CHAPTER 7

DETERMINATION OF NATIONAL INCOME

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  - Determination of Equilibrium Level of Income
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INTRODUCTION

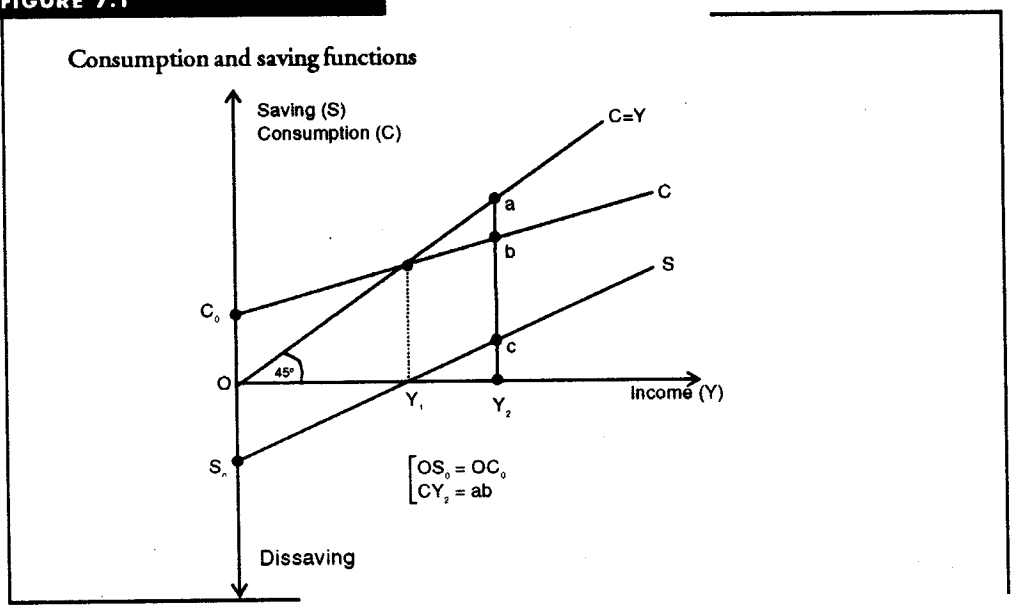
For a business manager to understand the dynamics of business environment, it is important to find out what determines national income and economic growth in an economy. Macroeconomic theory provides valuable insights into the process of income determination and growth factors. Macroeconomic policy and management, particularly in less developed countries like India, are oriented towards achieving higher rates of economic growth and in the process seek to activate the determinants of growth generally within a framework of economic planning and subject to the limitation of resources. Knowledge of income and growth determinants and their causative processes enables a business manager to understand the behaviour and impact of macroeconomic variables on business environment and make a reasonable forecast at least in the near future. Further, he is enabled to analyze the trends in the key variables and make strategic adjustments within the organization to reduce the adverse impact of environmental changes.

Determination of income discussed in the following sections is in the tradition of Keynsian macroeconomics.

INCOME DETERMINATION IN A SIMPLE TWO-SECTOR MODEL

This is the starting point of income determination in modern macroeconomic theory. This is also the simplest case in which the economy is divided into household and business sectors. The model assumes that there is a constant level of planned investment (I) by the business sector irrespective of the level of money income (Y) in the economy and the household consumption (C) is a positive linear function of income. The income-consumption relationship is given by consumption function (CoC) as shown in **figure (7.1)** below:

FIGURE 7.1



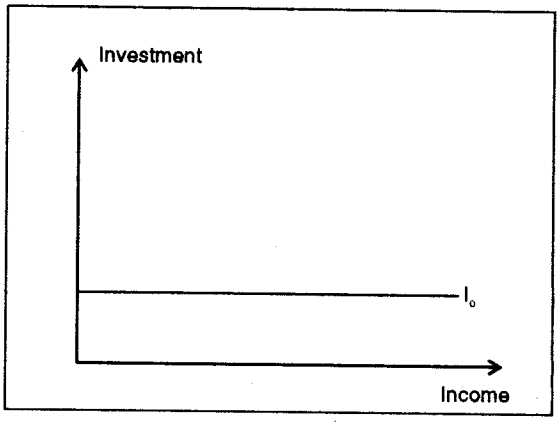
The function shows that:

- As income increases, consumption also increases.
- For income level below Y_1, consumption is higher than income showing that when income falls below a certain minimum level, household sector is not able to reduce consumption in the same proportion.
- When income is zero, there is still consumption equal to OC_0 which shows that the household sector must consume a minimum amount of goods and services which are essential for their survival or to which he is habitual. This consumption is financed through equal dissavings (using savings accumulated in the past) of OS_0 ($OC_0 = OS_0$), which can be seen on the savings function derived from the consumption function.
- At income level Y_1, income equals consumption and savings are zero (i.e. Y = C and S = 0).
- At income levels higher than Y_1, say at OY_2, (which equals aY2 because on the 45° line vertical and horizontal distances are equal and hence it is labeled Y = C line, consumption is bY_2 and saving ab ($aY_2 - bY_2$) which can also be seen on the saving function as cY_2 (= a b). The consumption function is generally expressed as $C = C_0 + b$ where C_0 is the length of the intercept on the y-axis and b the slope of the function.

The planned (constant) investment is seen as a horizontal line running parallel to income-axis in Diagram (b) showing, that the investment remains constant irrespective of the level of income.

FIGURE 7.2

The Investment Function



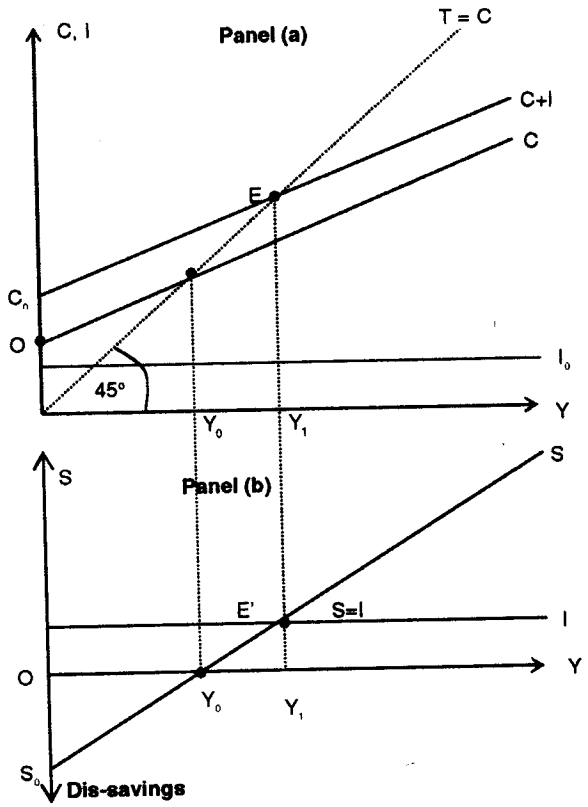
Determination of Equilibrium Level of Income

Equilibrium level of income is determined at a point where the total revenue of the business sector from the sale of consumption and investment goods (e.g. machinery) is equal to aggregate money income. C + I represents aggregate planned spending which in equilibrium must be equal

to the value of aggregate output or income (Y) assuming that there are no unsold stocks of goods and the households keep no idle savings. Value of aggregate output and income are identical as aggregate output value is distributed as factor incomes of the household sector. The income is partly spent on consumption goods and partly saved which are lent to the business sector directly or through the financial market and is turned into investment (assuming there are no idle hoardings). The investment represents expenditure on capital goods by the business sector). The equilibrium occurs at point E in Panel (a) of **figure 7.3** where aggregate expenditure ($C + I = EY_1$) equals value of aggregate output 0Y1. The point is determined at the point of intersection of C+I line with the 45° line. Equivalently, the equilibrium occurs at E' in the (b) panel of the diagram where saving and investment are equal.

FIGURE 7.3

Income determination in the two-sector model



Thus, in equilibrium,

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

Or $S = I \quad \ldots\ldots (2)$

Algebraically (2) can be easily derived from (1). We know income (Y) is disposed of as consumption (C) and savings (S), or

$Y = C + S$ ..... (3)

From (1) and (3), it follows that $C + I = C + S$ or $I = S$. Hence (1) and (2) are equivalent conditions. For example see, **Box-7.1**.

BOX 7.1

Alternative values of investment multiplier (k) corresponding to different values of b(MPC).

b-values :	0.9	0.8	0.7	0.6	
k-values :	10	5	3.3	2.5	(using $k = 1/(1-b)$

The table shows that as the slope of the function falls, the value of the multiplier also decreases.

INVESTMENT-INCOME RELATION: THE MULTIPLIER ANALYSIS

Multiplier analysis refers to the multiple increases in equilibrium level of income caused by an autonomous change in the level of aggregate spending. The investment component of aggregate spending is decided by the business sector and is a relatively more dynamic determinant of output and income. The multiple increase in income brought about by a given increase in investment is due to investment multiplier (k) which is defined as the ratio between change in investment (I) and the consequent change in the level of income (Y). That is,

$k = \Delta Y/\Delta I$; or $\Delta Y = k.\Delta I$

Deriving the value of the multiplier

Algebraically, it is easy to derive the value of the multiplier from the equilibrium condition of income determination ($Y = C + I$) and the equation of consumption function ($C = C0 + bY$). We have,

$Y = C + I$

or, $Y = C_0 + bY + I$

or, $(1-b)\ Y = C_0 + I$ .....(1)

If investment increases from I to $I+ \Delta I$, then income will increase from Y to $Y + \Delta Y$, so that $(1 - b)\ (Y + \Delta Y) = Co + I + \Delta I$ .....(2)

(2) - (1) gives, $(1 - b)\ \Delta Y = \Delta I$

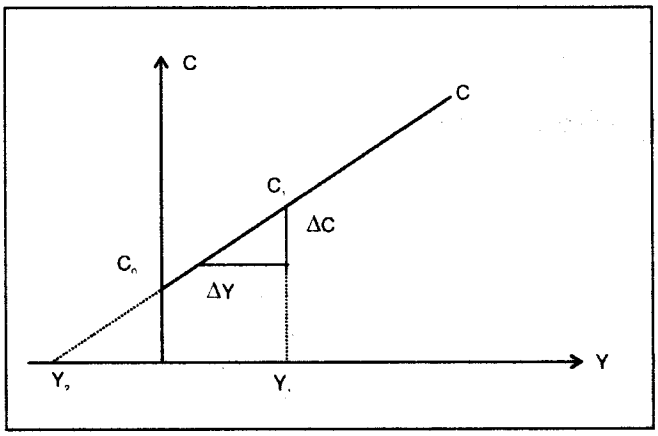
or $Y/ I = 1/(1 - b)$ or $k = 1/(1 - b)$ which gives the value of investment multiplier in terms of b which is the slope of the consumption function (**Box-7.1**). The slope called the **Marginal Propensity to Consume (MPC)** is defined as

$MPC = \Delta C/\Delta Y\ (= C_1Y_1/Y_1Y_2)$

It measures the change in consumption (C) resulting from a change in disposable income.

FIGURE 7.4

The Marginal Propensity to Consume



BOX 7.2

Illustration of the Relation Between Intended Investment and Equilibrium Income

If consumption function is represented by C = 40 + 0.9Y, what would be the equilibrium level of income if intended investment of the business sector is Rs 60 (in billions).

Solution:

Equilibrium condition requires that value of output equals planned aggregate spending

$Y = C + I$

or, $Y = 40 + 0.9Y + 60$

or, $0.1Y = 100$

or, $Y = 1000$ .....(1)

In this example, equilibrium level of income would be Rs. 1000 billion.

Alternatively, equilibrium condition requires that

$S + I$

or, $Y - C = 60$ $(S = Y - C)$

or, $Y - (40 + 0.9Y) = 60$

or, $0.1Y = 100$

or, $Y = 1000$ which is the same as (1)

Obviously, the higher the value of b, the greater would be the value of the multiplier.

Thus, if people spend a larger proportion of their incremental (additional) income, then a given increase in investment would bring about a larger increase in aggregate income in the economy. And, given the value of multiplier, an increase in the level of investment will increase income multiplier times the investment. These two cases are shown in the **Figure 7.5**.

Effect of Increased Investment on Income

FIGURE 7.5 (a)

Effect of an increase in investment on the equilibrium lend of income, MPC remaining the same.

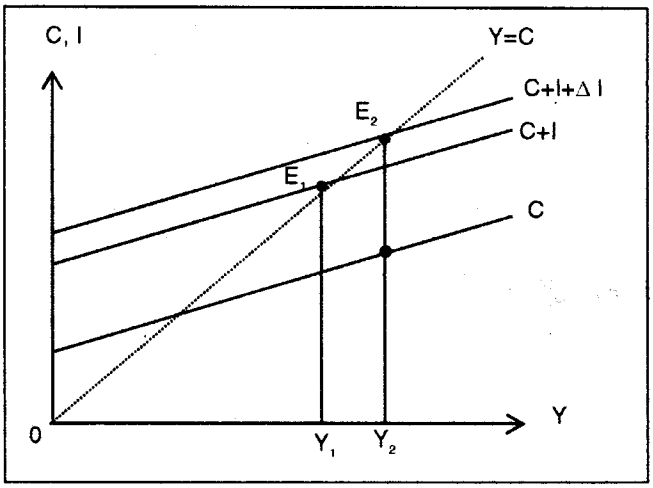
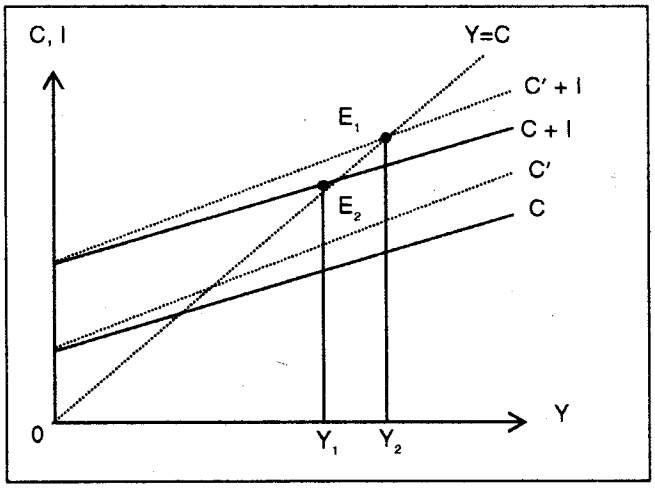


FIGURE 7.5 (b)

Effect of an increase in the value of MPC on the equilibrium level of income, investment remaining the same



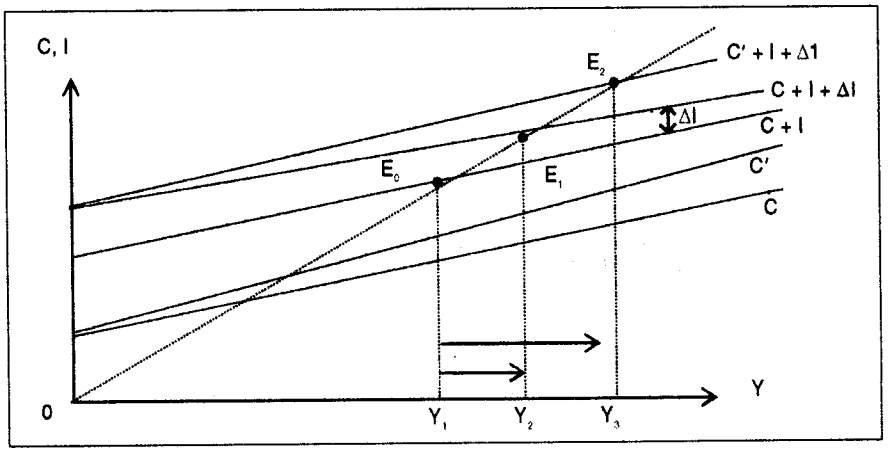
Panel (a) shows that as investment increases by ΔI (=E_2.a) equilibrium level of income increases from OY_1 to OY_2. In this case the multiplier value is E2a/Y_1Y_2. Panel (b) shows that as MPC increases, consumption function shifts from position C to C' (showing higher slope) and correspondingly, aggregate spending function shifts from C + I to

C' + I position. This shift shifts the equilibrium level of income from OY_1 to OY_2. It shows that increase in income is possible even without increase in investment. Using this principle it is possible to show how an increase in income caused by a given increase in investment can be enlarged by a rising MPC.

Figure 7.6 shows that with consumption function C, a given increase in investment, ΔI, raises equilibrium level of income from OY_1 to OY_2. But on the consumption function C' with higher MPC (slope) the income increases from OY_1 to OY_3 (OY_2). The higher value of MPC here enlarges the multiplier of investment on income.

FIGURE 7.6

Combined Effect of a Rise in MPC and Investment on Equilibrium Income



THE DYNAMIC MULTIPLIER ACTION

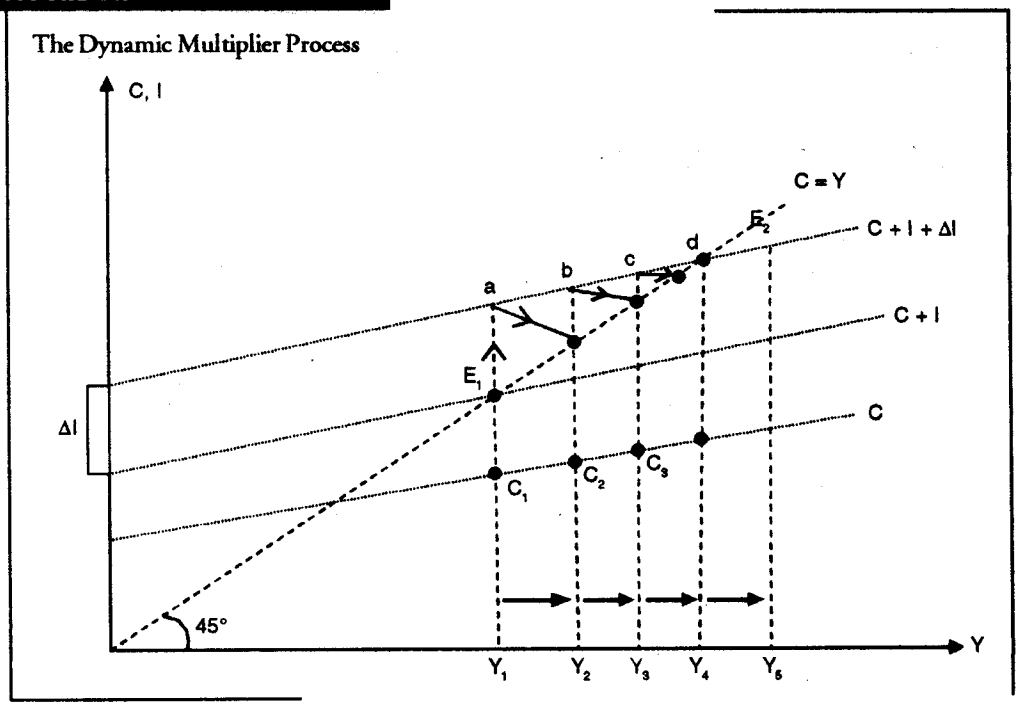
The above multiplier analysis is static in the sense that it does not recognize the time lag that is most likely to appear between increase in investment and the resultant increase in income. It considers both the changes as taking place simultaneously.

For this reason, it is also called static or lagless multiplier. Dynamic (also called lagged or period or sequence) multiplier action recognizes the existence of time period or lag between change in income and resulting change in income and shows the process of change in income in the intervening time period divided into successive stages. Dynamic multiplier gives a more realistic and thorough insight into the process of income propagation following a given increase in investment. This is shown in **Figure 7.7**.

When the economy is in initial equilibrium at E_1, additional investment $\Delta I = aE_1$ takes place raising income by full amount of investment ($aE_1 = ae = y_1y_2$). This happens because at y_1 total investment (aC_1) is greater than savings (E_1C_1). At y_2, again investment (bC_2) exceeds savings (eC_2) raising income level to y3 at which investment again exceeds savings. The dynamic process continues so long as investment exceeds savings. The system achieves equilibrium at E_2 where investment equals savings and aggregate spending equals value of output or income. The process will act in reverse if ΔI is negative or investment is less than saving.

FIGURE 7.7

The Dynamic Multiplier Process



MANAGERIAL IMPLICATIONS

The above analysis carries important messages for the business manager. The manager should be able to foresee the effect of rising total investment in the economy on income. The effect on income may materialize after some time lag depending upon the behaviour of the economy but in the meantime he can reposition or revise his production and marketing plans to tap the additional consumer income. It may not be possible to calculate precisely the increase in market demand due to the market imperfections, leakages from the income generation process and non-fulfillment of some of the assumptions of the model but the general lesson is that the market can be expected to expand after a given increase in investment at the macro level. A number of private and public sector agencies regularly compile and publish data on new investments in the various sectors of the economy. Another lesson that derives from the analysis is that the tendency of the people to spend an increasing proportion of their additional income (i.e. MPC) in certain product segments expands the market by a multiple. A rising MPC could be the result of falling rate of interest (which induces people to save less and spend more) or changes in consumer tastes and preferences

caused by advertising or other factors. The combined effect of increased investment and increased MPC can expand the market at an accelerated pace and the business manager can monitor such developments and take strategic positions in the market.

INCOME DETERMINATION IN THE THREE-SECTOR MODEL

This model comes closer to reality as it includes government as the third sector. In the earlier two-sector model government, had no role in the economy. In this model government is present with public expenditure and taxes and the model explains how income is determined as government spending (G) and taxes (T) change. These are fiscal policy areas in which changes cause variations in national income or output determination.

In this model, the economy is in equilibrium when,

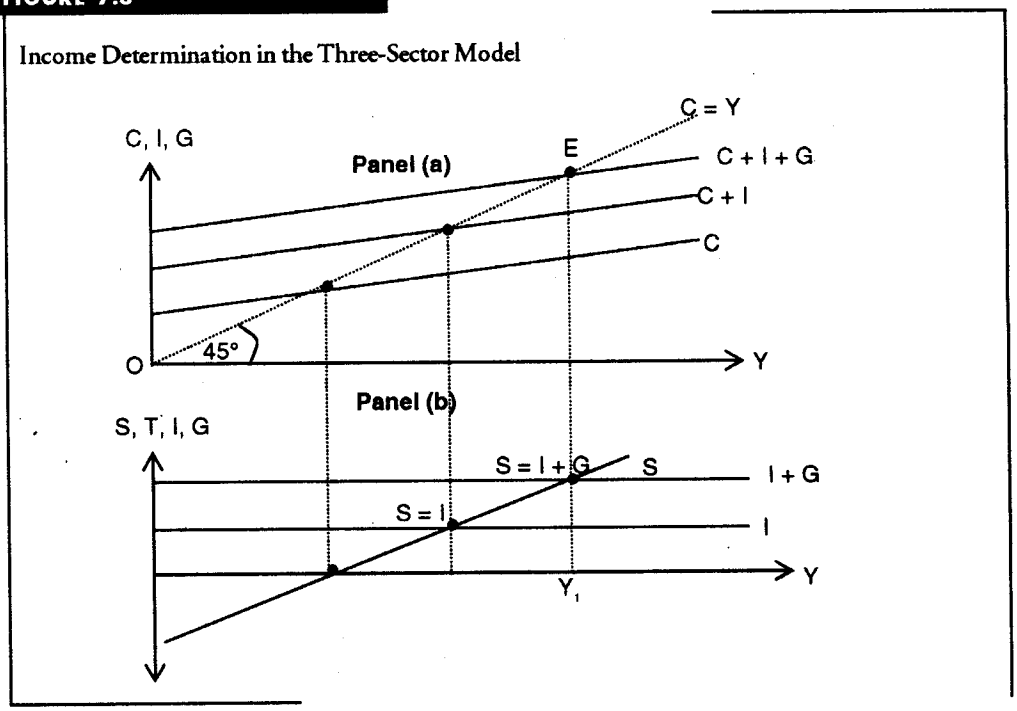
$Y = C + I + G$ (aggregate spending approach)

$T + S = I + G$ (saving-investment approach)

The equilibrium level of income is shown at point E in Panel (a) of the **Figure 7.8** where aggregate spending (C + I + G) equals the value of output or income OY1. Equivalently, equilibrium exists at point E in Panel (b) where aggregate savings are equal to total private investment and government expenditure.

FIGURE 7.8

Income Determination in the Three-Sector Model



Effect of Changes in Government Expenditure and Taxes on Income

As explained in **Chapter 6**, government has a number of transactions with other sectors of the economy. Government is a big spender and it finances its expenditures through taxes and other means. All these transactions affect the equilibrium level of income.

Government Expenditure Multiplier

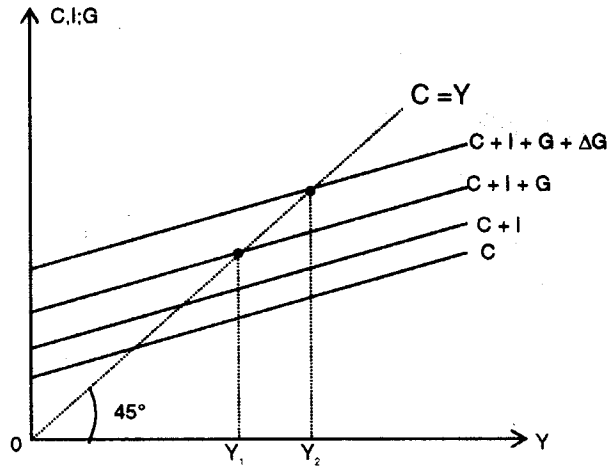
This multiplier determines the effect of a given change in government expenditure on the equilibrium level of income. An initial government expenditure triggers off a chain of responses in the economy. When a government, for example, builds a flyover, a larger number of persons (workers, material, suppliers, engineers, service providers etc.) receive income which is spent on goods and services. The income received by the producers of these goods and services is further spent. The combined effect is of ΔG, as shown in the diagram, is to raise the equilibrium of income from OY_1 to OY_2. The effect of ΔG is the same as that of ΔI in **Figure 7.9**, so that the government expenditure multiplier (kg) as the ratio between initial increase in government spending to the consequential final change in income is

$$k_g = \Delta Y/\Delta G = 1/(1\text{-MPC})$$

(derivation explained in earlier sections)

FIGURE 7.9

Effect of an Increase in Government Expenditure on Equilibrium Income



Tax Multiplier

Tax directly reduces the level of income and consumption expenditure. The fall in consumption graphically shown as the downward and rightward (south-west) shift of the consumption function brings about a multiple fall in the equilibrium level of income. In **Figure 7.10**, taxes lower aggregate

spending, assuming that the taxes collected by the government are not spent. Taxes collected but not spent are government savings, which together with private savings constitute leakage from income determination process. As a result of these taxes, income falls from OY_1 to OY_2.

Formally, tax multiplier (kt) can be defined as the ratio between change in taxes and resultant change in income, or, $kt = \Delta Y/\Delta T$. A given tax increase causes a multiple fall and a tax decrease causes a multiple increase in the level of income. This demonstrates the power of taxes to stimulate an economy. However, the magnitude of the tax multiplier in a given macroeconomic situation is always less than the value of expenditure (government or private investment) multiplier, k. The relation between kt and k is

$k_t = -b.k$, (b = MPC)

So that k_t is smaller than k (because MPC 1). The argument is simple to follow. A tax of Rs. 100 crore, for example, reduces consumption by Rs. 80 crore if MPC is 0.8. The fall in aggregate expenditure by Rs. 80 crore causes a multiple reduction in income by the multiple of k (= 1/(1 - 0.8) = 5). That is $\Delta Y = 5 \times 80 = 400$.

In this case,

$kt = -\Delta Y/\Delta T = -400/100 = -4$. Minus sign indicates that the change in income caused by tax is negative.

or, $k_t = (0.8)(5)$

or, $k_t = -b.k$. It follows that

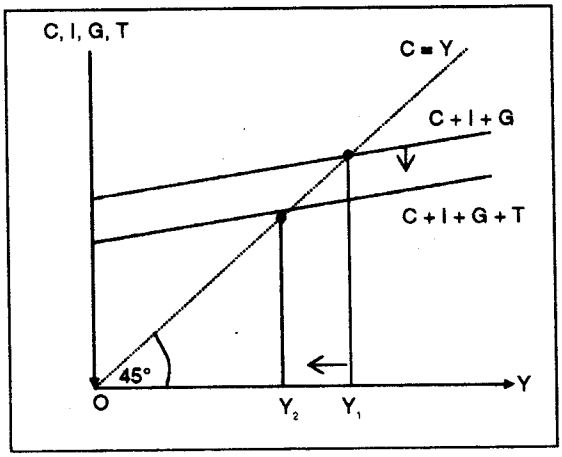
$Kt = -b/(1-b)$ ($k = 1/(1-b)$, $(b < 1)$

It has a negative value.

Similarly, a fall in taxes will stimulate income by the amount of tax reduction multiplied by tax multiplier. Decrease in taxes and increase in government transfers (like subsidies, pensions etc.) has the same kind of effect on income.

FIGURE 7.10

The Effect of Taxes on Equilibrium Income



Combined Effect of Government Expenditure and Taxes on Income: The Balanced-Budget Multiplier

The above analysis leads to an interesting stage. What would be the effect on income if a given increase in government expenditure is fully financed or matched by equal increase in taxes? It appears that the impact would be neutral but actually it is not so. In this case, income increases by the amount of government expenditure. This proposition is established by what is called the Balanced Budget Theorem. The effect of equal changes in taxes and government expenditure is called balance budget multiplier. The theorem is established as follows.

When government expenditure is financed by taxes there are two types of changes in income. The change caused by the former is positive and is denoted by $\Delta G/1\text{-}b$ following government expenditure multiplier and that by the latter is negative denoted by $-b\Delta T/1\text{-}b$. The combined or net change in income would be

$$Y = \Delta G/(1\text{-}b) - b\Delta T/(1\text{-}b) = (\Delta G - b\Delta T)/(1 - b)$$

Since, the budget is balanced, $\Delta G = \Delta T$, so that,

$$\Delta Y = (\Delta G - b\Delta G)/(1 - b) = \Delta G(1 - b)/(1 - b)$$

or, $\Delta Y = \Delta G$, which proves the theorem. Here the balanced budget multiplier defined as the ratio between change in income and change in fully tax-financed government expenditure is $\Delta y/\Delta G = 1$. The theorem and the multiplier are illustrated in **Box 7.3**.

BOX 7.3

Numerical illustration of Balanced Budget Theorem and Multiplier

Imagine that the government decides to spend additional Rs. 1000 crore to revive the economy. To maintain fiscal balance, it decides to finance the expenditure by raising equal amount through taxes (autonomous) If MPC = 0.8, government expenditure multiplier is 5 (=1/(1-0.8) through which income rises by Rs. 5000 crore (=5x1000). At i.e., the same time, taxes of Rs. 1000 crore reduce income through tax multiplier of 4(=5x0.8) by Rs. 4000 crore. Combining the two, net increase in income is Rs. 1000 crore (=5000-1000) which is equal to the original increase in government expenditure. In this case balanced budget multiplier is unity as increase in government expenditure equals increase in income.

In this case, taxes, for the sake of simplicity, are assumed as a flat sum, which is autonomous or constant irrespective of the level of income. If the taxes, to be more realistic, are related to income, a fully tax-financed government expenditure would still lead to a net increase in income but this increase would be less than the size of increase in government expenditure. Or, in other words, the balanced budget multiplier would be less than unity.

Implications for the Corporate Manager

The three-sector model provides a good understanding of how government influences the economy with government expenditure, taxes and transfer payments. Government makes a large number of purchases like consumers and makes a variety of economic and social investments in healthcare, education, entertainment, sanitation etc. Similarly, it makes transfer payments like pensions, grants, relief, subsidies, unemployment allowances. All these expenditures create income in the public,

which is further spent in successive Grounds. For a business manager, a given increase in government expenditure should signify a multiple increase in the total market in foreseeable future. Total market does not expand through various sub-markets and products equally. That basically depends upon where the government initially spends and what the taste and preference pattern of the society in general is. Government expenditure creates new income and markets irrespective of whether the expenditure is productive or not. Even the additional expenditure on military hardware has the capacity to expand markets.

A word of caution here. Many social expenditures (like pensions) may be unproductive or indirectly productive (like healthcare and education) and the government may consider such expenditure important from the point of view of social welfare. However, a heavy dose of such expenditures would be inflationary as these create money income but not additional output. If government expenditure is productive, it will create output or income in a non-inflationary manner provided idle resources in wait for employment are available in the economy. If the economy is already close to full employment, any substantial dose of government investment will tend to displace private investment plans. This is called crowding out effect of public investment. Not only that, such investments tends to create inflationary conditions in industrial goods markets and raise employee compensations and interest costs. Firms close to break even could be seriously threatened and may be driven out of the market. Other firms could become less competitive in comparison with firms who can raise resources through international sources.

The business manager has to re-strategize under such circumstances. The new corporate strategy may require changes in the capital structure in favour of equity funds. Cost cutting strategies would also be required that may have to be based on human resource restructuring, technology changes and even changes in the product mix to obviate competition, wherever required. Similarly, corporate managers have to watch changes in the tax regime. Managers must expect a shrink in the market following a rise in taxes and have to revise their advertising and marketing plans well in advance. Marginal propensity to consume and income elasticity of demand are the critical parameters on which changes in market demand following government expenditure and taxes can be estimated and predicted. Structure of taxation is an equally important factor. Direct taxes (like income tax) reduce the spending power but have no direct or perceptible impact on prices. Commodity (or indirect) taxes, on the other hand, raise prices and hence reduce real income (in terms of purchasing power). Consumers generally react, by reducing demand, depending upon the elasticity of demand for the products the prices of which are affected by taxes. Taxes on industrial goods raise costs for the consumer goods industries and they have to adopt cost-cutting measures to retain their market shares. A successful business manager is aware of fiscal pressures and related development and can anticipate tax changes in the annual budget presentations. Such projections enable the organisation to draw suitable strategies in advance.

INCOME DETERMINATION IN THE FOUR-SECTOR MODEL

This is the open-economy model in which exports and imports are also considered for determining the impact on level of income. The earlier models were with reference to a closed economy where foreign spending was not included. In an economy, there are exports and imports of consumption goods and investment goods by government and the private sector units. This international transaction can be aggregated into exports (X) and imports (M) at the macro level and the difference (X-M) is termed as 'net exports' or 'trade balance'. This balance is may be positive (called trade surplus)

or negative (or trade deficit). Positive net exports add to the country's aggregate income whereas negative balance reduces it as it constitutes an expenditure leakage abroad. This is also evident in the national income equation,

$$Y = C + I + G + (X - M),$$

where, C, G and I are the components of domestic spending. The right-hand side is the flow of aggregate expenditure and the left hand side shows equal aggregate income.

THE IMPORT AND EXPORT FUNCTIONS

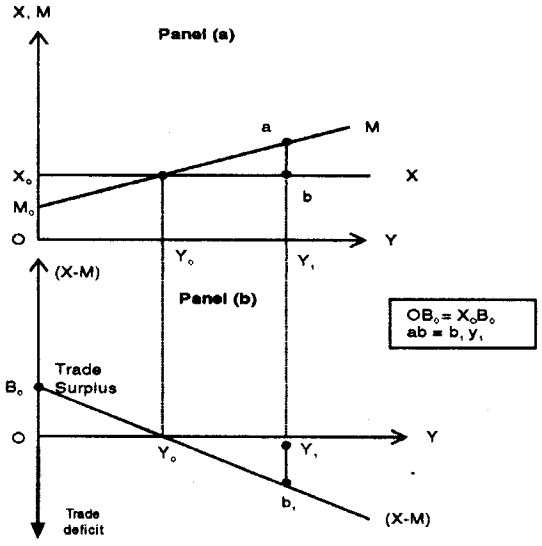
As income increases, spending also increases and a part of the increase in spending is expected to be for imports. Expenditure on imports will depend upon the preference of the public for imported goods, the need or demand for the business units for imported materials and capital goods and the requirements of the government for imports. Government requirement for imports could be partly for itself (like defence equipment, paper for currency, satellite systems, broadcasting equipment, railway wagons and engines, submarines etc.) or for industry and the public through canalized imports. A positive relationship is generally expected between the level of income and imports and for the sake of simplicity we assume it to be linear. The import function MoM is shown in **Figure 7.11**. The import function (looking like consumption function) has an intercept on the y-axis showing that at zero income level (only a theoretical possibility) there are still some imports Omo which are indispensably required (e.g. food and defence imports) by the country. It has a positive slope called the marginal propensity to import (m), which is defined as the ratio between change in income and the resulting change in imports. The algebraic expression of the import function is

$$M = Mo + mY, \text{ in which}$$

$$m = \Delta M/\Delta Y \text{ (marginal propensity to import).}$$

FIGURE 7.11

The Import, Export and Trade Balance Functions



The exports of a country depend on the level of income and demand in the foreign or importing countries rather than the income of the exporting country, so that the export function XoX is invariant with respect to income.

When the income of a country, e.g. the US, shrinks, countries like India and those in Europe face decline in their exports to the US which is a major importer of their products. Similarly, boom conditions in the US create additional export opportunities for other countries.

Panel (b) of the **Figure 7.11** given the trade balance function, which is derived from Panel (a) by vertically subtracting M function from the X-function. For that reason, vertical distance between M and X functions in Panel (a) equals vertical distance between y-axis and trade balance function (x - M) in Panel (b) for a particular level of income. That is, for income level Y1, ab = 1b1Y. At income level Yo, X and M are equal and trade balance is nil. To the left of this level, there is trade surplus and to the right of it trade deficit and it goes on increasing as income expands.

Interdependence Between Imports and Exports

It is again a simplifying assumption that imports and exports are independent functions. There is interdependence between imports and exports which can be seen both in theory and practice. Theoretically, an increase in exports brings about a multiple increase in the level of income (as seen in the following sections), which in turn leads to increase in imports, depending upon the value of marginal propensity to import. In actual practice, export-import policies in a number of countries provide for import of raw materials, intermediates and capital goods against pre-determined standards of export performance. In countries where quota system is prevalent for specified categories of industrial goods, exports are encouraged through higher quota entitlements.

Similarly we can expect exports to rise as a result of increase in imports. Theoretically, higher imports in country A mean increased exports of other countries which raises their incomes in a multiple manner. The rise in income would increase their imports (depending upon their respective marginal propensity to import) meaning thereby increased demand for A's exports. The process presumes good trade relations between the countries. However, the interrelationship between exports and imports is lagged and calculation of precise relationship between the two would require an empirical investigation using business econometrics, or other statistical methods.

The Determination of Equilibrium Level of Income

In the four-sector model, total spending equals domestic spending (C + I + G) plus net foreign spending (X - M). That is,

$$Y = C + I + G + (X - M)$$

or, $Y = Co + c(Y - T) + I + G + X - (Mo + mY)$

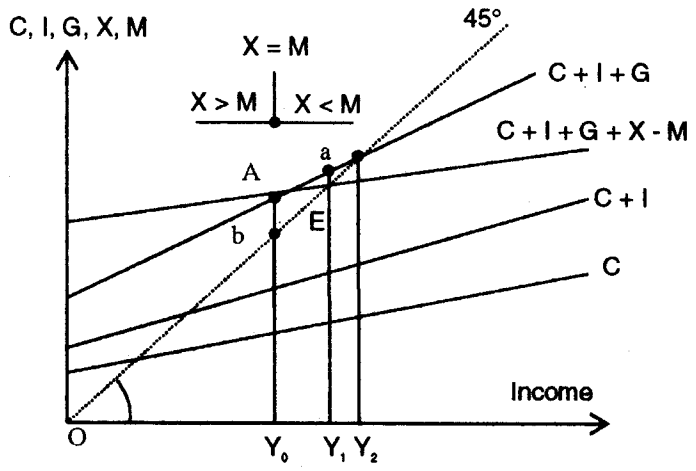
Where $C = Co + c(Y - T)$, $Y - T$ being disposable income after taxes.

And $M = Mo + mY$ (as above)

The graphical determination of income is shown in the **Figure 7.12.**

FIGURE 7.12

Equilibrium Level of Income in the Four-Sector Model: Equilibrium with Trade Deficit



Equilibrium is achieved at point E where aggregate spending (C + I + G + X - M) cuts the 45° line. At this point all the components of aggregate expenditure sum up to the equilibrium income of OY_1. At any point below OY_1 there is excess of spending over income, which causes pressures for output and income to rise. On the other hand, for income levels above OY_1, spending is less than the income, which creates pressure for the output and income to fall. Eventually, the system settles at E.

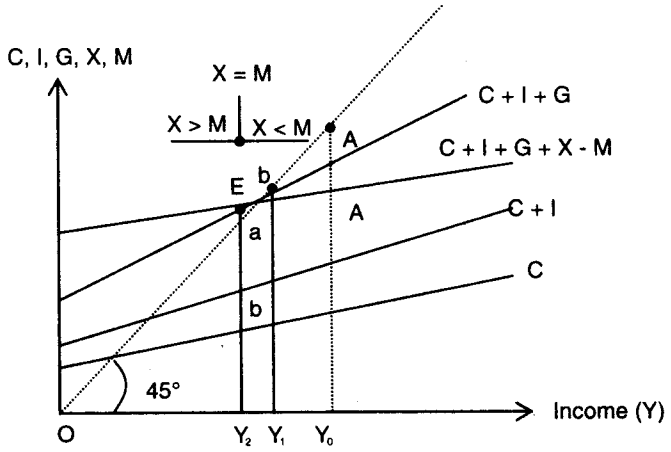
It must be noted that at this equilibrium level, the economy sustains a trade deficit (M > X) of the amount Ea. The income is high enough to cause imports to exceed exports. Trade balance occurs at point A where income is OYo but this is not an equilibrium position since aggregate spending exceeds income by Ab. Beyond OYo, rising income causes imports to rise above export level and create a deficit. The analysis shows that an open economy may have to live with a trade deficit even in equilibrium. In the absence of foreign trade, the equilibrium level of income would have been higher at OY_2.

This case shows that the trade deficit is responsible for lowering the level of income. If the economy had a trade surplus at the equilibrium level of income, then equilibrium income level would be higher in the four-sector model (as compared to the three-sector model) due to the positive contribution of the trade surplus (Ea) to income. This is shown in **Figure 7.13** where $OY_1 > OY_2$.

Using the same apparatus, equilibrium level of income would be achieved with trade balance when the point of intersection of C + I + G and C + I + G + (X - M) functions lies on the 45° line.

FIGURE 7.13

Equilibrium Level of Income in the Four Sector Model: Equilibrium with Trade Surplus



Effect of Changes in Exports and Imports on the Equilibrium Level of Income

Exports of a country may change as a result of changes in the price or product competitiveness or in the incomes abroad. It may also be due to innovative market strategies and tapping of the hitherto untapped foreign markets by the exporters. Similarly, imports may change as a result of import liberalization, change in tariff rates, and better quality or lower price of imports. Changes on both the sides affect the equilibrium level of income as exhibited in **Figure 7.14** below:

FIGURE 7.14 (a)

Effect of an Autonomous Increase in Exports on Equilibrium Level of Income

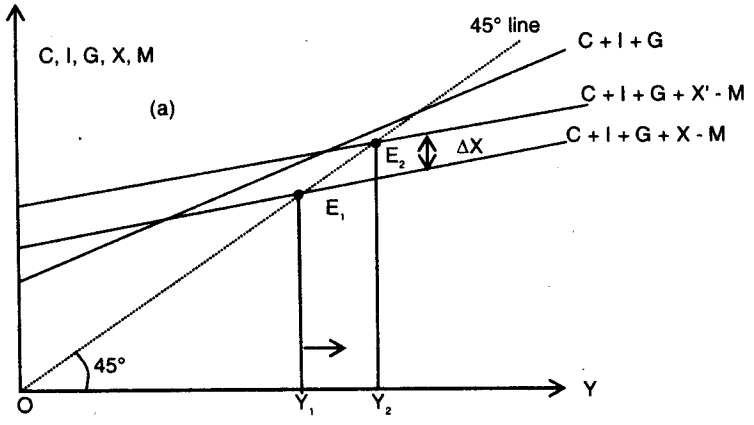
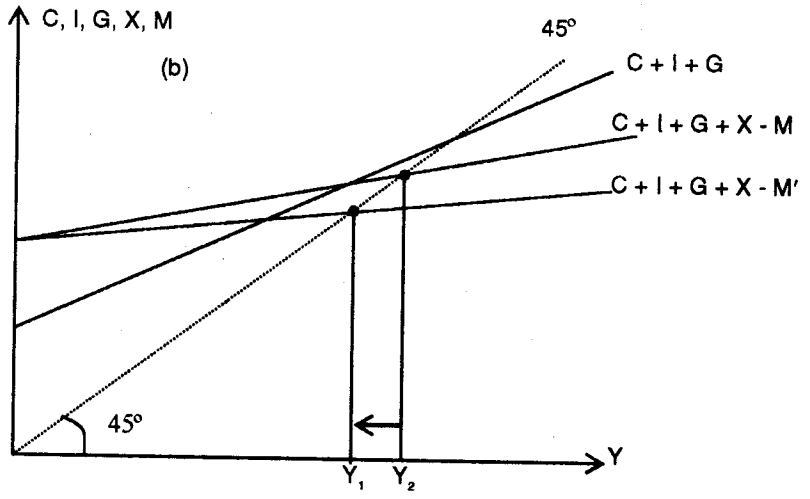


FIGURE 7.14 (b)

Effect on an Increase in Imports (through a rise in the marginal Propensity to import) on Equilibrium Level of Income



The Figure omits C and I functions for the sake of simplicity and neatness. An increase in exports by X (Panel a) raises the function C + I + G + (X - M) to C + I + G + (X' - M) raising the level of equilibrium income from OY_1 to OY_2. The increase in income is determined by the size of the foreign trade multiplier, which is explained in the following sections. An opposite effect will be produced if the export level falls. In this particular case, trade deficit exists at both OY_1 and OY_2 levels of income but deficit at OY_2 is lower due to increased exports. At OY_2 imports are also higher, but increase in imports is less than the increase in exports so that the trade deficit is smaller.

Panel (b) shows the impact of the rise in import function which equivalently rotates the C + I + G + X - M function clockwise to the new position C + I + G + X - M on the equilibrium income. As shown, income falls from OY_1 to OY_2 because of the larger expenditure leakage caused by increased imports. The higher the marginal propensity to import, the higher would be the contraction in income, other things being equal.

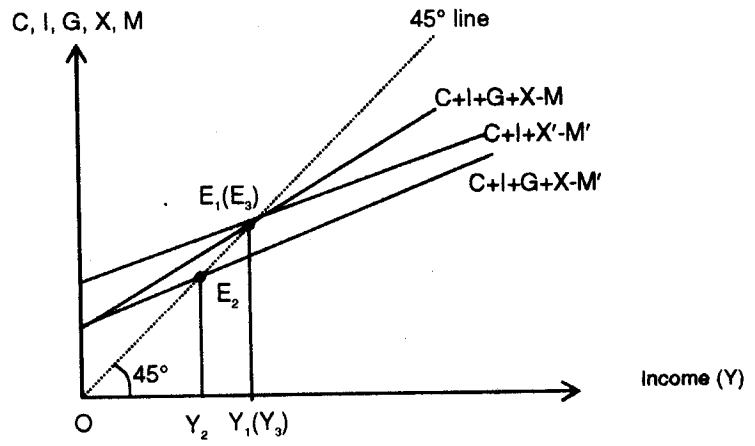
Let us now examine the combined impact of changes in exports and imports that may take place simultaneously. This case recognizes the interdependence of exports and imports where changes in imports is accompanied by changes in exports or vice versa.

Figure 7.15 presents the case of impact of simultaneous changes in imports and exports on the equilibrium level of income. To show the operational part of the Figure, C, I and C + I + G functions are omitted for clarity of exposition. Corresponding to the spending function C + I + G + (X - M), equilibrium level of income is OY_1. As marginal propensity to import increases, the spending function shifts to C + I + G + (X - M') lowering the equilibrium income to OY_2. At this stage, if exports increase automatically by an amount that exactly offset the negative impact

of increase in imports, than the new spending function will be C + I + (X - M') which is parallel to C + I + (X - M') which re-establishes the equilibrium EI and the new equilibrium income OY3 is the same as OY1. If exports increase by a larger amount, OY3 would be greater than OY1.

FIGURE 7.15

Effect of Simultaneous Changes in Exports and Imports on Equilibrium Level of Income



FOREIGN TRADE MULTIPLIER

A given increase in exports causes a multiple increase in the level of equilibrium income, the increase depending upon the size of the foreign trade multiplier. Foreign trade multiplier (kf) is defined as the ratio between increase in exports (Δx) and increase in income (ΔY)

That is, $k_f = \Delta Y/\Delta X$

The value of the multiplier can be easily derived in terms of marginal propensity to consume and marginal propensity to import.

As already explained, consumption (C) is a function disposable income (Y-T), or

$C = Co + c (Y - T)$ .....(1)

Where c is marginal propensity to consume (MPC). Import function, as described above is:

$M = Mo + mY$ .....(2)

As already explained,

equilibrium level of income is given by $Y = C + I + G + (X - M)$

Substituting the values of C and M from (1) and (2),

$Y = Co + c(Y - T) + I + G + X - (Mo + mY)$

or, $(1 - c + m)Y = Co - cT + I + G + X - Mo$

$$Y = \frac{1}{1-c+m}(C_o - cT + I + G + x - M_o)$$

Or $$Y = \frac{1}{1-c+m}X + \frac{1}{1-c+m}(-cT + I + G - M_o) \quad \ldots\ldots (3)$$

Let X increase to X + ΔX so that y increases to Y + ΔY. Then,

$$Y + \Delta Y = \frac{1}{1-c+m}(C_o - cT + I + G - M_o) + \frac{1}{1-c+m}(X + \Delta X) \quad \ldots\ldots\ldots (4)$$

(4) - (3) gives,

$$\Delta Y = \frac{1}{1-c+m}\Delta X$$

or $\frac{\Delta Y}{\Delta X} = \frac{1}{1-c+m}$, which measures foreign trade multiplier (k_f) in terms of marginal prosperity to consume and marginal propensity to import. Thus, if c = 0.7 and m = 0.1 then,

$$k_f = \frac{\Delta Y}{\Delta X} = 1/(1 - 0.7 + 0.1) = 2.5,$$

which means than if exports rise by Rs. 4 billion, national income would rise by Rs. 10 billion. The higher the value of c, the higher would be the value of the multiplier. Similarly, the lower the value of m, the higher would be the value of the multiplier. The model suggests that if the impact of exports on income is to be increased, government should adopt measures to raise MPC (c) and lower MPM (m).

IMPLICATIONS FOR THE CORPORATE MANAGER

The four-sector income determination analysis contains a number of implications for corporate strategy. The analysis strengthens the understanding of the business manager with regard to the nature of import and export functions and their link with national income, which determines market potential for the products of the business organization. It enables the manager to anticipate changes in imports (subject of course to the limitations of the parameters of export-import policy) resulting from changes in income.

A change in the level of imports has certain strategic implications for a business organization. If the product lines of the organization are close substitutes of the import goods, it will have to restrategise itself against import competition both on price and quality. Such imports have the potential to alter the sectoral environment. Free imports of automobile tyres, for example, can be a great challenge to producers using traditional or obsolete technology and might force them to effect technological improvements in their production processes through direct import of technology or by negotiating a foreign collaboration.

At the macro level, any sharp rise in imports is expected to reduce national income at least in the short run. Since increased expenditure on foreign goods straight away means loss of demand for domestic output, conditions of recessions might set in if import levels are high and cut across a large number of product lines. The overall slowdown in domestic income would hit more severely the firms which face high-income elasticity of demand for their products. Electrical gadgets, entertainment electronics (like music systems), fashion garments, cosmetics, automobiles, cell phones, air-conditioners are typical examples of products with high-income elasticity of demand. Competition generally intensifies when market size tends to shrink. Corporate managers therefore have to keep a watch on the export-import policies of the government and consumer preferences for imported goods. Business economists generally have a working estimate of the impact of changes in import levels on national income demand and state of competition. Similarly, impact on domestic income and consumption and state of market competition.

Key Terms

Balance budget Multiplier
Balanced budget theorem
Capital goods
Closed economy
Consumption function
Crowding out effect
Disposable income
Dynamic multiplier
Factor incomes
Foreign trade multiplier
Investment multiplier
Marginal propensity to Consume
Marginal propensity to Import
Net exports
Tax multiplier
Trade deficit
Trade surplus
Transfer payments

Supplementary Readings

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Long Questions

1. Explain the process of income determination in a two-sector model. What is the role of investment multiplier? On what factors does the value of the multiplier depend?
2. What is effect of changes in investment and government expenditure on national income? What is the significance of this relationship in managerial decision-making?
3. Explain dynamic multiplier action. What are the limitations of the process? What implications' can a business manager draw for his corporate decisions?

4. What is Balanced - Budget Theorem? How does it enhance the understanding of a business manager regarding the operation and effect of fiscal policy?
5. Explain the process of national income determination in an open economy. What is the mechanism of foreign trade multiplier? What should an export-oriented firm learn from this mechanism?
6. How do changes in exports and imports affect national income? From this relationship, explain how trade liberalisation is expected to influence economic growth in a country like India.

Short Questions

1. How is national income determination a 'process'?
2. Give a numerical and graphical illustration of the relation between consumption function and the savings function.
3. Explain the concept of autonomous investment. How is it different from induced investment?
4. What is investment multiplier? How does it work?
5. What is marginal propensity to consume? What is its relation with investment multiplier?
6. Distinguish between static and dynamic multiplier.
7. What is tax multiplier? Give a numerical illustration.
8. What is Balanced Budget Theorem? What message does it give to the government for budgetary policy?
9. What can a business manager learn from the process of national income determination?
10. What is 'crowding out' effect of public investment?
11. What is foreign trade multiplier? On what factors does its value depend?

Practical Assignments

1. Study the national accounts statistics of India and estimate the value of investment multiplier from the given data. Compute this value over the last few years and make a presentation to the class commenting on the trend of multiplier values.
2. Hold a panel discussion on 'How can a Business Manager Enrich his Understanding of the Growth of an Economy from the Point of View of Corporate Decision-making?' by studying the process of income determination. Hold a subsequent class discussion on the limitations of this process.
3. Compile the macroeconomic data on national income, public expenditure and taxes over the last few years and highlight interrelations between these variables using standard concepts given in the Chapter. Discuss the results in the class.
4. From India's macroeconomic data, prepare a trend of import intensity and export orientation of the economy our the past few years. Comment on the relation between foreign trade and national income and make an attempt to estimate the value of foreign trade multiplier. Draw lessons for an export-oriented firm.