4

C H A P T E R

NATIONAL INCOME DETERMINATION

NAGGING QUESTIONS

Q1. Can a rich man in the economy help others earn better or not? Do his economic actions impact others?

Q2. Could increased sales of your father's company could mean additional hiring of employees and hence, increased level of income in the economy?

Q3. From where did we get additional sales? Can it be made effective without people spending more?

Q4. Cake can be made bigger by increasing one or more of its ingredients. Similarly, level of national income can be raised by changing level of its constituents. What are these factors that determine level of national income?

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INTRODUCTION

National income accounting provides us with ex-post data about national income but Keynes' National Income determination is useful to predict its level at the onset of financial year. In order to explain the level and determinants of national income, economic models are constructed. One such model is Keynes' model, which is dealt with, in this chapter.

The production of output takes place in an economy if there is demand in the economy. As we have seen in last chapter demand for output comes from four sectors viz. households, firms, government and rest of the world and their respective expenditures are consumption expenditure, investment expenditure, government expenditure and net exports.

$$AE = C + I + G + NX$$

where,

C, Consumption spending by households

I, Investment spending by businesses and households

G, Government purchase of goods and services

NX, foreign demand for our goods and services

For our model, in this chapter, these expenditures are only 'intended' or 'planned' or 'desired'. Based upon these desired spending one can determine level of GDP for an economy.

The determination of national income, and understanding the factors that determine level of GDP, becomes the objective of this chapter. Keeping this in mind, this chapter is divided into four sections. Each section is devoted to understanding of model containing different sectors of an economy. This chapter has following sections:

- In first section, two-sector model is being discussed along with concept of multiplier.
- The second section deals with three sector model. It introduces the concepts like Budget surplus, impact of Government purchases and taxes, automatic stabilizers, and Balanced Budget Multiplier.
- Four-sector model is explained in the third section of this chapter.
- In the last section, the changes in the equilibrium level of income are discussed.

Assumptions relevant to all models in this chapter

The following assumptions are implicit in all the models explained in this chapter:

- *Prices are Fixed:* The modelling of economy considered here, does not take into account change in prices and its impact.
- *Short Run:* The analysis of goods market pertains to short run as prices are fixed.

4.1 TWO-SECTOR MODEL

In this section, we will assume that there are only two sectors in the economy *viz.* households and firms. For the sake of simplicity, we assume that there is no government expenditure and economy is a closed economy *i.e.* it has no links with rest of the world. In two sector model, the demand for the output is made on two accounts: consumption and investment. So, aggregate expenditure (AE) in the economy is sum of desired consumption expenditure and desired investment expenditure.

$$\boxed{AE = C + I}$$

4.1-1 Consumption

According to Keynes' Psychological law of consumption, "Men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in income". In other words, Consumption depends upon current income. Income is used for consumption purposes and rest is saved and so for this reason, change in consumption is always smaller than change in income. Aggregate consumption of the economy is aggregate of consumption by all individuals in the economy. Consumption of an individual depends on his/her disposable income. The disposable income is the income remaining after paying tax liabilities. The relationship between consumption and income can be written as :

$$C = \overline{C} + cY^d,\ 0 \le c \ge 1,\ \overline{C} > 0 \qquad (4.1)$$

Where, C is consumption expendiure dependent upon disposable income (Y^d). Since, in two sector model there is no government so there are no taxes to be paid. Therefore, $Y^d = Y$. $\overline{C}$ is autonomous consumption expenditure. $\overline{C}$ is the level of consumption when income level is zero. This is consumption financed out of savings. Since consumption and income are positively related, the coefficient of Y^d (c) is positive. 'cY^d' component is induced part of consumption i.e. consumption responds to changes in level of income.

This coefficient (c) is greater than zero since change in income brings about positive change in consumption, and is less than or equal to change in income since no one can consume more than one's income. Even if such a option is prevalent for an individual i.e. to borrow from the market; it is not possible for the entire economy. Hence, restriction on 'c' seems valid. The consumption function has a positive intercept $\overline{C}$ and slopes upward at a constant slope given by 'c'. The consumption function is plotted in fig. 4.1.

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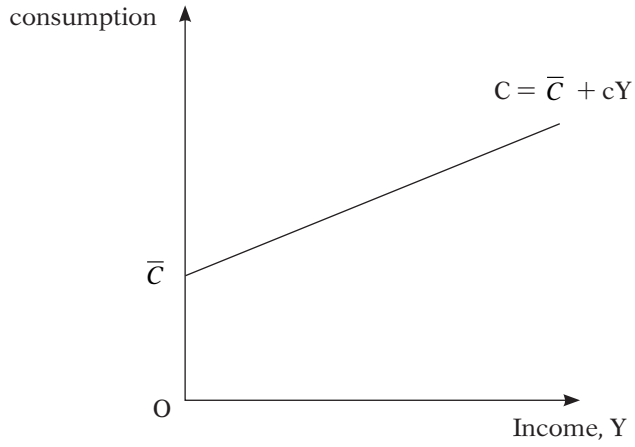

Fig. 4.1 : Consumption Function

Consumption function is given as C = $\overline{C}$ + cYd. Consumption is a linear function of disposable income with intercept $\overline{C}$ and slope c (MPC)

Marginal propensity to consume (c)

The rate at which consumption changes to change in level of income is given by:-

$$\frac{\Delta C}{\Delta Y} = \{derived\ from\ differentiating\ consumption\ function\ w.r.t.Y\} \tag{4.2}$$

'c' is referred to as marginal propensity to consume i.e. it shows that by how much change in consumption take place for one unit increase in income. It is also slope of consumption function.

Average Propensity to Consume

On the other hand, the ratio of consumption to total income is referred to as Average propensity to consume. It is given as:

$$\text{Average Propensity to Consume} = \frac{C}{Y}$$

It shows consumption as the fraction of total income. Imagine a consumer's income is ₹ 100 and he spends ₹ 80 out of it. Then, his Average Propensity to consume is 0.8 (₹80/₹100). If his income increases to ₹ 200 and he consumes ₹ 160, then his Marginal Propensity to consume is (also) 0.8 ($= \frac{160-80}{200-100}$). At this new level of income, his average propensity to consume is again 0.8 (₹ 160/200). Will it be always the case that average propensity to consume is equal to marginal propensity to consume? What if consumer had initial consumption of ₹ 75 instead of ₹ 80? Will the two values differ?

4.1-2 Savings function

As we know from Keynes' Psychological law of consumption that income is either consumed or saved. The income not consumed is saving:

i.e. Y=C+S

S=Y-C

where, S is saving

Plugging the value of consumption, we get:

$$S = Y - \overline{C} - cY$$

$$\Rightarrow S = -\overline{C} + (1-c)\,Y$$

$$\Rightarrow S = -\overline{C} + s\,Y\ ;\ \{s=1-c\} \tag{4.3}$$

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where, 's' is marginal propensity to save. Since, change in income brings change in consumption and/ or change in savings:-

$$\Delta Y = \Delta C + \Delta S$$

Dividing both sides of above equation by ΔY, we get:

$$\frac{\Delta Y}{\Delta Y} = \frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y}$$

$$\Rightarrow 1 = \frac{\Delta C}{\Delta Y} + \frac{\Delta S}{\Delta Y}$$

$$\Rightarrow 1 = mpc + mps$$

$$\Rightarrow 1 = C + S \qquad (4.4)$$

Or equivalently, 1-c = s

where, c is Marginal Propensity to consume (mpc)

s is Marginal Propensity to save (mps)

Marginal Propensity to save (mps) shows increase in savings per unit increase in income.

Sum of marginal propensity to consume and marginal propensity to save is always unity. Because consumption depends on income and whatever in not consumed is automatically saved; so saving are also function of current income. The corresponding saving function is show in panel (b) of fig. 4.2.

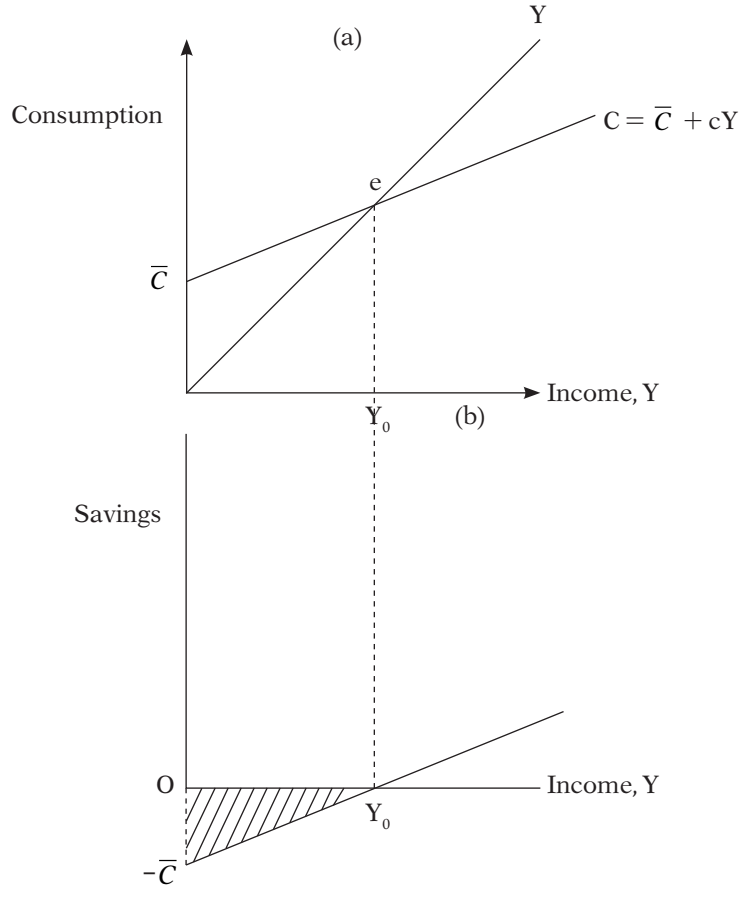

Fig 4.2 : Saving function for a corresponding consumption function

From the panel a, Saving function is plotted in panel b. S = - $\overline{C}$ + (1 - C)Y or S = - $\overline{C}$ + sY. It's intercept is - $\overline{C}$ and slope is s (MPS) equal to (1 - MPC). The point Y_0 there are dis-saving shown by the shaded area. Beyond Y_0, savings are positive (S = Y -d).

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Till the point income is less than consumption, there are dis-savings. When income is zero, consumption is positive (as shown in Fig 4.2 (a)), consumption is $\overline{C}$ and saving are $-\overline{C}$. This amount to saying that consumption is financed from dis-savings. As income increases dis-savings fall (or savings increase). At income level-OY_0, income is equal to consumption and hence, savings are zero. Beyond OY_0, income exceeds consumption and there are additions to the savings. Savings function starts with a negative intercept equal to the amount of autonomous consumption and slopes upward (as in panel (b) of 4.2). Its slope is marginal propensity to save.

Consumption and savings depend directly upon disposable income.

Average Propensity to save

The ratio of savings to total income is referred to as Average propensity to save. It is given as:

$$\text{Average Propensity to Save} = \frac{S}{Y}$$

It shows savings as the fraction of total income. Imagine a consumer's income is ₹ 100 and he spends ₹ 80 out of it. Then, his Average Propensity to save is 0.2 (₹ 20/₹ 100), he saves ₹ 20 out of his income ₹ 100.

Since, income is either spent or saved. Thus,

$$Y=C+S$$

Dividing both sides of above equation by Y, we get:

$$\frac{Y}{Y} = \frac{C}{Y} + \frac{S}{Y}$$

$$\Rightarrow 1 = \frac{C}{Y} + \frac{S}{Y}$$

$$\Rightarrow 1 = apc + aps$$

Thus, sum of average propensity to consume and average propensity to save is equal to unity.

4.1-3 Investment

Another expenditure head is investment. Desired investment, though, is function of interest rate; but for this section we will assume that it is exogenously fixed at a level for each level of income (and interest rate). Investment function is a horizontal line at $\overline{I}$ (as shown in fig. 4.3). $\overline{I}$ is called autonomous Investment because it does not change with the change in level of income.

Investment, $I = \overline{I}$

where $\overline{I}$ is autonomous investment expenditure.

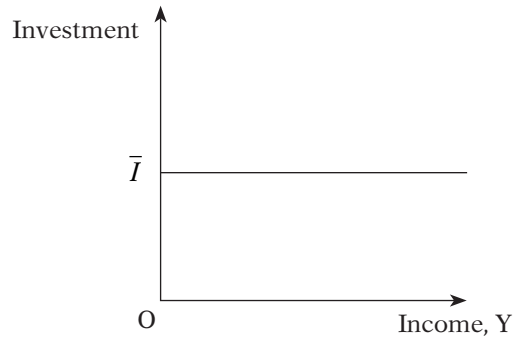

Fig. 4.3 : Autonomous investment

Investment is $\overline{I}$ which is autonomous in naure as it does not with the change in the level of income. That's why it is horizontal straight line, parallel to x axis.

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