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Income Determination

We have so far talked about the national income, price level, rate of interest etc. in an ad hoc manner – without investigating the forces that govern their values. The basic objective of macroeconomics is to develop theoretical tools, called models, capable of describing the processes which determine the values of these variables. Specifically, the models attempt to provide theoretical explanation to questions such as what causes periods of slow growth or recessions in the economy, or increment in the price level, or a rise in unemployment. It is difficult to account for all the variables at the same time. Thus, when we concentrate on the determination of a particular variable, we must hold the values of all other variables constant. This is a stylisation typical of almost any theoretical exercise and is called the assumption of *ceteris paribus*, which literally means 'other things remaining equal'. You can think of the procedure as follows – in order to solve for the values of two variables x and y from two equations, we solve for one variable, say x, in terms of y from one equation first, and then substitute this value into the other equation to obtain the complete solution. We apply the same method in the analysis of the macroeconomic system.

4.1 Ex Ante and Ex Post

In the chapter on National Income Accounting, we have come across terms like consumption, investment, or the total output of final goods and services in an economy (GDP). These terms have dual connotations. In Chapter 2 they were used in the accounting sense – denoting actual values of these items as measured by the activities within the economy in a certain year. We call these actual or accounting values **ex post** measures of these items.

These terms, however, can be used with a different connotation. Consumption may denote not what people have actually consumed in a given year, but what they had planned to consume during the same period. Similarly, investment can mean the amount a producer plans to add to her inventory. It may be different from what she ends up doing. Suppose the producer plans to add Rs 100 worth goods to her stock by the end of the year. Her planned investment is, therefore, Rs 100 in that year. However, due to an unforeseen upsurge of demand for her goods in the market the volume of her sales exceeds what

she had planned to sell and, to meet this extra demand, she has to sell goods worth Rs 30 from her stock. Therefore, at the end of the year, her inventory goes up by Rs (100 – 30) = Rs 70 only. Her planned investment is Rs 100 whereas her actual, or ex post, investment is Rs 70 only. We call the planned values of the variables – consumption, investment or output of final goods – their **ex ante** measures.

In a theoretical model of the economy the **ex ante** values of these variables should be our primary concern. If anybody wants to predict what the equilibrium value of the final goods, output or GDP will be it is important for her to know what quantities of the final goods people plan to demand or supply. We must, therefore, learn about the determinants of the ex ante values of consumption, investment or aggregate output of the economy.

Ex Ante Consumption: What does planned consumption depend on? People spend a part of their income on consumption and save the rest. Suppose your income increases by Rs 100. You will not use up this entire extra income but save a certain fraction, say 20 per cent, of it to build up a cushion of savings for the period when you cease to earn income, or for meeting large expenses in future. Different people plan to save different fractions of their additional incomes (with the rich typically saving a greater proportion of their income than the poor), and if we average these we may arrive at a fraction which will give us an idea of what proportion of the total additional income of the economy people wish to save as a whole. We call this fraction the **marginal propensity to save (mps)**. It gives us the ratio of total additional planned savings in an economy to the total additional income of the economy. Since consumption is the complement of savings (additional income of the economy is either put into additional savings or used for extra consumption by the people), if we subtract the mps from 1, we get the **marginal propensity to consume (mpc)**, which, in a similar way, is the fraction of total additional income that people use for consumption. Suppose, mpc of an economy is c, where $0 < c < 1$. If the total income of the economy increases from 0 to Y, then total consumption of the economy should be

$$C = c\,(Y - 0) = c.Y$$

However, it is not precisely so. We have forgotten something here. If the income of the economy in a certain year is zero, the above equation tells us that the economy has to starve for an entire year, which is, obviously, an outrageous idea. If your income is zero in a certain period you use your past savings to buy certain minimum consumption items in order to survive. Hence we must add the minimum or subsistence level of consumption of the economy in the above equation, which, therefore, becomes

$$C = \bar{C} + c.Y \qquad (4.1)$$

where $\bar{C} > 0$ is the minimum consumption level and is a given or exogenous item to our model, which, therefore, is treated as a constant. The equation tells us that as the income of the economy increases above zero, the economy uses c proportion of this extra income to increase its consumption above the minimum level.

Ex Ante Investment: Investment is defined as addition to the stock of physical capital (such as machines, buildings, roads etc., i.e. anything that adds to the future productive capacity of the economy) and changes in the inventory (or the stock of finished goods) of a producer. Note that 'investment goods' (such as machines) are also part of the final goods – they are not intermediate goods like

raw materials. Machines produced in an economy in a given year are not 'used up' to produce other goods but yield their services over a number of years.

Investment decisions by producers, such as whether to buy a new machine, depend, to a large extent, on the market rate of interest. However, for simplicity, we assume here that firms plan to invest the same amount every year. We can write the ex ante investment demand as

$$I = \bar{I} \tag{4.2}$$

where $\bar{I}$ is a positive constant which represents the autonomous (given or exogenous) investment in the economy in a given year.

Ex Ante Aggregate Demand for Final Goods: In an economy without a government, the ex ante aggregate demand for final goods is the sum total of the ex ante consumption expenditure and ex ante investment expenditure on such goods, viz. $AD = C + I$. Substituting the values of C and I from equations (4.1) and (4.2), aggregate demand for final goods can be written as

$$AD = \bar{C} + \bar{I} + c.Y$$

If the final goods market is in equilibrium this can be written as

$$Y = \bar{C} + \bar{I} + c.Y$$

where Y is the ex ante, or planned, supply of final goods. This equation can be further simplified by adding up the two autonomous terms, $\bar{C}$ and $\bar{I}$, making it

$$Y = \bar{A} + c.Y \tag{4.3}$$

where $\bar{A} = \bar{C} + \bar{I}$ is the total autonomous expenditure in the economy. In reality, these two components of autonomous expenditure behave in different ways. $\bar{C}$, representing subsistence consumption level of an economy, remains more or less stable over time. However, $\bar{I}$ has been observed to undergo periodic fluctuations.

A word of caution is in order. The term Y on the left hand side of equation (4.3) represents the ex ante output or the planned supply of final goods. On the other hand, the expression on the right hand side denotes ex ante or planned aggregate demand for final goods in the economy. Ex ante supply is equal to ex ante demand only when the final goods market, and hence the economy, is in equilibrium. Equation (4.3) should not, therefore, be confused with the accounting identity of Chapter 2, which states that the ex post value of total output must always be equal to the sum total of ex post consumption and ex post investment in the economy. If ex ante demand for final goods falls short of the output of final goods that the producers have planned to produce in a given year, equation (4.3) will not hold. Stocks will be piling up in the warehouses which we may consider as *unintended accumulation of inventories*. It is not a part of planned or ex ante investment. However, it is definitely a part of the actual addition to inventories at the end of the year or, in other words, an ex post investment. Thus even though planned Y is greater than planned $C + I$, actual Y will be equal to actual $C + I$, with the extra output showing up as unintended accumulation of inventories in the ex post I on the right hand side of the accounting identity.

At this point, we can introduce a government in this economy. The major economic activities of the government that affect the aggregate demand for final goods and services can be summarized by the fiscal variables Tax (T) and Government Expenditure (G), both autonomous to our analysis. Government, through its expenditure G on final goods and services, adds to the aggregate

demand like other firms and households. On the other hand, taxes imposed by the government take a part of the income away from the household, whose disposable income, therefore, becomes $Y_d = Y - T$. Households spend only a fraction of this disposable income for consumption purpose. Hence, equation (4.3) has to be modified in the following way to incorporate the government

$$Y = \bar{C} + \bar{I} + G + c(Y - T)$$

Note that $G - c.T$, like $\bar{C}$ or $\bar{I}$, just adds to the autonomous term $\bar{A}$. It does not significantly change the analysis in any qualitative way. We shall, for the sake of simplicity, ignore the government sector for the rest of this chapter. Observe also, that without the government imposing indirect taxes and subsidies, the total value of final goods and services produced in the economy, GDP, becomes identically equal to the National Income. Henceforth, throughout the rest of the chapter, we shall refer to Y as GDP or National Income interchangeably.