Simple Keynesian Model (SKM): Assumptions, Conditions and Defects

Assumptions of the Simple Keynesian Model:

The simple Keynesian model of income determination (henceforth the SKM) is based on the following assumptions:

1. Demand creates its own supply.

2. The aggregate price level remains fixed. This means that all variables are real variables and all changes are in real terms.

Therefore if aggregate demand increases, output will increase, prices remaining the same. And due to the existence of excess production capacity and unemployed resources (especially manpower) the economy will reach the point of full employment — if there is sufficient demand stimulation.

3. The economy has excess production capacity.

4. The economy is closed — there is no export and import.

5. There is no retained earnings. All profits are assumed to be distributed as dividends among the shareholders.

6. Firms are assumed to make no tax payments; all taxes are paid by households. The central proposition of the simple Keynesian model (the SKM) is that national output (income) reaches its equilibrium value when output is equal to aggregate demand.

In the SKM the condition for equilibrium can be expressed as:

$Y = E$ – (1)

where Y is equal to total output (GDP) and E equals aggregate demand or desired expenditure on output. Aggregate demand or desired expenditure (E) has three components, viz., household consumption (Q, derived business investment demand (I) and government demand for (currently produced) goods and services. Thus the equilibrium condition of national income in a closed three-sector economy is

$Y = E = C + I + G$ … (2)

This means that income received (K) is equal to desired expenditure (E). Here we do not distinguish between gross and net investment. So we ignore depreciation. Moreover we take GDP and national income as equivalent concepts. Thus, we ignore net indirect business, taxes — which cause discrepancy between the two totals.

Since national product (output) Y also measures national income, we can write

$Y = C + S + T$ … (3)

This equation is basically an identity. It suggests that national income, all of which is assumed to be paid out to households in the form of factor incomes (such as rents, wages, interest and dividends) is partly consumed (C) partly saved (S) and partly paid in taxes (T).

Moreover, since Y is national product, we can write

$Y = C + l_r + G$ … (4)

This means that national product is equal to consumption plus realised investment (I_r) plus government spending.

From the definitions given in equation (3) and (4) we can rewrite the condition for equilibrium income given in equation (2) in two alternative ways.

From equation (2) we have $Y = C + I + G$ in equilibrium, and from equation (3) we have $Y = C + S + T$, which is a definitional identity. In equilibrium, therefore, we have

$C + S + T = Y = C + I + G$ … (5)

or, $S + T = I + G$,

In a like manner, from equations (2) and (4) we can express the equilibrium condition as

$C + I_r + G = Y = C + I + G$

or, by cancelling common terms, $I_r = I$ … (6)

Conditions for Equilibrium of SKM:

Thus, there are three equivalent ways to state the condition for equilibrium in the SKM:

$Y = C + I + G$ … (2)

$S + T = I + G$ … (5)

$I_r = I$ – (6)

These conditions are illustrated in Fig. 8.1. which is a circular flow diagram of income and output for a three-sector economy:

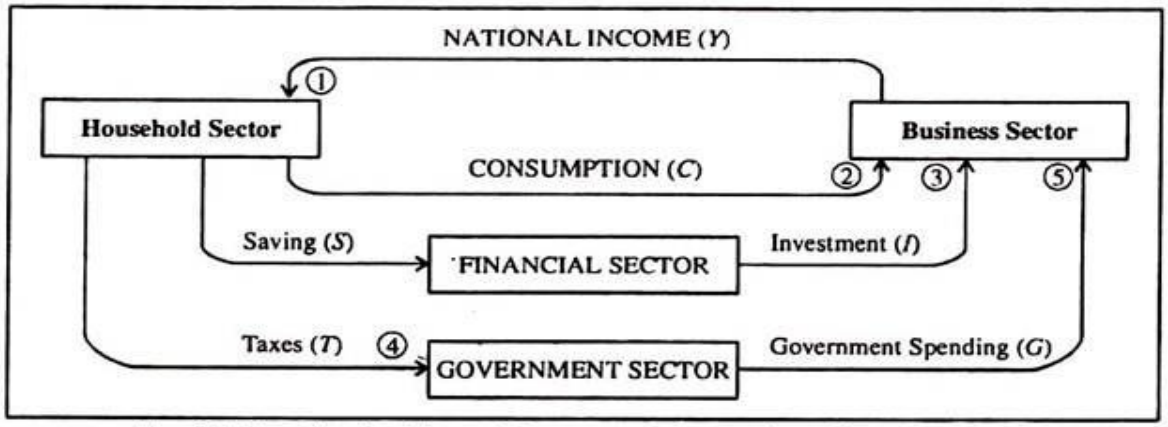

Fig. 8.1 The Circular Flow of Income and Output in a Closed Economy

The revenue of the business sector is used for paying rent, wages, interest and dividends to the household sector. A portion of income received by the household sector (10 is used

by the households for consumption (C) which goes to the business sector as income. Another portion which is saved (S) goes to the business sector as investment (I) sector And the last portion goes to the government in the form of taxes (T) which finance government expenditure (G)which, in its turn, is spent on goods and services produced in the business sector.

Injections and Leakages:

In this context we draw a distinction between injections and leakages. Anything which exerts an expansionary pressure on national income is an injection and anything which exerts a contractionary pressure on national income is a leakage. Investment and government expenditure are injections into the circular flow of income, while savings (S) and taxes (T) are leakages from the circular flow of income.

Examination of the Three Equilibrium Conditions:

The three equilibrium conditions of national income given by equations (2), (5) and (6) may now be examined in detail. Production of a certain level of output, Y. generates he same amount of income to households. A portion of this income directly comes back to the firms as demand for consumption goods.

National output will reach its equilibrium level if this demand (C), when added to desired investment expenditure of firms (I) and government spending (G), produces a total demand equal to Y — that is, if

$Y = C + I + G$

The second equilibrium condition of income

$S + T = I + G$

suggests that a flow rate of output will be an equilibrium rate if the sum-total of leakages (S + T) is just balanced by the sum-total of injections (I + G).

This condition ensures that the amount of income households does not spend on output (S + T) and, therefore, the amount of output that is produced but not sold to households (Y – C = S + T)is exactly equal to the amount the other two sectors wish to buy (I + G). Thus total output equals aggregate demand.

Equation (6) states that in equilibrium desired (planned) investment must equal realised (actual) investment. What is the significance of the divergence of desired investment from realised investment? Total business investment has two broad components viz., fixed asset investment (or business spending on plant, equipment and machinery) and inventory investment (or increase or decrease in the stocks of finished goods and raw materials).

It is quite reasonable to assume that desired spending on plant and equipment equal actual spending. But desired inventory investment varies from realised inventory investment, n national income accounts, all goods that are produced by a firm and not sold are treated as inventory investment – whether such investment was intended or not.

In order to realise the difference between realised and intended investment totals, we have to see what happens when a level of output ($Y = C + I_r + G$) is produced that exceeds aggregate demand ($Y = C + I + G$).

In this case we have the following inequality:

$Y > E$

$C + I_r + G > C + I + G > \ldots(7)$

$I_r > I$

where $I_r - I$ is the undesired (unintended) accumulation of inventory. The excess of I_r over unintended inventory accumulation. It indicates the amount by which output exceeds aggregate demand, i.e., the output which will remain unsold over and above the amount of inventory investment the firms desired.

In the opposite situation, if aggregate demand exceeds output, we have

$E > Y \ldots (g)$

$C + I + G > C + I_r + G$

$I > I_r$

where the excess of I over I_r $(I - I_r)$ is the unintended inventory shortfall. Since aggregate demand exceeds aggregate output, firms end up selling more than what they planned. Inventories fall below their desired levels. At equilibrium, $I = l_r$.

0This means that the firms' both production and sales plans are correct in the sense that, after selling their output, their inventory investment is just at its desired level. This is the level at which output equals aggregate demand, as is clear from equation (7) or (8).

We may now explain why equilibrium level of national income cannot occur at any other point. If, at a given level of output, firms are accumulating unintended inventories or are finding their inventories depleted, output has a tendency to rise or fall. This is because the firms' sales plans are fulfilled, but production plans are not. If production exceeds demand ($Y > E$), firms are accumulating undesired inventories ($I_r > I$).

In such a situation there is a tendency for output to fall as firms reduce their volumes of production in order to reduce their inventory levels. If, on the other hand, demand exceeds production ($E > Y$) there is an inventory shortfall ($l_r < I$). So there is a tendency for output to rise because firms will try to prevent further fall in inventories. So it logically follows that when aggregate demand equals output, output has no tendency to either rise or fall, i.e., it is in equilibrium.

In such a situation there is neither an unintended accumulation of inventory nor a shortfall. Both the output and sales plans of the firms have been fulfilled. Thus inventory changes play a very important role in the SKM.

The Components of Aggregate Demand:

Since the level of income in the SKM is determined by aggregate demand, we have to study the factors determining each component (viz., consumption, investment and government expenditure). Since consumption and saving on the one hand, and government expenditure and taxes on the other are mirror image concepts, we have to study the determinants of saving and the role of taxes.

Since private consumption expenditure is the most important component of aggregate desired expenditure, our discussion starts with consumption.

i. Consumption:

According to Keynes the level of consumption expenditure is a stable function of disposable income which is national income less taxes paid ($Y_d = Y - T$). Although consumption is affected by various other variables (called non-income determinants of consumption), income is the main factor influencing consumption.

This is why in his discussion of consumption function. Keynes ignored all other factors influencing consumption.

The Keynesian short-run consumption function showing consumption-income relationship is expressed as:

$C = a + bY_d$

$a > 0, b < 1 \ldots(9)$

This income-consumption relation is shown in Fig. 8.2. Here the intercept term, a indicates autonomous consumption which has no relation to Y_d. The parameter, 'b', is slope of the function, i.e., $b = \Delta C/\Delta Y$. It is called the marginal propensity to consume (MPC).

It gives the increase in consumer expenditure per unit increase in Y_d. It can be defined as the ratio of the change in C brought about by certain change in Y_d. Consumption is primarily induced expenditure, meaning expenditure that depends directly on the level of income.

According to Keynes 'b' is greater than zero but less than one. In other words, it lies in-between zero and one. This simply means that consumption will increase with an increase in disposable income (b > 0) but the increase in consumption will be less than the increase in disposable income (b < 1).

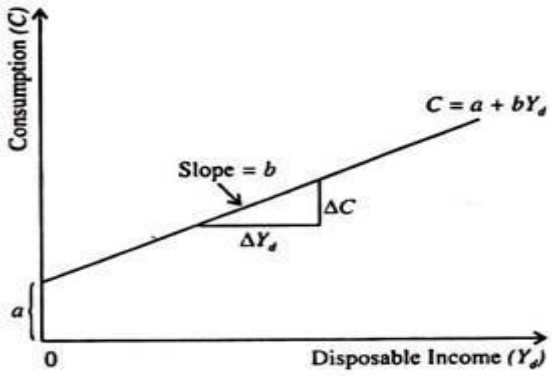

Fig. 8.2 The Keynesian Consumption Function

In SKM, where the economy is closed, we have

$Y = C + S + T$ …(10)

where all the terms have their usual meanings.

Or $Y_d = Y - T = C + S$

This means that disposable income is, by definition — consumption plus saving. Thus the relation between saving income is automatically determined from the consumption- income relationship. In the SKM, we have

$S = - a + (1 - b) Y_d$. …(11)

When $Y_d = 0$, we get

$S = Y_d - C = 0 - a = - a$

Thus what is not spent on consumption goods is automatically saved. If a one-unit increase in Y_d leads to an increase of b units in consumption, the remainder of the one- unit increase (1 – b) is the increase in saving:

$\Delta S/\Delta Y_d$

This increase in saving per unit increase in Y_d, i.e., (1 – b) is called the marginal propensity to save (MPS). The saving function (5) is shown graphically in Fig. 8.3. It shows the level of savings (S) at each level of disposable income (Y_d). The intercept of the saving function (- a) is the negative level of saving (called dissaving) at a zero level of disposable income. The slope of the function is the MPS (= 1 – b), the increase in saving per unit increase in Y_d.

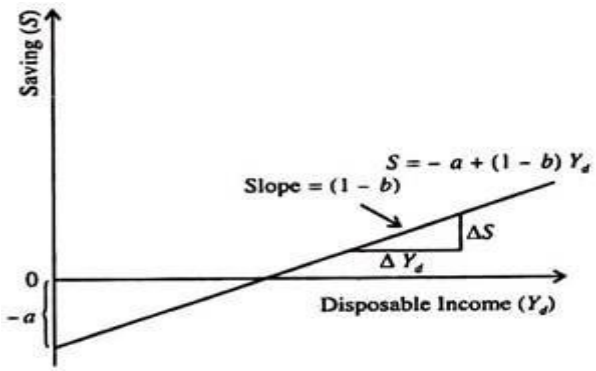

Fig. 8.3 The Keynesian Saving Function

ii. Investment:

According to Keynes the level of aggregate demand (desired expenditure) depends on two things, viz., the desire to consume and the inducement to invest. So like consumption, investment is also a key variable in SKM. One main factor causing changes in equilibrium income in SKM is desired business investment expenditure.

According to Keynes, national income in a closed economy moves up or down due to changes in aggregate demand and Keynes looked at those components of aggregate demand which were autonomous, i.e., independent of current income. Changes in autonomous (income-independent) components of aggregate demand cause national income to vary.

Keynes believed that consumption was a fairly stable function of Y_d. But investment was the most volatile component of autonomous demand and investment fluctuations were primarily responsible for income fluctuations or business cycles.

In fact, the Keynesian theory of business cycle goes in terms of income fluctuations, which are caused by fluctuations in expectations of the future profitability of investment prospects.

According to Keynes there are two primary determinants of investment expenditure in the short-run the interest rate (which is a policy variable) and the expected rate of return on new investment projects, called the marginal efficiency of capital (MEC).

If we assume that the rate of interest remains constant in the short run, then investment can be taken as determined solely by MEC, which is determined by the state of business expectations.

Since investment depended upon expectations of the future (which could shift frequently, and at times drastically, in response to new information and events) and the future was uncertain, Keynes felt that investment was unstable.

In the SKM all investment is taken as autonomous. Hence the investment demand schedule is a horizontal straight line with zero slope. This means that a fixed level of investment takes place at all levels of income.

Government Spending and Taxes:

Government spending (G) is a second component of autonomous expenditures. It is autonomous because it is fully controlled by the government and does not depend on national income in any way.

Like government expenditure the level of tax revenue (T) is also controlled by the policymaker — the finance-minister and is thus a policy variable like government expenditure and the rate of interest.

Graphical Illustration of the SKM:

Fig. 8.4 shows how equilibrium income is determined in the SKM. We measure income on the horizontal axis and the components of aggregate demand on the vertical axis. We draw a 45° line as an guideline. Any point on the line indicates that aggregate expenditure (C + I + G) equals aggregate output (income), Y. The consumption function (C = a + bY) as also the aggregate expenditure schedule C + I + G are shown separately.

The schedule is derived by adding up the two components of autonomous (income-independent) expenditure, viz., investment and government spending, at each level of income to consumption expenditure (which is partly autonomous and largely induced).

Since the autonomous components of expenditure do not depend directly on income, the vertical distance between the C schedule and (C + I + G) schedule is the same at all levels of income.

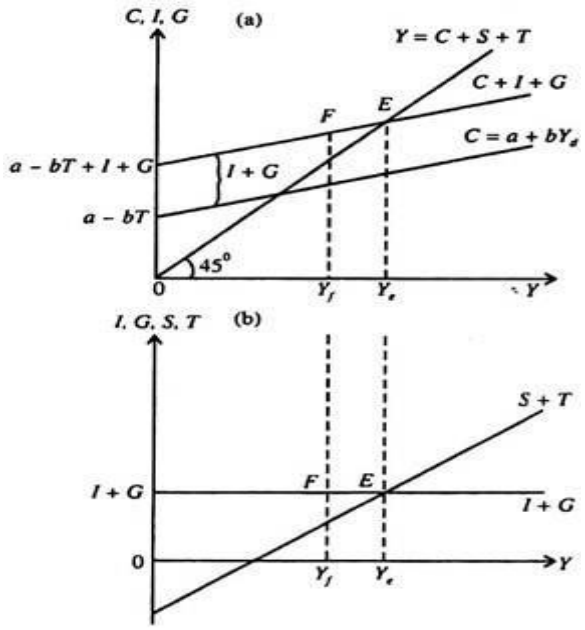

Fig. 8.4 The Determination of Equilibrium Income

In part (a) of Fig. 8.4 the equilibrium level of income is Y. It corresponds to point A, where the C + I + G schedule intersects the 45° line and Y = C + I + G, i.e., income received = desired expenditure as is shown by equation (2). This is the condition of equilibrium in the SKM according to the income-expenditure approach.

In part (b) we plot the (I + G) schedule as a horizontal line, implying that its level does not depend on Y. The line S + T is upward sloping because saving varies directly (though not proportionately) with income. In equilibrium, S + T has to be equal to I + G. This is the second condition equilibrium income in the SKM, as is shown by equation (5).

i. The Logic of Equilibrium:

In order to prove that E is the only point of equilibrium, we have to disprove that no other point can be an equilibrium point. For example in part (a) income corresponding to point F (which is to the left of point E), the C + I + G schedule lies above the 45° line. Similarly, at this point I + G exceeds S + T in part (b). This is a disequilibrium situation in the sense that desired expenditure (C + I + G) exceeds actual output.

This means that desired investment will exceed actual investment at this level of income, i.e., $C + I + G > Y = C + I_r + G$. This means that $I > l_r$. There will be an undesired shortfall of inventory at a level of income which is less than Y_e. As soon as inventory is exhausted, the stage will be set for fresh production. Consequently output has to rise to meet the extra demand.

The converse is also true. If actual income exceeds its equilibrium level Y_e, output will exceed aggregate demand, i.e., $Y > C + I + G$. Since the entire output cannot be sold, there will be undesired accumulation of inventories $(Y = C + I_r + G) > (C + I + G)$ (or $l_r > I$). So, a cutback in production is inevitable. As a result output will tend to fall.

Thus it logically follows that only when actual output attains its equilibrium value (Y_e) there is neither undesired running down or accumulation of inventories. Consequently there is no tendency for output (income) to rise or fall. In other words, national income has reached its equilibrium level. Thus inventory changes play a very important role in the SKM. This point may now be discussed in detail.

(a) Consider a simple Keynesian model where C = 50 + 0.6Y and I = 30 + 0.2 Y. The country is closed without government. Determine the equilibrium national income of the country.

(b) Suppose that in this country last year's aggregate demand determines this year's production. If autonomous investment rises from 30 to 40 then what will be the national income in three years' time?

(c) If, starting from the situation described in (a), the investment function changes to I = 30 + 0.4K, what will happen to national income?

Solution. (a) Equilibrium level is attained at the point where aggregate demand equals aggregate supply

$$Y = C + I + G.$$

Since, in the given problem, $G = 0$ we have :

$$Y = C + I \qquad \text{... (1)}$$

Substituting given values of C and I in (1) :

$$Y = 50 + 0.6Y + 30 + 0.2Y$$

or, $Y = 0.8Y + 80$

or, $Y - 0.8Y = 80$

or, $0.2Y = 80$

or, $Y = \frac{80}{0.2}$

or, $Y = 400$

$\therefore$ **equilibrium income is 400 units.**

(b) Now investment increases by 10 units (from 30 to 40).

In the first year Y increases by 10 units and AD increases by $10(0.6 + 0.2) = 8$ units. So in the second year Y increases by 8 units but AD increases by $8 (0.6 + 0.2) = 6.4$ units. And in the third year Y increases by 6.4 units.

Thus, increase in Y over the three years is :

$$10 + 8 + 6.4 = 24.4$$

Y was initially 400 units

So the output level now becomes

$$Y = 400 + 24.4 \quad \text{or, } Y = 424.4 \text{ units}$$

(c) $Y = 50 + 0.6Y + 30 + 0.4Y$

or, $Y = 80 + Y$

or, $Y - Y = 80$

or, $Y(1 - 1) = 80$

or, $0.Y = 80$

or, $Y = \frac{80}{0}$

or, $Y \to \infty$.

The consumption function for a simple economy is given by $C = 310 + 0.7\ Y_d$

(a) Write an expression for saving in the economy.

(b) Express consumption in terms of Y when direct taxation is levied (i) as a lumpsum tax, T = 300, or (ii) as a proportional income tax, t = 0.4. Add these consumption functions to your diagram showing the consumption function without taxation and comment.

Solution

(a) Using the relationship $S = Y_d - C$ we substitute the consumption function and obtain

$5 = Y_d - (310 + 0.7\ Y_d) = Y_d - 310 - 0.7\ Y_d$

Collecting terms gives the saving function

$S = -310 + 0.3\ Y_d$

With no direct taxation, $Y_d = Y$ and the consumption and saving functions become

$C = 310 + 0.7\ Y$

$S = -310 + 0.3\ Y$

(b) (i) With direct taxation, $Y_d = Y - T$. When T = 300, the consumption function becomes

$C = 310 + 0.7\ (Y - 300)$ or

$C = 310 + 0.7\ Y - 210 = 100 + 0.7\ Y$

A lumpsum tax shifts as consumption function down parallel to the original consumption function. (Students should check this point by drawing a suitable diagram.)

(ii) Using the relationship that with a proportional income tax $Y_d = (1 - t)\ Y$, since t = 0.4 we have $Y_d = (1 - 0.4)\ Y = 0.6\ Y$. Substituting this in the consumption function gives

$C = 310 + (0.7 \times 0.6\ Y) = 310 + 0.42\ Y$

Defects of the SKM:

The simple Keynesian model, presented in this chapter, is incomplete. It ignores money and interest rates and fails to explain the behaviour of prices and wages. Yet the model is useful in more "ways than one.

Firstly, the model clearly illustrates the role of aggregate demand in determining equilibrium income in a closed economy. No doubt aggregate demand plays a key role in determining income in the SKM. But it overstates the role of aggregate demand. This is why the autonomous expenditure multiplier is higher than in the IS-LM curve model (to be studied in Chapters 9 and 10).

In Keynes' view, changes in autonomous expenditure, especially private investment demand, cause changes in equilibrium level of income. Changes in primary investment also induce changes in consumption spending. As a result, national income rises by a multiple of the initial increase in investment.

The increase in national income is equal to the primary investment (autonomous) plus a chain of secondary consumption spending. According to Keynes, the root cause of unemployment and depression is inadequate investment, and a consequent low level of aggregate demand.

The model also highlights the role of compensatory fiscal policy to stabilise the economy. Fiscal policy can be used to manage aggregate demand to restore equilibrium output which fluctuates due to unstable investment demand.

Here we have considered a simple closed economy. However, the model can be extended to cover an open economy.

The Concept of Investment 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' 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 ΔY stands for the resultant increase in income, then multiplier is equal to the ratio of increment in income (ΔK) 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 times 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 $\Delta Y = 100 + 100 \times 4/5 + 100(4/5)^2 + 100(4/5)^3 + 100(4/5)^4 \ldots$

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

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

$$(\Delta Y) = 100 \frac{1}{1-4/5} \quad \ldots(i)$$

$$= 100 \times \frac{1}{1/5}$$

$$= 100 \times 5$$

$$= 500$$

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:

$$\Delta Y = \Delta I \frac{1}{1 - MPC}$$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - MPC}$$

$\frac{\Delta Y}{\Delta I}$ measures the size of the multiplier. Therefore,

$$\text{Size of multiplier or } k = \frac{1}{1 - MPC} \quad \ldots(ii)$$

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/MPC.

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 … (1)

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

ΔY = ΔC + ΔI … (2)

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

$$\Delta C = b\Delta Y \quad \ldots(3)$$

Substituting (3) into (2) we have

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

$$\Delta Y - b\Delta Y = \Delta I$$

$$\Delta Y(1 - b) = \Delta I$$

$$\Delta Y = \frac{1}{1-b}\Delta I$$

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1-b}$$

As b stands for marginal propensity to consume,

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1 - MPC} = \frac{1}{MPS}$$

This is the same formula of multiplier as obtained earlier. Note that the value of multiplier ΔY/ΔI will remain constant as long as marginal propensity to consume remains the same.

The Size or Value of Investment Multiplier:

The multiplier tells us how much increase in income occurs when autonomous investment increases by Rs. 1, that is, investment multiplier ΔY/ΔI is and its value is equal to 1/1-b where b stands for marginal propensity to consume (MPC). Thus, multiplier =ΔY/ΔI =1/ 1-b equals marginal propensity to save (MPS) the value of investment multiplier is equal to 1/1-b = 1/s where s stands for marginal propensity to save. In other words, the size of multiplier is equal to 1/1- MPC = 1/MPC Thus, the value of multiplier can be obtained if we know either the value of MPS or MPS.

Now, higher the marginal propensity to consume (b) (or the lower the value of marginal propensity to save (s), the greater the value of multiplier. For example, if marginal propensity to consume (b) is 0.8, investment multiplier is

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1-08} = \frac{1}{0.2} = 1 \times \frac{10}{2} = 5$$

If MPC or $b = 0.75$, multiplier is

$$= \frac{\Delta Y}{\Delta I} = \frac{1}{1-0.75} = \frac{1}{0.25} = \frac{100}{25} = 4$$

As mentioned above, the size or value of multiplier can be calculated using either the value of marginal propensity to consume (MPC) or the value of marginal property to save (MPS or s). In fact, the value of multiplier is the reciprocal of marginal propensity to save (ΔY/ΔI = 1/MPS or 1/s) When marginal propensity to consume is 0.8, marginal propensity to save will be 1 – 0.8 = 0.2.

The multiplier will be 1/0.2 or 1/2/10 = Likewise if marginal propensity to consume (b) is 0.75, marginal propensity to save will be 1 – 0.75 = 0.25 and multiplier will be 1/0.25 = 1/25/100 = 4.

Given the size of multiplier we can find out the increase in income (ΔY) resulting from a certain increase in investment (ΔI) by using the multiplier relationship. Thus

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1-b}$$

$$\Delta Y = \Delta I . \frac{1}{1-b}$$

If marginal propensity to consume is equal to 0.8, with the increase in investment by ₹ 100 crores the increase in income will be:

$$\frac{\Delta Y}{\Delta I} = \frac{1}{1-b}$$

$$\Delta Y = \Delta I \times \frac{1}{1-b} = 100 \times \frac{1}{1-0.8}$$

$$100 \times \frac{1}{0.2} = 100 \times 5 = 500$$

Two Limiting Cases of the Value of Multiplier:

There are two limiting cases of the multiplier. One limiting case occurs when the marginal propensity to consume is equal to one, that is, when the whole of the increment in income is consumed and nothing is saved.

In this case, the size of multiplier will be equal to infinity, that is, a small increase in investment will bring about a very large increase in income and employment so that full employment is reached and even the process goes beyond that. "In such circumstances, the Government would need to employ only one road builder to raise income indefinitely, causing first full employment and then a limitless spiral of inflation."

However, this is unlikely to occur since marginal propensity to consume in the real world is less than one. The other limiting case occurs when marginal propensity to consume is equal to zero, that is, when nothing out of the increment in income is consumed, and the whole increment in income is saved.

In this case, the value of the multiplier will be equal to one. That is, in this case, the increment in income will be equal to the original increase in investment and not a multiple of it. But in actual practice the marginal propensity to consume is less than one but more than zero ($1 > \Delta C/\Delta Y > 0$). Therefore, the value of the multiplier is greater than one but less than infinity.

Working of Multiplier and its Assumptions:

In our above explanation of multiplier, we have made many simplifying assumptions. First, we have assumed that the marginal propensity to consume remains constant throughout as the income increases in various rounds of consumption expenditure. However, the marginal propensity to consume may differ in various rounds of consumption expenditure.

But this constancy of marginal propensity to consume is a realistic assumption, since all available empirical evidence shows that marginal propensity to consume is very stable in the short run. Secondly, we have assumed that there is a net increase in investment in a period and no further indirect effects on investment in that period occur or if they occur they have been taken into account so that there is a given net increase in investment.

Further, we have assumed that there is no any time-lag between the increase in investment and the resultant increment in income. That is, increment in income takes place instantaneously as a result of increment in investment. J.M. Keynes ignored the time-lag in the process of income generation and therefore his multiplier is also called instantaneous multiplier. In recent years, the importance of time-lag has been recognized and concept of dynamic multiplier has been developed on that basis.

Another important assumption in the theory of multiplier is that excess capacity exists in the consumer goods industries so that when the demand for them increases, more amounts of consumer goods can be produced to meet this demand. If there is no excess capacity in consumer goods industries, the increase in demand as a result of some original increase in investment will bring about rise in prices rather than increases in real income, output and employment.

As we shall see later, Keynes' multiplier was evolved in the context of advanced capitalist economies which were in grip of depression and in times of depression and there did exist excess capacity in the consumer goods industries due to lack of aggregate demand. The Keynesian multiplier effect is very small in developing countries like India since there is not much excess capacity in consumer goods industries.

In our above analysis of the multiplier process we have taken a closed economy, that is, we have not taken into account imports and exports. If ours were an open economy, then a part of the increment in consumption expenditure would have been made on imports of goods from abroad.

This would have caused increment in income in foreign countries rather than within the country. This will reduce the value of the multiplier. Imports are important leakage from the multiplier process and we have ignored them in our above analysis for the purpose of simplicity.

It is worth noting that multiplier not only works in money terms but also in real terms. In other words, multiple increment in income as a result of a given net increase in investment does not only take place in money terms but also in terms of real output, that is, in terms of goods and services.

When incomes increase as a result of investment and these increments in income are spent on consumer goods, the output of consumer goods is increased to meet the extra demand brought about by increased incomes. Therefore, real income or output increases by the same amount as the increment in money incomes, since the prices of goods have been assumed to be constant.

Of course, we have assumed, that there exists excess productive capacity in the consumer goods industries so that when the demand for consumer goods increases, their production can be easily increased to meet this demand. However, if due to some bottlenecks output of goods cannot be increased in response to increasing demand, prices will rise and as a result the real multiplier effect will be small.

Diagrammatic Representation of Multiplier:

The level of national income is determined by the equilibrium between aggregate demand and aggregate supply. In other words, the level of national income is fixed at the level where C + I curve intersects the 45° income curve. With such a diagram we can explain the multiplier.

The multiplier is illustrated in Fig. 10.1. In this figure C represents marginal propensity to consume. Marginal propensity to consume has been here assumed to be equal to 1/2 i.e., 0.5. Therefore, the slope of the curve C of marginal propensity to consume curve C has been taken to be equal to 0.5. C + I represents aggregate demand curve.

It will be seen from Fig. 10.1 that the aggregate demand curve C + I which intersects the 45° line at point E so that the level of income equal to OF, is determined. If investment increases by the amount EH we can then find out how much increment in income occur as a result of this. As a consequence of increase in investment by EH, the aggregate demand curve shifted upward to the new position C + I'.

This new aggregate demand curve C + I intersects income line at point F so that the equilibrium level of income increases to OF As a result of net increase in investment equal to EH. the income has increased by Y_2Y_2It is seen from the figure that F, Y_2 is greater than EH. On measuring it will be found that Y_1 Y_2 is twice the length of EH. This is as it is expected because the market propensity to consume is here equal to and 1/2 therefore the size of multiplier will be equal to 2.

The multiplier can be illustrated through savings investment diagram also. The multiplier can be explained with the help of savings investment diagram, as has been shown in Fig. 10.2. In this figure SS is the saving curve indicating that as the level of income increases, the community plans to save more. II is the investment curve showing the level of investment planned to be undertaken by the investors in the community. The investment has been taken to be a constant amount and autonomous of changes in income.

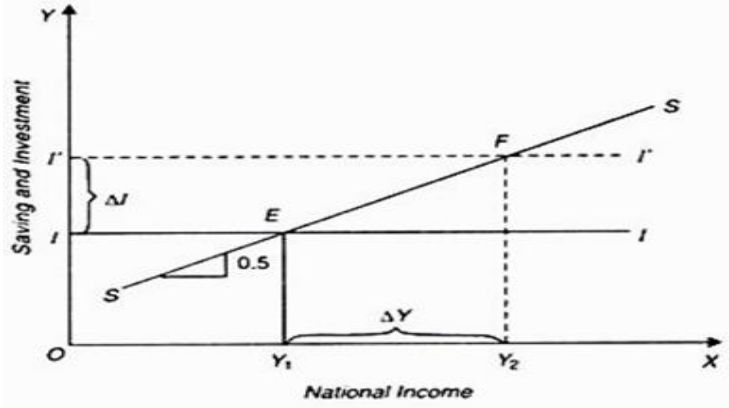

Fig. 10.2. *Multiplier Explained with the Aid of Savings-Investment Diagram*

This investment level OI has been determined by the marginal efficiency of capital and the rate of interest. Investment being autonomous of income means that it does not change with the level of income. Keynes treated investment as autonomous of income and we will here follow him. It will be seen from Fig. 10.2 that saving and investment curves intersect at point E, that is, planned saving and planned investment are in equilibrium at the level of income OY_1Thus, with the given saving and investment curves level of income equal to OY_1 is determined.

Now suppose that there is an increase in investment by the amount II". With this increase in investment, the investment curve shifts to the new dotted position TF. This new investment curve II intersects the saving curve at point F and a new equilibrium is reached at the level of income OY_2 A glance at Fig. 10.2 will reveal that the increase in income Y_1 Y_2 is greater than the increase in investment by II".

On measuring these increments in income and investment it will be found that the increment in income Y_1 Y_2 is two times the increment in investment II. This is because we have here assumed that propensity to save is equal to 1/2 (Or marginal propensity to consume is equal to 1/2) Therefore, the slope of the saving curve has been taken to be equal to 1/2 or 0.5 Thus in this case multiplier is equal to 2.

Multiplier = $\Delta Y/\Delta I = Y_1 Y_2/II$, 1/MPS =2

Since marginal propensity to save is here equal to1/2 the multiplier on the basis of our above formula, namely, k =1/ MPS will be equal to 2.

Leakages in the Multiplier Process:

We have seen above that as a result of increase in investment, the level of income increases by a multiple of it. In our above analysis, saving is a leakage in the multiplier process. Had there been no saving and as a result marginal propensity to consume were equal to 1, the multiplier would have been equal to infinity.

In that case as a result of some initial increase in investment, income would go on rising indefinitely. Since marginal propensity to consume is actually less than one, some saving does take place. Therefore, multiplier in actual practice is less than infinity.

But besides saving, there are other leakages in the process of income generation which reduce the size of the multiplier. Therefore, the increase in income as a result of some increase in investment will be less than warranted by the size of the multiplier measured by the given marginal propensity to consume. We explain below the various leakages that occur in the income stream and reduce the size of multiplier in the real world.

Paying off debts:

The first leakage in the multiplier process occurs in the form of payment of debts by the people, especially by businessmen. In the real world, all income received by the people as a result of some increase in investment is not consumed. A part of the increment in income is used for paying back the debts which the people have taken from moneylenders, banks or other financial institutions.

The incomes used for paying back the debts do not get spent on consumer goods and services and therefore leak away from the income stream. This reduces the size of the multiplier. Of course, when incomes received by the moneylenders, banks or institutions are again lent back to the people, they come back to the income stream and enhance the size of multiplier. But this may or may not happen.

Holding of idle cash balances:

If the people hold apart of their increment in income as idle cash balances and do not use it for consumption, they also constitute leakage in the multiplier process. As we have seen, people keep part of their income for satisfying their precautionary and speculative motives, money kept for such purposes is not consumed and therefore does not appear in the successive rounds of consumption expenditure and therefore reduces the increments in total income and output.

Imports:

In our above analysis of the working of the multiplier process we have taken the example of a closed economy, that is, an economy with no foreign trade. If it is an open economy as is usually the case, then a part of increment in income will also be spent on the imports of consumer goods. The proportion of increments in income spent on the imports of consumer goods will generate income in other countries and will not help in raising income and output in the domestic economy.

Therefore, imports constitute another important leakage in the multiplier process. Suppose marginal propensity to save of an open economy is 1/4, i.e., marginal propensity to consume is 3/4. Suppose further that marginal propensity to import is 1/4 , the size of the multiplier without imports will be equal 4 to equal to 4 but the size of the multiplier with the marginal propensity to import equal to 1/4 and the marginal propensity to consume equal to 3/4 will be smaller.

Multiplier in an Open Economy = 1/ 1 -(MPC-MPI) = 1/1 – MPC + MPI

where MFC stands for marginal propensity to consume and MP1 for marginal propensity to import.

In our example quoted above, where marginal propensity to consume is equal to 3/4 and marginal 3/4 propensity to import is equal to 1/4, the multiplier is:

K = 1/1- (3/4 – 1/4) = 1/1/2 =2

We, therefore, see that the size of multiplier instead of being equal to 4, as it would have been in the case of a closed economy, is equal to 2 in the open economy with — as the marginal propensity to import.

Taxation:

Taxation is another important leakage in the multiplier process. The increments in income which the people receive as a result of increase in investment are also in part used for payment of taxes. Therefore, the money used for payment of taxes does not appear in the successive rounds of consumption expenditure in the multiplier process, and the multiplier is reduced to that extent.

However, if the money raised through taxation is spent by the Government, the leakage through taxation will be offset by the increase in Government expenditure. But it is not necessary that all the money raised through taxation is spent by the Government as it happens when Government makes a surplus budget.

No doubt, if the Government expenditure increases by an amount equal to the taxation, it would not have any adverse effect on the increases in income and investment and in this way there would be no leakage in the multiplier process.

Increase in Prices:

Price inflation constitutes another important leakage in the working of the multiplier process in real terms. The multiplier works in real terms only when as a result of increase in money income and aggregate demand, output of consumer goods is also increased.

When output of consumer goods cannot be easily increased, a part of the increases in the money income and aggregate demand raises prices of the goods rather than their output. Therefore, the multiplier is reduced to the extent of price inflation. In developing countries like India the extra incomes and demand are mostly spent on food-grains whose output cannot be increased so easily.

Therefore, the increments in demand raise the prices of goods to a greater extent than the increase in their output. Besides, in developing countries like India, there is not much excess capacity in many consumer goods industries, especially in agriculture and other wage-goods industries.

Therefore, when income and demand increase as a result of increase in investment, it generally raises the prices of these goods rather than their output and therefore weakens the working of the multiplier in real terms. Thus, it was often asserted in the past that Keynesian theory of multiplier was not very much relevant to the conditions of developing countries like India. However, we shall discuss later that this old view about the working of Keynes' multiplier is not fully correct.

The above various leakages reduce the multiplier effect of the investment undertaken. If these leakages are plugged, the effect of change in investment on income and employment would be greater.

Multiplier with Changes in Price Level:

In our above analysis of multiplier with aggregate demand curve, it is assumed that price level remains constant and the firms are willing to supply more output at a given price. How much national income or GNP increases as a result of any autonomous expenditure such as government expenditure, investment expenditure, net exports is determined by a shift in aggregate demand curve by the size of simple Keynesian multiplier when price level is fixed.

This implies a horizontal short-run supply curve. However, as studied above, short-run aggregate supply curve slopes upward as the firms are willing to supply additional output in the short run only at a higher price level. With short-run aggregate supply curve sloping upward, a rightward shift in aggregate demand curve raises new equilibrium GNP level not equal to the horizontal shift in the aggregate demand curve but less than it.

Consequently, the size of multiplier is smaller than that of simple Keynesian multiplier with a given fixed price level. This is because a part of expansionary effect of GNP of the increase in autonomous government expenditure is offset by rise in the price level.

The multiplier effect in case of upward sloping curve is shown in Fig. 10.3. To begin with, in the top panel of Fig. 10.3 aggregate expenditure curve AE_0 intersects 45° line at point Sand determines Y_0 equilibrium level of GNP. In the panel at the bottom of Fig. 10.3 the corresponding aggregate demand curve AD_0 and the short-run aggregate supply curve SAS intersect at B' at the above determined GNP level K_0. Now suppose autonomous investment expenditure (which is independent of changes in price level) increases by AI.

As a result, aggregate expenditure curve AE shifts upward to AE_1 and determines new equilibrium GNP level equal to Y_2. In the lower panel (b), due to the upward shift in aggregate expenditure curve, aggregate demand curve shifts rightward from AD to AD_1The horizontal shift in the aggregate demand curve at a given price level is determined by the increase in aggregate expenditure multiplied by the simple Keynesian multiplier at the given fixed price level (B'H or $\Delta Y = \Delta I$ 1/1- MPC) But given the upward sloping short-run aggregate supply curve SAS with new aggregate demand curve AD_1, price level does not remain fixed. As will be seen from the lower panel (b) of Fig. 10.3, the aggregate demand curve AD_1 intersects the short-run aggregate supply curve SAS at point R' and as a result price level rises to P_1.

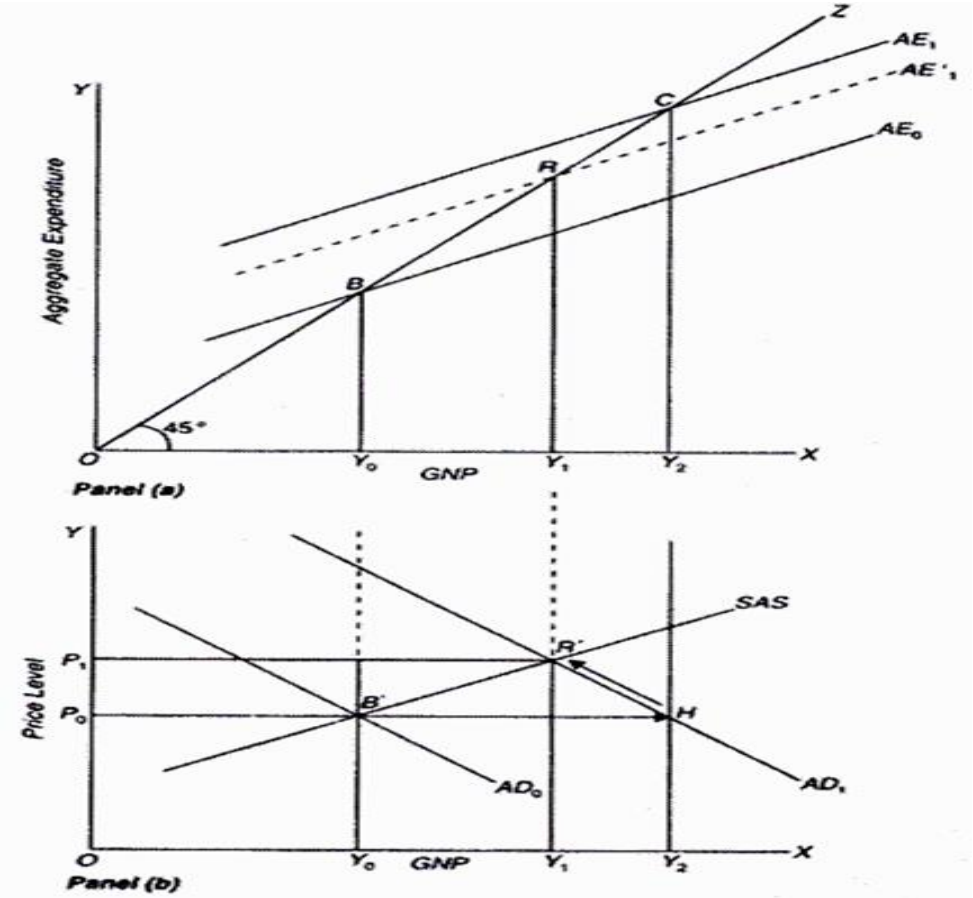

Fig. 10.3. *Multiplier Effect with Changes in Price Level*

Now, with this rise in price level to P_1, aggregate expenditure curve in the upper panel (a) will not remain unaffected but will shift downward. This fall in aggregate expenditure curve is due to the adverse effects on wealth or real balances, interest rate and net exports. Much of wealth is held in the form of bank deposits, bonds and shares of companies and other assets.

With the rise in price level, real value or purchasing power of wealth possessed by the people declines. This induces them to spend less. As a result, consumption expenditure declines due to this wealth effect. Secondly, the rise in price level reduces the supply of real money balances (M^s/P) that causes a shift in money supply curve to the left.

Given the demand function for money (M^d), the decline in the real money supply will cause rate of interest to rise. Now, the rise in interest will induce private investment expenditure to decline. Lastly, rise in price level in the domestic economy will adversely affect exports of a country causing net exports to fall.

Thus, as a result of negative effects of rise in price level on real wealth, private investment and net exports, in the upper panel (a) of Fig. 10.3 aggregate expenditure curve shifts downward to AE_1 (dotted) so that it determines GNP level Y_1 at which aggregate

expenditure curve AE_1intersects 45° line. This also corresponds to the intersection of aggregate demand curve AD_1 and short-run aggregate supply curve SAS point R' in the lower panel (b) of Q 1. Fig. 10.3.

Thus with the upward sloping short-run aggregate supply curve SAS, the effect of increase in autonomous investment expenditure (or for that matter increase in any other autonomous expenditure such as Government expenditure, net exports, autonomous consumption) on the GNP level can be visualized to occur in two stages.

First, increase in investment expenditure shifts aggregate expenditure curve AE upward in the upper panel (a) of Fig. 10.3 and correspondingly aggregate demand curve in the lower panel (b) shifts to the right to AD_1 and brings about increase in GNP level from Y_0 to $Y_2$with the given fixed price level P_r In the second stage due to the upward sloping short-run aggregate supply curve SAS, the rightward shift in the aggregate demand curve causes price level to rise from P_0 to P_t and causes decrease in GNP from $Y_2$to Y_1

However, as shall be seen from Fig. 10.3, when price level effect is taken into account, the increase in investment expenditure has still a multiplier effect on real GDP but this effect is smaller than it would be if price level remained fixed. It may be further noted that steeper the slope of the short- run supply curve, the greater is the increase in the price level and smaller is the effect on real GNP.

Importance of the Concept of Multiplier:

Multiplier is one of the most important concepts developed by J.M. Keynes to explain the determination of income and employment in an economy. The theory of multiplier has been used to explain the cumulative upward and downward swings of the trade cycles that occur in a free-enterprise capitalist economy. When investment in an economy rises, it has a multiple and cumulative effect on national income, output and employment.

As a result, economy experiences rapid upward movement. On the other hand, when due to some reasons, especially due to the adverse change in the expectations of the business class, investment falls, then backward working of the multiplier causes a multiple and cumulative fall in income, output and employment and as a result the economy rapidly moves on downswing of the trade cycle. Thus, Keynesian theory of multiplier helps a good deal in explaining the movements of trade cycles or fluctuations in the economy.

The theory of multiplier has also a great practical importance in the field of fiscal policy to be pursued by the Government to get out of the depression and achieve the state of full employment. To get rid of depression and remove unemployment, Government investment in public works was recommended even before Keynes.

But it was thought that the increase in income will be limited to the amount of investment undertaken in these public works. But the importance of public works is enhanced when it is realised that the total effect on income, output and employment as a result of some initial investment has a multiplier effect. Thus, Keynes recommended Government investment in public works to solve the problem of depression and unemployment.

The public investment in public works such as road building, construction of hospitals, schools, irrigation facilities will raise aggregate demand by a multiple amount. The multiple increase in income and demand will also encourage the increase in private investment.

Thus, the deficiency in private investment which leads to the state of depression and underemployment equilibrium will now be made up and a state of full employment will be restored. If the multiplier had not worked, the income and demand would have risen as a result of some public investment but not as much as they rise with the multiplier effect.

Inspired by the Keynesian theory of multiplier, expansionary fiscal policy of increase in Government expenditure and reduction in income tax have been adopted by President John Kennedy and President George W. Bush in the United States of America to remove involuntary unemployment and depression. This had a great success in removing unemployment and depression and therefore, Keynesian theory of multiplier was vindicated and as a result people's belief in it increased.

Numerical Problems on Multiplier:

Problem 1:

Suppose the level of autonomous investment in an economy is Rs. 200 crores and consumption function of the economy is:

$C = 80 + 0.75Y$

(a) What will be the equilibrium level of income?

(b) What will be the increase in national income if investment increases by Rs. 25 crores.

Solution:

(a) For equilibrium level of income,

$$Y = C + I \quad \ldots(1)$$

where $C = 80 + 0.75$

$I = 200$ crores

Substituting the values of C and I in (1) we have

$$Y = 80 + 0.75K + 200$$

$$(Y - 0.75Y) = 80 + 200 = 280$$

$$0.25\,Y = 280$$

$$Y = 280 \times \frac{100}{25} = 1120$$

Equilibrium level of income is therefore equal to 1120 crores.

(b) How much increase in income will occur as a result of increase in investment by Rs. 25 crores depends on the size of multiplier. The size of multiple is determined by the value of marginal propensity to consume. In the given consumption function (C = 80 + 0.75 F) marginal propensity to consume is equal to 0.75 or 3/4. Thus, multiplier = 1/1 – MPC = 1/1 – 3/4 = 4

Thus, with increase in investment by Rs. 25 crores, national income will rise by 25 x 4 = 100 crores.

Problem 2:

Suppose in a country investment increases by Rs. 100 crore and consumption is given by C = 10 + 0.6Y (where C = consumption and Y = income). How much increase will there take place in income?

Solution.

Multiplier, $k = \frac{\Delta Y}{\Delta I}$

or $\Delta Y = k.\Delta I \quad \ldots(1)$

Now, multiplier, $k = \frac{1}{1 - MPC}$

In the given consumption, $MPC = 0.6$

$$k = \frac{1}{1 - 0.6} = \frac{1}{0.4} = \frac{1}{\frac{4}{10}} = \frac{1}{\frac{2}{5}} = 2.5$$

Substituting the value of $k = 2.5$ and $\Delta I = ₹\ 100$ in (1) above, we have

$$\Delta Y = 2.5 \times 100 = 250$$

Thus increase in investment by ₹ 100 crore will cause income to rise by ₹ 250 crore.

Problem 3. *What increase in investment needed to raise income by ₹ 4,000 crores, if MPC is 0.75 ? How much will there be increase in consumption and saving due to this increase in income?*

Solution. How much increase in investment is required to raise income by ₹ 4,000 crores depends on the value of multiplier and the size of multiplier (k) depends on the marginal propensity to consume (MPC). Thus,

$$\text{Multiplier } (k) = \frac{1}{1 - MPC} = \frac{1}{1 - 0.75} = \frac{1}{0.25} = 4$$

Now, $k = \frac{\Delta Y}{\Delta I}$

or $\Delta I = \frac{\Delta Y}{k} \quad \ldots(i)$

Substituting the value of ΔY and k in (i), we have

$$\Delta I = \frac{4000}{4} = 1000$$

Thus, investment should rise by ₹ 1,000 crore to achieve ₹ 4,000 crorore increase in income.

The Paradox of Thrift:

An interesting paradox arises when all people in a society try to save more but in fact they are unable to do so. The multiplier theory of Keynes helps a good deal in explaining this paradox. According to this paradox of thrift, the attempt by the people as a whole to save more for hard times such as impending period of recession or unemployment may not materialize and in their bid to save more the society in-fact may not only end up with the same savings (or, even lower savings) but also in the process cause their consumption or standard of living to decline.

Thrift (i.e., the desire to save more) is considered to be a virtue in most of the societies and it is regarded as an act of prudence on the part of individuals to save for a rainy day. According to a proverb, "a penny saved is a penny earned". Further, according to classical economists, savings determine investment which plays a crucial role in accelerating the rate of economic growth.

However, the paradox of thrift shows that the efforts to .save more, especially in times of depression, may actually deepen the economic crisis and cause output to fall and unemployment to increase. It goes to the credit of Keynes that with his multiplier theory he was able to resolve the paradox of thrift. Keynesian explanation of paradox of thrift has been shown in Fig. 10.4.

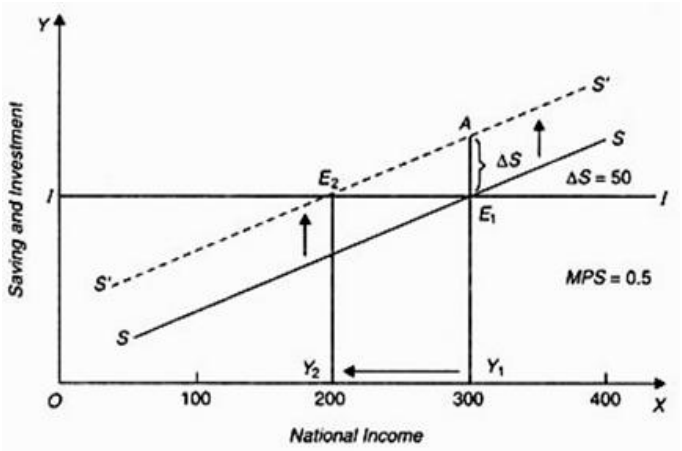

Fig. 10.4. *The Paradox of Thrift*

According to the Keynesian theory, the saying "penny saved is penny earned" is quite inappropriate for the economy as a whole when it is working at underemployment equilibrium, that is, when there prevails recession or depression. Keynes has showed that if all people in a society decide to save more, they may actually fail to do so but nevertheless reduce their consumption.

This is because, according to Keynes, the effort to save more by all in a society will lower the aggregate demand for goods and services resulting in a drop in the level of national income. At the lower level of national income, the savings fall to the original level but consumption will be less than before which implies that the people would become worse off.

Consider Fig. 10.4, where 55 is the saving curve with a slope equal to 0.5, and II is the planned investment curve. It will be seen that saving and investment curves intersect at point E and determine level of income equal to K, or Rs.300 crores. Now suppose that expecting hard times ahead all people try to save more by the amount of Rs. 50 crores which would cause an autonomous downward shift in the consumption function.

This downward shift in the consumption function brings about an upward shift by Rs. 50 crores or E A in the saving function curve to S'S'. This new saving function curve S'S' cuts the planned investment curve II at point E_2 according to which new equilibrium level of income falls to Y_2 or Rs. 200 crores. It is important to note that level of income does not drop only by the amount (E_1A or RS. 50 crores), that is, by the extent of reduction in consumption due to more saving but by a multiple of it.

With marginal propensity to save (MPS) being equal to 0.5 or 1/52, the value of multiplier would be 1/MPS= 1-1/2= 2. Further, the decline in consumption due to more saving would cause the multiplier to work in reverse, that is, the multiplier would operate to reduce the level of consumption and income by a magnified amount. The decline in consumption expenditure of the people by Rs. 50 crores in the first instance due to more saving by them implies that the producers and sellers of goods and services will find their income to fall by Rs. 50 crores. But the reverse process will not stop here.

Given the marginal propensity to consume being equal to 0.5 or the producers/sellers of goods and services in turn would spend Rs.25 crores less when they find their income has fallen by Rs.50 crores. It will be observed from Fig. 10.4 that this process of reduction of the level of income will continue till the new saving is equal to investment at the lower level of income Y_2 (Rs.200 crores), that is, the level of income has declined by Rs. 100 crores (50 x 2) from its initial equilibrium level of income Y_1 of Rs. 300 crores.

Thus the attempt by all people to save more has led to the decline in the equilibrium level of income to Y_2 or Rs. 200 crores at which, with marginal propensity to consume remaining unchanged at 0.5 or ½, saving of the society will fall to the initial level of Y_1E or Rs. 100 crores (200 x 0.5 = 100). This is clearly depicted in Fig. 10.4. With the decrease in planned saving by Rs. 50 crores at every level of income the saving function (SS) shifts upward.

This sets in motion the operation of the multiplier in the reverse and as will be seen from the 10.4, the new equilibrium is reached at the new lower level of income Y_2 (Rs. 200 crores). It is important to observe that the saving which had risen to Y_1A (Rs. 150 crores) has once again fallen to the original level of Rs. 100 crores ($Y_2E_2 = Y_1E_1$) due to reduction in consumption expenditure inducing the working of multiplier in the reverse which causes a decline in the equilibrium level of income from Y_1 (Rs. 300 crores) to Y_2 (Rs. 200 crores).

In other words, the increases in saving by Rs. 50 crores has led to the fall in income by Rs. 100 crores because the multiplier is equal to 2. This explains the paradoxical feature of an economy gripped by recession. This is paradoxical because in their attempt to save more the people have caused a decline in their income and consumption with no increase in the saving of the society at all.

In our analysis we have assumed that the planned investment is fixed, that is, determined outside the model. In other words, the investment has been assumed to be autonomous of income, that is, it does not vary with income.

Can We Avert the Paradox of Thrift?

Paradox of thrift holds good when a free market economy is in the grip of recession or depression and investment demand is inadequate due to lack of profit opportunities. However, it has been pointed out by some economists that paradox of thrift can be averted if the extra savings that the people do for a rainy day are somehow channeled into additional investment through financial markets.

Indeed, the classical economists argued that the increase in the supply of savings would lead to the fall in the rate of interest which would induce increase in planned investment. If this happens, then in our saving-investment diagram the investment curve *II* would shift up to *I'I'* and as will be seen from Fig. 10.5 the new equilibrium level of income may not fall and therefore the paradox of thrift is averted.

In Fig. 10.5, initially the saving curve (S_1S_1) and investment curve (*II*) intersect at point E_1 and determine Y_1 level of income. Now, if the people of the society expecting difficult times ahead,\ desire to save E_1A more. If these extra savings, for reasons mentioned above, result in more investment, the investment curve will shift to *I'I'*, the new equilibrium will be at point A corresponding to the original level of income Y_1. In this way the paradox of thrift has been averted.

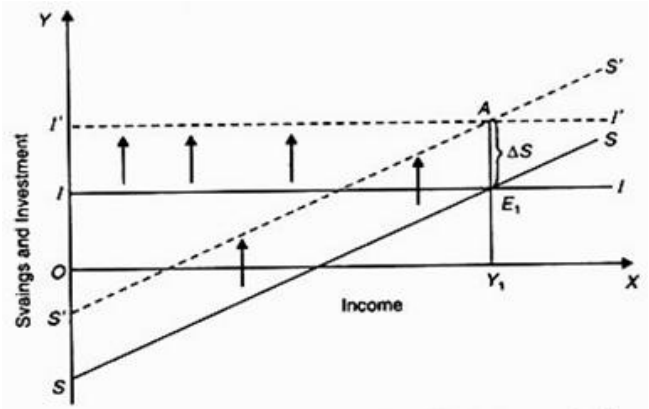

Fig. 10.5. *The situation when paradox of thrift does not hold.*

However, according to the modern economists, especially the followers of Keynes, the empirical evidence does not support the above argument of averting the paradox of thrift. This is because at times of recession or depression, the prospective yields from investment are so small that no possible reduction in the rate of interest will induce sufficient increase in investment.

Thus, according to them, in a free-market and private enterprise economy without Government intervention paradox of thrift cannot be averted. Of course, if the Government intervenes as it does even in the present- day predominantly private enterprise economies of the USA and Great Britain, it can mobilise the extra savings of the people and invest them in some worthwhile projects and thus prevent aggregate demand and income from falling.

This can happen because the Government undertakes investment because it is not motivated by profit motive but by the considerations of promoting social interest and economic growth. It is because of this that the role of the Government has greatly increased for overcoming recession in the capitalist countries.

Balanced Budget Multiplier

We have already considered the independent effects of government spending and taxes on national income.

Now we will consider the combined effects of government spending and taxes on national income in the light of balanced budget.

Balanced budget means change in government expenditure is exactly matched by a change in taxes. If government expenditure and tax receipts increase by the same amount, will national income or output increase or remain the same?

Classical economists believed that a balanced budget is neutral in the sense that the levels of output or income remain unchanged. However, Keynes and his followers argued that, in reality, its effect on income will not be zero or neutral. In other words, we can find out the expansionary effect on national income of a balanced budget.

The expansionary effect of a balanced budget is called the balanced budget multiplier (henceforth BBM) or unit multiplier. Here an increase in government spending matched by an increase in taxes results in a net increase in income by the same amount. This is the essence of BBM. This may be illustrated here. Let us assume an MPC of 0.75. If government expenditure increases by Rs. 20 crore national income would increase to Rs. 80 crore.

This can be obtained by using the formula for government spending multiplier, K_G:

$$\Delta Y = \frac{1}{1-MPC}\Delta G$$

$$80 = \frac{1}{1-0.75}.20$$

Now, an increase in taxes by the same amount (i.e. Rs. 20 crore) would lead to a reduction in aggregate output of Rs. 60 crore.

Applying the formula for tax multiplier, K_T, we obtain:

$$\Delta Y = \frac{-MPC}{1-MPC}.\Delta T$$

$$-60 = \frac{-0.75}{1-0.75}.20$$

This happens because with the increase in taxes of Rs. 20 crore, consumption would decline to Rs. 15 crore and not Rs. 20 crore, since the value of MPC being 0.75. (i.e., 0.75x 20 = Rs. 25 crore). Reduction in consumption by Rs. 15 crore leads to a decline in income by Rs. 60 crore. As a result, the net increase in national income (Rs. 80 – Rs. 60 crore) becomes Rs. 20 crore. Thus, the BBM, defined as the net increase in income (Rs. 20 crore) caused by an increase in government spending (Rs. 20 crore), and increase in taxes (Rs. 20 crore) will have a value of 1. This result is known as the balanced budget theorem or unit multiplier theorem which must have a value of one, no matter whatever the value of MPC.

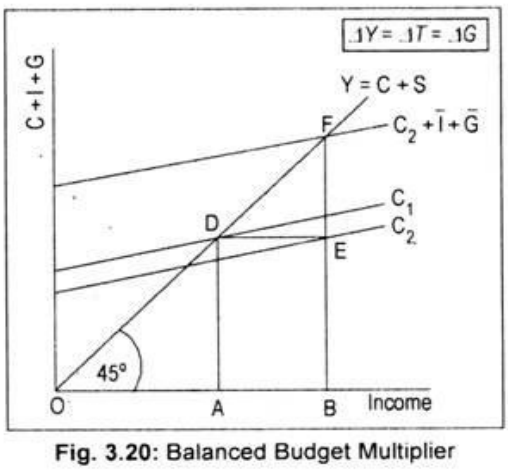

Fig. 3.20: Balanced Budget Multiplier

We can explain BBM in terms of the Fig. 3.20 where C_1 is the consumption line before the launching of the tax-expenditure programme. C_2 is the post-tax consumption line, DE being the tax receipt. If the entire DE amount of tax receipt is spent by the government, the aggregate demand curve would be represented by $C_2 + I + G$, where investment and government expenditure are assumed to be autonomous.

This curve intersects the 45° line at point F. As a result, national income rises from OA to OB. Note that AB = DE = EF.

Since AB represents the increase in income (ΔY), DE is the increase in tax (ΔT) and EF is the increase in government expenditure (ΔG), we may write:

$\Delta Y = \Delta T = \Delta G$

$\therefore \Delta Y/\Delta G = \Delta Y/\Delta T = 1$

The value of BBM (symbolised by K_B) is unity. It can also be expressed in the following way:

$$K_B = K_G + K_T$$

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

$$\therefore K_B = \frac{1-MPC}{1-MPC} = 1 \ (\because MPS = 1 - MPC)$$

Since K_G is positive and K_T is negative, the net effect of balanced budget is not neutral. Income changes by an amount equal to a change in government expenditure and tax receipt. So the value of BBM must be 1. Since K_T is one less than K_G, a balanced budget must have a value of one.

However, in reality, the BBM may have a value less than one. In this model, we assumed the uniform MPC for all taxpayers and beneficiaries of government expenditure. However, if MPC of the taxpayers is different from those of the recipients of government expenditure, the value of BBM would be less than unity, but greater than zero. Thus, the BBM must not have value equal to (one) 1 in a complex society (e.g., in the IS-LM model)