the initial decrease in investment. Suppose investment decreases by Rs 100 crores. With an MPC=0.5 and K=2, consumption expenditure would keep on declining till aggregate income is decreased by Rs 200 crores. In terms of multiplier formula, \( -\Delta = K(\Delta I) \), we get \(-200 = 2(-100)\).

The magnitude of contraction due to the backward operation of the multiplier depends on the value of MPC. The higher the MPC, the greater is the value of the multiplier and the greater the cumulative decline in income, and vice versa. On the contrary the higher the MPS, the lower is the value of the multiplier and the smaller the
cumulative decline in income, and, vice versa. Thus, a community with a high propensity to consume (or low propensity to save) will be hurt more by the reverse operation of the multiplier than one with a low propensity to consume (or high propensity to save)

**THE DYNAMIC OR PERIOD MULTIPLIER**

Keynes's logical theory of the multiplier is an instantaneous process without time lag. It is a timeless static equilibrium analysis in which the total effect of a change in investment on income is instantaneous so that consumption goods are produced simultaneously and consumption expenditure is also incurred instantaneously. But this is not; borne out by facts because a time lag is always involved between the receipt of income and its expenditure on consumption goods and also in producing consumption goods. Thus "the timeless multiplier analysis disregards the transition and deals only with-the new equilibrium income level" and is, therefore, unrealistic.

The dynamic multiplier relates to the time lags in the process of income generation. The series of adjustments in income and consumption may take months or even years for the multiplier process to complete, depending upon the assumption made about the period involved. This is explained in Table where if each round is of one month and it takes seventeen rounds for an initial investment of Rs 100 crores to generate an income of Rs 200 crores, given the value of M PC to be 0.5, then the multiplier process will take 17 months to complete.

<table>
<thead>
<tr>
<th>Period in Months</th>
<th>I (increment in Investment)</th>
<th>C=CY=0.5 (increment in Investment)</th>
<th>Y (increment in income)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>t+1</td>
<td>100</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>t+2</td>
<td>100</td>
<td>50</td>
<td>150+25</td>
</tr>
<tr>
<td>t+3</td>
<td>100</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>t+n</td>
<td>100</td>
<td>100</td>
<td>200</td>
</tr>
</tbody>
</table>

The Table shows that if the MPC remains constant at 0.5 throughout, an initial increase of Rs 100 crores of investment will first raise income by 100 crores in the first month. Out of this Rs 50 crores will be spent on consumption. This will raise income in the second month to Rs 50 crores, and out of this Rs 25 crores will be spent on consumption. This will go on to increase income in the third month by Rs 25 crores, and successive increments in income get smaller and smaller in each period till in the
seventeenth month the income increases by Rs 0.001 corer. This can also be explained algebraically as:
\[ \Delta y = \Delta I + \Delta IC + \Delta IC^2 + \Delta IC^3 \ldots + \Delta IC^{n-1} \]
\[ \Delta Y = 100 + 100 \times (0.5) + 100 \times 0.5^2 + 100 \times 0.5^3 \ldots + 100 \times 0.5^{n-1} \]
\[ \Delta Y = 1 - 0.5^2 / 1 - 0.5 \times 100 = 1/(1-0.5) \times 100 = \text{Rs. 200 Crores} \]

This process of dynamic income propagation assumes that there is a consumption Jag and no investment lag so that consumption is a function of the income of the preceding period i.e.,
\[ C_t = f Y_{t-1} \]
and investment is a function of time (t) and of constant autonomous investment \( \Delta I \), i.e. \( I_t = f \times \Delta I \)

**Leakages of Multiplier.**

Leakages are the potential diversions from the income stream which tend to weaken the multiplier effect of new investment. Given the marginal propensity to consume, the increase in income in each round declines due to leakages in the income stream and ultimately the process of income propagation "peters out." The following are the important leakages:

1. **Saving.** Saving is the most important leakage of the multiplier process. Since the marginal propensity to consume is less than one the whole increment in income is not spent on consumption: A part of it is saved which peters out of the income stream and the increase. In income in the next round declines. Thus the higher the marginal propensity to save, the smaller the size of the multiplier and the greater the amount of leakage out of the income stream, and vice versa. For instance if MPS=1/6, the multiplier is 6, according to the formula \( K=1/\text{MPS} \); and the MPS of 1/3 gives a multiplier of 3.

2. **Purchase of Old Stocks and Securities.** If a part of the increased income is used in buying old stocks and securities instead of consumer goods, the consumption expenditure will fall and its cumulative effect on income will be less than before. In other words, the size of the multiplier will fall with a fall in consumption expenditure when people buy old stocks and shares.

3. **Price Inflation.** When increased investment leads to price inflation, the multiplier effect of increased income may be dissipated on higher prices. A rise in the prices of consumption goods implies increased expenditure on them. As a result,
increased income is absorbed by higher prices and the real consumption and income fall. Thus price inflation is an important leakage which tends to dissipate increase in income and consumption on higher prices rather than in increasing output and employment.

(4) **Net Imports.** If increased income is spent on the purchase of imported goods it acts as a leakage out of the domestic income stream. Such expenditure fails to effect the consumption of domestic goods. This argument can be extended to net imports when there is an excess of imports over exports thereby causing a net outflow of funds to other countries.

(5) **Undistributed Profits.** If profits accruing to joint stock companies are not distributed to the shareholders in the form of dividend but are kept in the reserve fund, it is a leakage from the income stream. Undistributed profits with the companies tend to reduce the income and hence further expenditure on consumption goods thereby weakening the multiplier process.

(6) **Taxation.** Taxation policy is also an important factor in weakening the multiplier process. Progressive taxes have the effect of lowering the disposable income of the taxpayers and reducing their consumption expenditure. Similarly commodity taxation tends to raise the prices of goods, and a part of increased income may be dissipated on higher prices. Thus increased taxation reduces the income stream and lowers the size of the multiplier.

**Importance of Multiplier—**

The concept of multiplier is one of the important contributions Keynes's to the income and employment theory. As aptly observed by Richard Goodwin. "Lord Keynes did discover the multiplier; that honor goes to Mr. RF. Kahn. But he gave it the role it today by transforming it from an instrument for the analysis of road building into one for the analysis of income building. It set a fresh wind blowing through the structure of economic thought” Its importance lies in the following:

(1) **Investment.** The multiplier theory highlights the importance of investment in income and employment theory. Since the consumption function is stable during the short run fluctuations in income and employment are due to fluctuations in the rate of investment. A fall in investment leads to a cumulative decline in income and employment the multiplier process and vice versa. Thus it underlines the investment and explains the process of income propagation.

(2) **Trade Cycle.** As a corollary to the above, when there are fluctuations. In the level of income and employment due to variations the rate pf investment, the multiplier process throws a spotlight on the different phases of the trade cycle. When there is a fall in investment, income and employment decline in a cumulative manner leading recession and ultimately to depression, on the contrary, an increase
in invest my deads to reveal and, if this process continues, to a boom. Thus the multiplier is regarded as an indispensable tool in trade cycles

(3) Saving-Investment Equality. It also helps in bringing the equality between saving and investment. If there is a divergence between saving and investment, an increase in investment leads to a rise in income via the multiplier process by more than the increase in initial, investment. As a result of the increase in income, saving also increases and equals investment.

(4) Formulation of Economic Policies. The multiplier is all important tool in the hands of modern states in formulating economic policies. Thus this principle presupposes state intervention in economic affairs.

(a) To achieve full employment. The state decides upon the amount of investment to be injected into the economy to remove unemployment and achieve full employment. An initial increase in investment leads to the rise in income and employment by the multiplier time the increase in investment. If a single dose of investment is insufficient to bring full employment, the state, can inject regular doses of investment for this purpose till the full employment level is reached.

(b) To control trade cycles. The state can control booms and depressions in a trade cycle on the basis of the multiplier effect on, income and employment. When the economy is experiencing inflationary pressures, the state can control them by a reduction in investment which leads to a cumulative decline in income and employment via the multiplier process. On the other hand, in a deflationary situation, an increase in investment can help increase the level of income and employment through the multiplier process.

(c) Deficit financing. The multiplier principle highlights the importance of deficit budgeting. In a state of depression, cheap money policy of lowering the rate of interest is not helpful because the marginal efficiency of capital is so low that a low rate of interest fails to encourage private investment. In such a situation, increased public expenditure through public investment programmes by creating a budget deficit helps in increasing income and employment by multiplier time the increase in investment.

Public Investment- The above discussion reveals the importance of the multiplier in public investment policy. Public investment refers to the state expenditure on public works and other works meant to increase public welfare. It is autonomous and is free from profit motive. It therefore, applies with greater force in overcoming inflationary and deflationary pressures in the economy, and in achieving and maintaining full employment. Private investment being induced by profit motive can help only when the public investment has created a favorable situation for the former. Hence, the importance of multiplier in public investment lies in creating or controlling income and employment. The state can have the greatest multiplier effect on income and employment by increasing public investment during a depression where the MPC is high (or the MPS is low). On the contrary, in periods of overfull employment, a decline in investment will have a serious effect on the levels of income and employment where the MPS is high (or MPC is low).