UNIT 9 CLASSICAL AND KEYNESIAN SYSTEMS*

Structure

9.0 OBJECTIVES

After going through this Unit, you should be in a position to

- bring out the salient features of classical economics;
- explain the demand for and supply of labour with the help of diagrams;
- explain the relationship between output and real wages;
- explain the concept of aggregate supply curve as per classical view;
- bring out salient features of Keynesian economics; and
- distinguish between classical and Keynesian views on the macroeconomy.

9.1 INTRODUCTION

During the 1930s the world economy was passing through severe economic crisis – there was widespread unemployment, unintended accumulation of inventories, and persistent decline in prices, output and income. The overall economic atmosphere was pessimistic. This period is termed as 'the Great Depression', because of the extent and duration of the downslide in global economic environment. There have been periodic decline in output and employment in countries; however the severity of the Great Depression is un-matched in economic history. Prevalent economic theory around that time was neither in a position to explain the ongoing developments nor to provide a solution to the problem.

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In the midst of the Great Depression, J M Keynes came up with the book, '*The General Theory of Employment, Interest and Money* (published in 1936)', which provided fresh insights to the problem. Keeping in view its radical nature of analysis, fundamentally different explanations, and distinct remedial measures it is often termed as 'Keynesian Revolution.

The Keynesian ideas further developed into a vast literature during the next three decades, which provided further insights and a new school of thought, the Keynesian economics. It was only during the 1970s that Keynesian economics lost its glory and gave way to a new school of thought, the New Classical Economics, which was a revival of classical economics. In this Unit we will discuss the salient features of classical economics and Keynesian economics.

9.2 THE CLASSICAL APPROACH

Keynes termed all economists prior to him as 'classical'. The classical period, generally taken as the period before 1930, was dominated by the work of Adam Smith (*Wealth of Nations*, 1776), David Ricardo (*Principles of Political Economy*, 1817) and John Stuart Mill (*Principles of Political Economy*, 1848). Neoclassical economists such as Alfred Marshall and A. C. Pigou extended the classical ideas. Important features of the classical ideas are as follows:

(i) **Microeconomic Issues**: Classical economists dealt mostly with microeconomic issues pertaining to behavior of economic agents such as firms and households. In classical view, a firm maximizes its profits subject to a resource constraint. Similarly, households try to maximize their utilities or economic gains given their budget constraints. Classical economists believed in the optimising tendencies of the market mechanism. Variables such as price level, wage rate and output level should be determined by market forces (supply and demand).

(ii) **Laissez Faire**: Classical economists believed in the philosophy of 'laissez faire', which is a French term meaning 'leave alone' or 'let you do'. According to this view, there should be minimal intervention from the government in business affairs. In fact, Adam Smith suggested that government should confine itself to three main duties, viz., (i) national defense, (ii) administration of justice (law and order), and (iii) establishing and maintaining certain public works (infrastructure, education, etc.).

(iii) **Invisible Hand**: Adam Smith introduced the concept of the 'invisible hand'. According to him, the economy will function well if everyone pursues his/ her own interest. "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest."

Individuals pursuing self-interest seem to be led by an 'invisible hand' to maximise the general welfare of everyone in the economy. It is not the generosity of a producer in selling a commodity; it is his/her self interest. Similarly, I am not doing a favour to the producer; I am pursuing my own interest in buying the commodity. The philosophy of the invisible hand confined classical economists to the analysis of the behavior of economic agents; they failed to see any conflict between interest of economic agents and that of the economy as a whole.

(iv) **Continuous Market Clearing**: Classical economists assumed that prices and wage rates are flexible. As you know from microeconomics, equilibrium price is determined at the level where supply and demand are equal. Given the supply and demand curves, if demand is more compared to supply, price will increase. Similarly, if supply is more compared to demand, price will decrease. This principle applies not only to commodities, but also to wage rate. If supply of labour is more than its demand, there will be a decline in wage rate till supply of labour equates its demand. An implication of the above is that there is no unemployment in the economy – wage rate will decline till all workers are employed. There is no disequilibrium in the market.

(v) **Perfect Competition**: Classical economists assumed that there is perfect competition in the market so that markets function smoothly. As there is full employment (due to flexibility in wage rate), production is always at the full employment level. An implication of the above is that there is no scope for ups and downs in the level of output. Going by this logic, the classical economists ruled out the possibility of 'business cycle'.

(vi) **Say's Law of Market**: Classical economists believed that production or supply is the key to economic prosperity. Thus they emphasized more on the supply side of the economy. This approach is summarized very well in the Say's law, named after the prominent classical economist J B Say. According to J B Say, 'supply creates its own demand'. Whenever some production takes place, there is a stream of income in the hands of people, which generates demand. A person should have produced something to sell (say, for example, labour) and thereby earned certain income. Thus in the classical viewpoint, there is no scope of deficiency of demand in the economy. Therefore, primary concern before an economy is production or supply, not consumption.

According to classical economists, economic growth of an economy is due to increase in the factors of production and technological advancements. Money is just a medium of exchange; and it facilitates transactions among economic agents. According to classical economists, increase in money supply does not affect the level of output – it only leads to increase in prices. They believed that there is dichotomy between monetary variables such as money supply and real variables such as output and employment. Thus the classical economists stressed the role of real factors in deciding the real variables such as output and employment. As mentioned earlier, the classical economists believed in free market systems without government intervention. Determination of output, employment and interest rate in the classical system is given below.

9.3 OUTPUT AND EMPLOYMENT IN THE CLASSICAL SYSTEM

In the classical system, decision-making by economic agents such as firms and households was very important. Aggregation of output and employment over firms constituted total output and total employment. Similarly, aggregation of supply of labour by individuals constituted total labour supply in the economy.

9.3.1 Production Function

As you know from microeconomics, a production function gives the technological relationship between inputs and output. It can be written as

$$Y = F\left(L, \overline{K}\right)$$

where Y is the total product (TP) produced, L is the quantity of labour used in production, and $\overline{K}$ is the stock of capital (assumed to be fixed in the short run). It is assumed that in the short run the state of technology and capital stock cannot be changed; thus they are constant. Output varies according to the amount of labour employed. The change in output due to an additional unit of labour is known as Marginal Product of Labour (MP_L) and it is given by the expression

$$MP_L = \frac{\Delta Y}{\Delta L}.$$

We present the relationship between TP (given by Y in the figure) and MP_L in Fig. 9.1. We observe that Y increases at an increasing rate for certain initial units of labour employed. Subsequently the curvature changes and Y starts increasing at a decreasing rate (point a). At point b, TP is at its maximum level; at this level of output MP_L touches zero.

The underlying idea is that as the amount of labour increases, MP_L of the additional labour remains positive but is lower than that of the labour hired previously.

When the TP starts falling, i.e., beyond point b, the MP_L becomes negative. You should note that MP_L is the *slope* of the TP curve. Classical economists assumed that the quantity of labour employed would be dependent upon the demand for and supply of labour in the labour market.

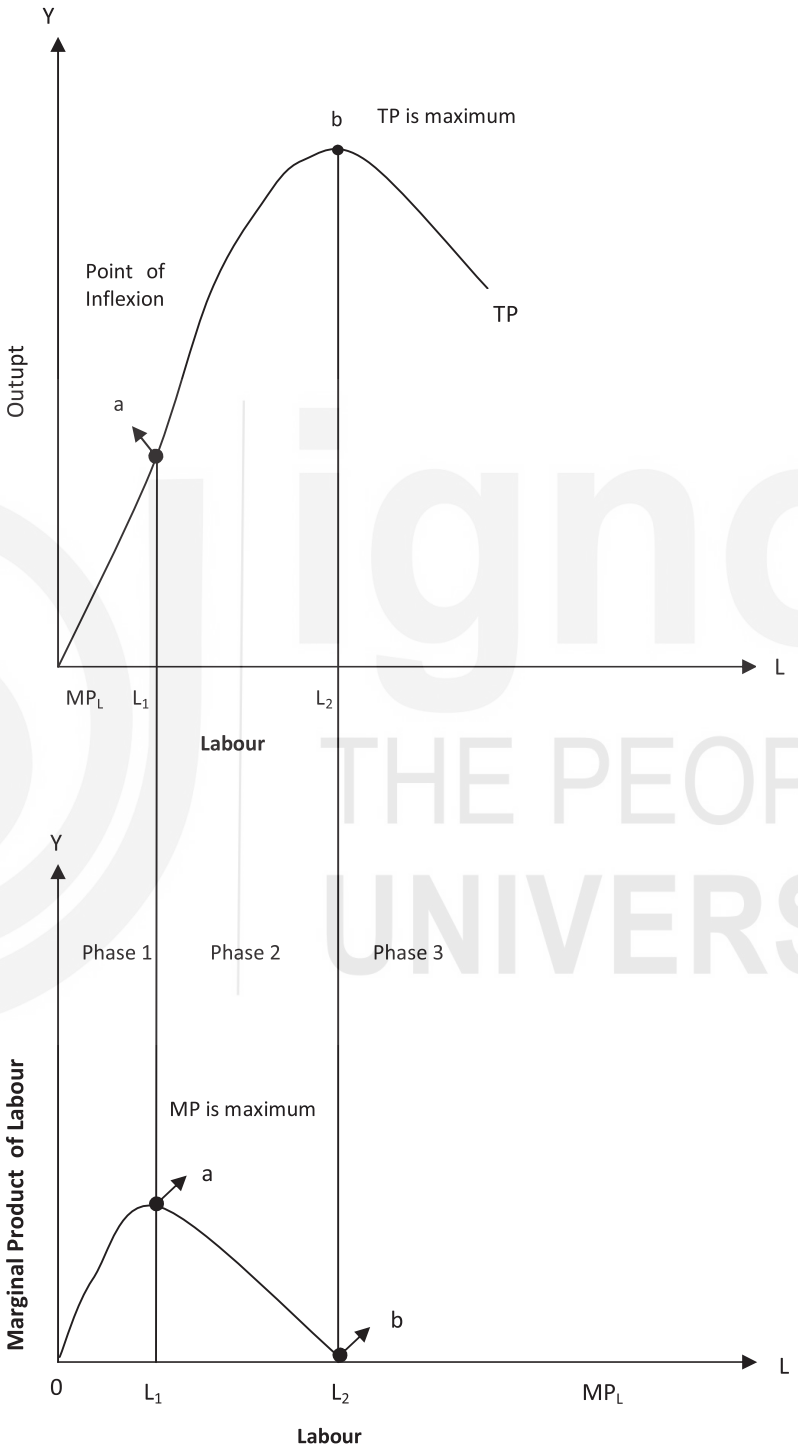

Fig. 9.1: Total Product and MP_L

9.3.2 Labour Demand

Labour is demanded because it contributes to production of goods and services; thus it is a derived demand. If the demand for commodity A increases, then the producer of commodity A will hire more labour. Labour as a factor of production carries an advantage as compared to capital – it is relatively easy to change the units of labour employed compared to capital.

Classical economists assumed that there is perfect competition in markets. In perfect competition, as you know, the firms are price takers – they cannot decide the price. Firms choose the output level at ongoing prices in order to maximize profits. Further, choice of the level of output and quantity of labour used are one decision. Now, the question is how a firm decides on the level of production, given the labour cost. A firm will increase output until the Marginal Cost (MC) of producing a unit of output is equal to the Marginal Revenue (MR) received from its sale. For such a firm, MR is equal to the price (MR = P). The MC will be equal to the ratio of wages (W) to the number of units of output produced by the additional unit of labour.

$$MC = \frac{W}{MP_L}$$

As per the condition for short run profit maximization, in perfectly competitive market, P = MC. Hence, $P = \frac{W}{MP_L}$, or, $\frac{W}{P} = MP_L$.

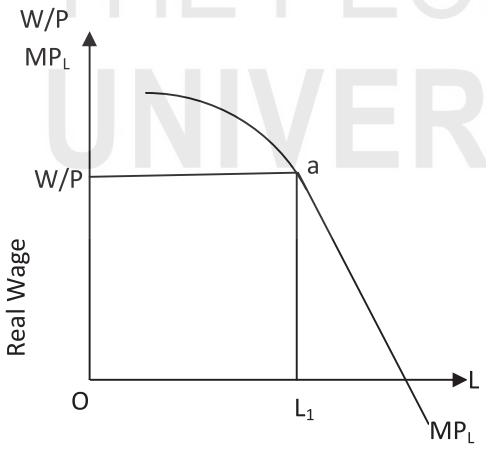

Fig. 9.2: Demand for Labour

Thus a firm will hire up to the point where the additional output obtained by hiring one more unit of labour (MP_L) is equal to the real wage (W/P) paid to labour. Fig. 9.2 shows this condition where employment (number of labour units) is depicted on the x-axis and real wage (W/P) is shown on the y-axis along with MP_L.

At point '*a*' in Fig.. 9.2 we observe that $\frac{W}{P} = MP_L$. To the left of point *a* we have $MP_L > \frac{W}{P}$ and to the right of point *a*, $MP_L > \frac{W}{P}$. The labour demand curve is downward sloping due to the law of diminishing returns. With an objective of profit maximization, the firm employs more labour when $MP_L > \frac{W}{P}$ and reduces the number when $MP_L < \frac{W}{P}$. The aggregation of the individual firms' demand curves for labour gives economy wide demand curve for labour.

So the aggregate labour demand function (L^d) can be written as

$$L^d = f\left(\frac{W}{P}\right)_{(-)}$$

The negative sign (–) in the expression indicates that a higher real wage rate is associated with a lower demand for labour.

9.3.3 Labour Supply

While maximizing their utility, individuals decide on the amount of work to put in and the amount of leisure to enjoy. It is assumed that work creates disutility (discomfort, uneasiness, or burden) in labour and there is a general preference for leisure to work. Economists use the term 'leisure' for all the activities which are off-the-job such as eating, sleeping, spending time with friends, etc. Because of its disutility, labour needs to be compensated for work with wage. Individuals weigh costs and benefits of working before deciding the number of hours to work.

There is a trade-off between income and leisure as income is earned through work which in turn reduces the leisure time. An individual has 24 hours in a day to allocate between work hours and leisure hours. Let us consider an example of an individual – (s)he has an option of working for 24 hours or spending all the day in leisure. S(he) chooses the combination of work and leisure which maximises her/ his utility given the wage rate and price level. Thus it is possible to substitute between work and leisure.

In Fig. 9.3, real income is measured on the x-axis, and real income/ real wage is measured on the y-axis. Real income is equal to real wage (W/P) multiplied by the number of hours the person works. Each vertical intercept represents zero leisure. In that case the real income will be [W/P × 24]. Indifference curves are labelled as U_1, U_2 and U_3. Points on these curves give various combinations of income and leisure which give equal satisfaction to the workers. The *slope of the indifference curve* gives the rate at which the person is willing to trade-off leisure

for income. The slope of the indifference curve implies the increase in income the individual would have to be paid, so that he gives up a unit of leisure. The cost of foregoing an hour of leisure is the real wage per hour, W/P.

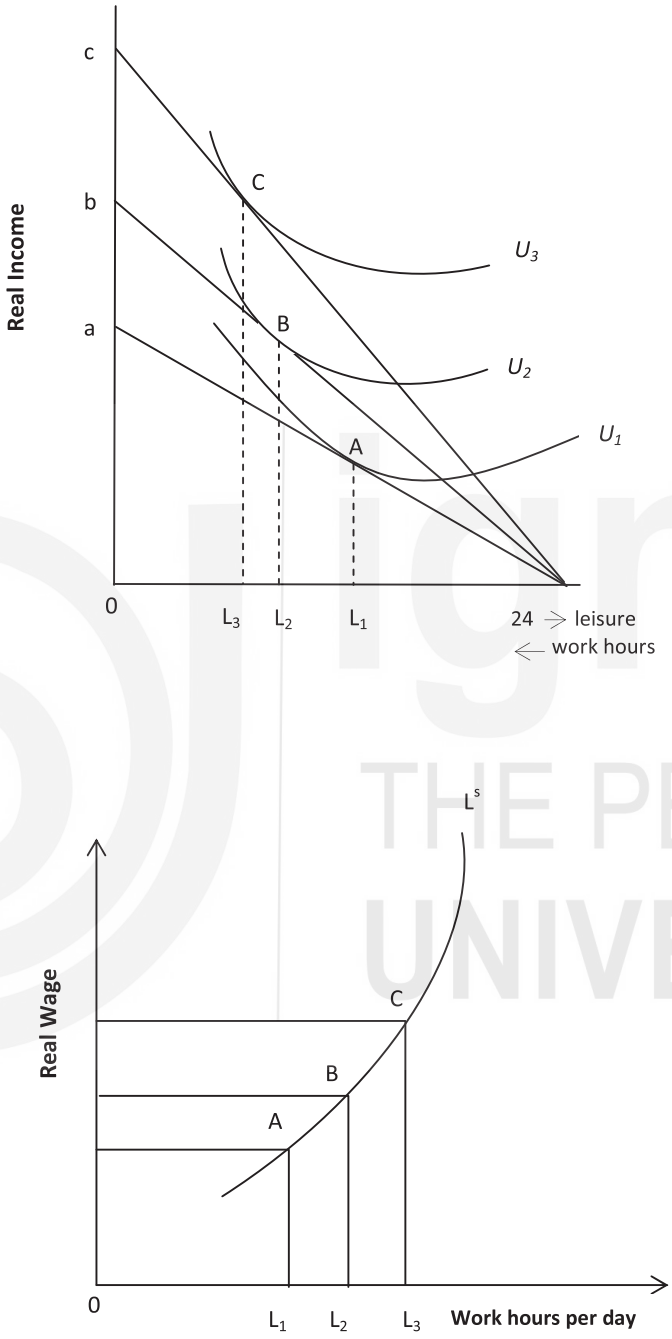

Fig. 9.3: Supply of Labour

The straight-line rays starting from point 24 on the horizontal axis give the budget lines facing the individual. The slope of these lines is real wage, W/P. Higher real wage rate makes the budget line steeper.

Three budget lines are shown in Fig. 9.3 representing three different real wage rates. In the bottom panel of Fig. 9.3 we plot the labour supply curve, which is upward sloping. We can say that labour supply is a function of real wage, which is given by

$$L^S = f\left(\frac{W}{P}\right)_{(+)}$$

The positive sign (+) in the above equation indicates that labour supply increases as real wage (W/P) increases. You should note that labour supply is determined by real wage and not money wage. Secondly, there are both 'substitution effect' and 'income effect' in the decision-making process of an individual on the number hours (s)he would work. As wage rate increases, a person works for more number of hours (substitution effect). Similarly, lower wage rate would discourage the person from work. Income of an individual depends on the number of hours (s)he works, multiplied by the wage rate. A higher wage rate implies higher income level for individuals. Suppose, person G is willing to work for 4 hours when wage rate is Rs. 100 per hour. When wage rate increases to Rs. 150 per hour (s)he is willing to work 6 hours a day. The first 4 hours which (s)he was willing to work at Rs. 100 per hours now pay him Rs. 150 per hour. Thus her/ his income increases from Rs. 400 to Rs. 900 per day! When her/ his income increases to a very high level, (s)he may actually decrease her/ his hours of work, and enjoy more leisure. This is similar to the 'income effect' in consumer demand theory. It is observed that at a very high an individual might reduce the work hours and increase leisure. This is a situation where the income effect is dominant. So, at very high wage rates, the labour supply curve assumes a negative slope and starts bending backwards towards the vertical axis.

Check Your Progress 1

1) Bring out the salient features of classical theory

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2) Explain the relationship of labour with output in the short run as per classical view.

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3) Derive the labour demand and labour supply curves.

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9.4 EQUILIBRIUM LEVEL OF OUTPUT AND EMPLOYMENT

So far, we have established the following relationships.

$$Y = F\left(L, \overline{K}\right)$$

$$L^d = f\left(\frac{W}{P}\right)_{(-)}$$

$$L^S = f\left(\frac{W}{P}\right)_{(+)}$$

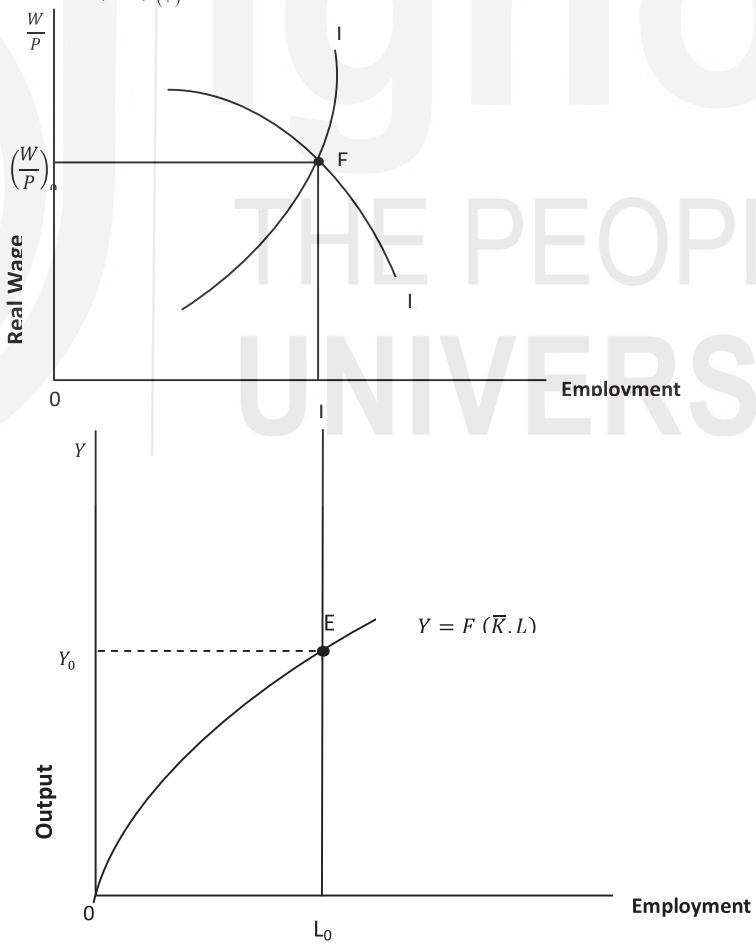

Fig. 9.4: Output and Employment Determination

Equilibrium condition in the labour market, i.e., $L^d = L^S$ along with production function determines the output, employment and real wage rate in the classical system. Fig. 9.4 depicts the equilibrium in the labour market, where Y_0 is output level, L_0 is employment level and $\left(\frac{W}{P}\right)_{(0)}$ is wage rate.

Output and employment are dependent on certain exogneous variables. You should note that exogenous variables are determined outside the model while endogenous variables are decided within the model. It is very simple to identify the exogenous variables which affect output and employment. We have used labour demand, labour supply and production function in Fig. 9.4 in order to determine output and employment. Thus, any variable that affects labour supply, labour demand and the production function will in turn affect the level of output and employment.

In the long run if there is a change in the capital stock, there will be a shift in the production function (because we assumed capital input to be fixed in the production function that we considered). Simlarly, if there is a change in technology, the production function will shift. In case of a shift in the production function, MP_L will change, which will shift the labour demand curve.

The labour supply curve however would depend upon a different set of variables – it will shift if there is change in the size of population and if the individuals' preferences change due to change in the labour-leisure trade offs. In the classical system, the levels of output and employment are dependent only on the supply-side factors.

Let us again consider labour supply and labour demand curves. We look at L^d and L^s as functions of money wage. We have an upward sloping labour supply curve, which is a function of money wage (W), assuming a given price level P_1.

Let us look at Fig. 9.5. We observe that different price levels give different labour supply curves. Each price level would mean, for a given money wage, a different real wage – hence a different labour supply curve.

Thus if money wage rate is constant, change in price level would result in a shift in the labour supply curve. As prices rise, the L^S curve shifts to the right. So, as prices go up and the money wage does not increase, the individual is left with a lower real wage and would like to reduce the amount of working hours. This can be observed from Fig. 9.5. As price level increases from P_1 to $2P_1$ and $3P_1$; and the money wage increases from W_1 to $2W_1$ and $3W_1$, the real wage remains unchanged.

$$\left[\frac{W_1}{P_1} = \frac{2W_1}{2P_1} = \frac{3W_1}{3P_1}\right]$$

This leads to the fact that employment will remain the same at L_1.

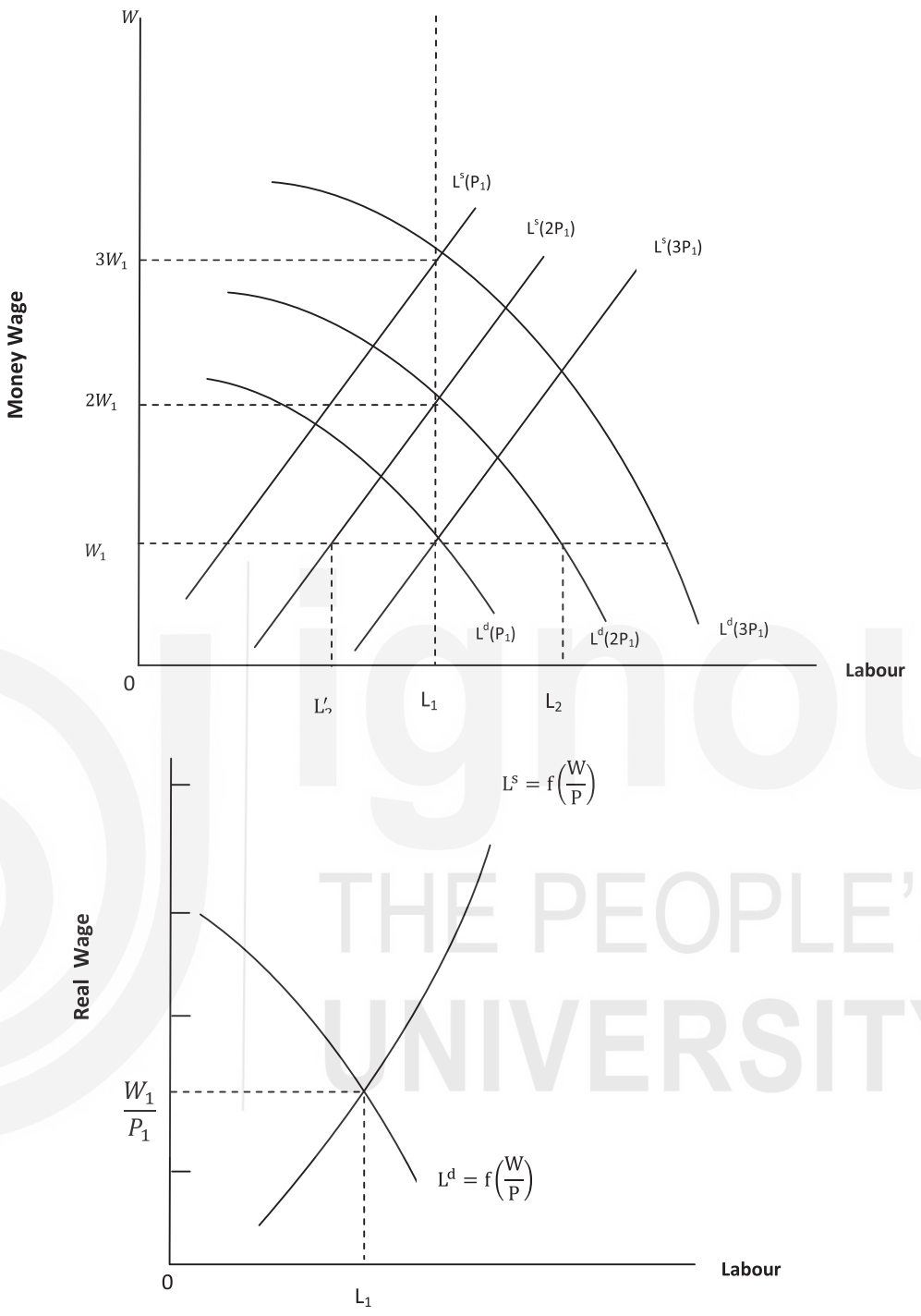

Fig. 9.5: Labour, Money Wage and Real Wage

Thus, proportional increases (or decreases) in both money wage and the price level leave the labour supply unchanged. Looking at the demand side, $\frac{W}{P} = MP_L$ we have $W = MP_L \times P$

Suppose money wage remains unchanged at W and price level increases from P_1 to $2P_1$ and then to $3P_1$ there is a decline in real wage more labour is demanded. Proportional increase in the money wage and the price level however will leave the labour demand unchanged at L_1.

9.5 AGGREGATE SUPPLY FUNCTION

The firm takes money wage as given while deciding its level of output. This, in turn, indicates the amount of labour to hire. As there are many firms, one firm's decision will not have any effect on the money wage level. As money wage is fixed, the output supply curve for the firm is positively sloped. Higher prices lead to more output as the real wage declines. At the economy level, however we cannot assume money wage rate to be fixed. Money wage rate must adjust in order to maintain the equilibrium between supply of and demand for labour. We observe from Fig. 9.5 that initial levels are: price level (P_1), money wages (W_1), employment (L_1), and output (Y_1). If P_1 increases to $2P_1$ and wage remains at W_1, the labour demand would increase to L_2. Higher prices will lead to lower real wage, so firms will demand more labour – it will result in expansion of output and employment. At $2P_1$, labour supply curve shifts to $L_S(2P_1)$. Therefore, the supply of labour at W_1 would be only L_2'. There is an excess demand for labour which is equal to $(L_2 - L_2')$ and hence the money wage will rise. Firms which do not increase the money wage experience a decline in availability of losing on labour. Wages will rise till equilibrium is achieved again. It happens at $2W_1$ in Fig. 9.5. The real wage rate is restored at initial level; employment level also is back at the initial level. Thus, the output supplied at a higher price, i.e., $2P_1$ is equal to Y_1.

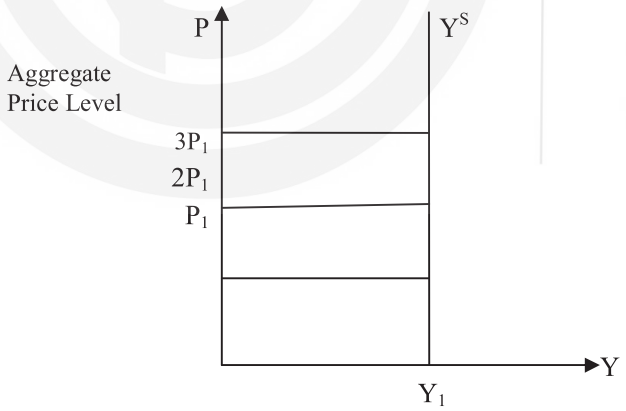

Fig. 9.6: Classical Aggregate Supply Curve

Similarly, when price level reaches $3P_1$, wages rise to $3W_1$, and output remains at Y_1. Hence, the aggregate supply curve is vertical (Fig. 9.6). Higher prices will be result in higher output only if they are not accompanied with higher money wages.

We make an important observation at this point. The shape of the aggregate demand curve will not make any difference to the equilibrium level of output. This is because the aggregate supply curve is vertical and is stable at Y_1. Factors like quantity of money, level of government spending and level of demand for goods and services are demand-side factors. As per classical economists, these factors do not affect the level of output.

9.6 THE KEYNESIAN SYSTEM

In classical view, supply-side factors are more important than the demand-side factors. According to Say's law of market, supply creates its own demand. Further, as price and wage rate are flexible, equilibrium is attained always. There is no scope for unemployment and output is always at full employment level. As supply and demand forces lead to an optimum condition for the economy, there is no need for government intervention. The Great Depression, however, belied these beliefs. During the 1930s there was widespread unemployment, poverty, and insecurity among households. At this point, Keynes provided an altogether different insight into the problems confronting major economies. Some of the salient features of Keynesian economics are presented below.

a) **Demand Creates its Supply**: Just opposite to the classical view, Keynes proposed that demand for a product encourages producers to come up with products demanded. If there is idle capacity in the economy, output will increase if aggregate demand increases.

b) **Rigidities in Prices and Wage Rate**: Prices and wage rate are not flexible as suggested by classical economists.

   Suppliers have monopoly power; perfectly competitive markets do not exist. As we receive our wages and salaries in nominal terms, we resist downward movements in wages and salaries. There are several contracts which do not allow immediate revision in prices and wages. Moreover, adjustments in prices and wage rate are staggered over a period of time; adjustments are not instantaneous.

c) **Unemployment in Economy**: Classical economists ruled out the possibility of unemployment in the economy. According to Keynes, unemployment is normal for an economy. Periodic fluctuations in unemployment can be neutralized by government intervention.

d) **Government Intervention**: If aggregate demand is falling short of aggregate supply, in Keynesian system the government should increase its spending. Thus in the Keynesian system government has an active and important role in the economy.

e) If there is large scale unemployment in the economy, government should create jobs through investments in productive activities. If inflation is high, government should adhere to restrictive policies to reduce the level of aggregate demand.

f) **Aggregate Supply Curve**: According to classical economists, aggregate supply curve is vertical. The classical economists however were referring to the long run situations. According to Keynes, short run is also important. In the short run the aggregate supply curve is horizontal, if the available resources in the economy are under-utilised. An implication of the above is that increase in aggregate demand will result in increase in output, without increasing prices.

We will discuss further on the Keynesian model in subsequent Units of this course.

Check Your Progress 2

1) Explain the relationship between real wage, money wage and labour employment.

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2) Why is the classical aggregate supply curve vertical?

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3) Bring out the major differences between Classical and Keynesian models.

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9.7 LET US SUM UP

In this Unit we discussed the salient features of classical and Keynesian systems. The classical economists stressed on the theory of 'invisible hand' and advocated that price level and wage rate should be decided by market forces. Classical economists suggested that there should be no government intervention in determination of output, employment, prices and wage rate. According to them, the economy adjusts to any kind of disturbance through movement of prices and wage rate, and equilibrium is attained again quickly. The aggregate supply curve is vertical, reducing the role of aggregate demand to minimum.

Keynesian economics, on other hand, is a contrast to classical economics. Keynes believed that in case the economy goes through bad times, it is the role of the government to intervene and help economy to attain equilibrium. According to Keynes, prices, wage rate and output do not adjust quickly to variation in supply and demand conditions. If the economy is left to itself (without government intervention) a very long time period will be required for the economy to attain equilibrium conditions. Government intervention would neutralize the adverse effects.

9.8 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Refer to Section 9.2 and answer.

2) Discuss the concept of MP_L and then explain how it applies to the production function. Refer to Section 9.3 and Table 9.1.

3) Refer to Sub-sections 9.3.1 and 9.3.2. Explain Fig. 9.2 and Fig. 9.3.

Check Your Progress 2

1) Go through Section 9.4 and Fig. 9.5. Discuss the role of change in the price level in terms of real wage and money wage.

2) Refer to Fig. 9.6. Output supplied at a higher price is the same as that supplied at a lower price.

3) Refer to Sections 9.2 and 9.6.

UNIT 10 KEYNESIAN MODEL OF INCOME DETERMINATION*

Structure

10.0 OBJECTIVES

After going through this Unit, you should be in a position to

- define consumption function and saving function;
- explain the concept of multiplier and its operations;
- explain the relationship between marginal propensity to consume and aggregate demand;
- calculate the value of investment multiplier; and
- explain the concept of Keynesian Cross in a diagram.

10.1 INTRODUCTION

As pointed out in Unit 2, output, income and expenditure are three different ways of measuring the level of economic activity in an economy. Whatever method we adopt for measurement, we reach the same level. In this Unit we will discuss another concept, that is, the equilibrium level of output. At the equilibrium level, the demand for and supply of output are equal. We assume that prices are fixed and firms are willing to sell any amount of output at the given level of prices. To develop the concept of aggregate demand, assuming constant prices is very important. On supply side, Keynes takes the aggregate supply curve to be horizontal. We will also discuss the consumption function, factors responsible for deciding aggregate demand and multiplier.

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10.2 EQUILIBRIUM AND AGGREGATE DEMAND

We already know that the total demand for goods and services is known as 'aggregate demand'. The factors which together make aggregate demand (AD) are consumption (C), investment (I), government expenditure (G), and net exports (NX).

$$AD = C + I + G + NX$$

In case we assume the aggregate demand for goods and services to be constant, we get a horizontal AD curve. It means that AD is independent of income and output levels. In Fig. 10.1, output level (representing aggregate supply) is presented on the x-axis while aggregate demand is shown on the y-axis. A 45° line shows equality between the variables shown on x-axis and y-axis, i.e., at any point on this 45° line, AD = Y. In other words, this line represents the locus of equilibrium points where aggregate demand is equal to the output level.

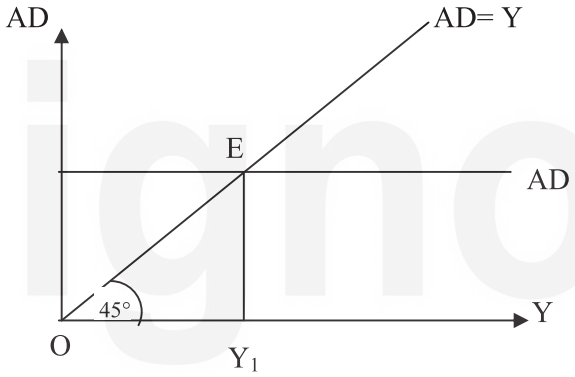

Fig. 10.1: Horizontal AD Curve

In case the AD curve is horizontal, we can say that the equilibrium exists at point E where AD = Y. No forces are causing any change at point E. Equilibrium level of output is Y_1. In case firms produce to the left of Y_1, aggregate supply is less than aggregate demand, and there is run down of exiting inventories. On the other hand, if firms produce to the right of Y_1, there is excess supply (aggregate supply is more than aggregate demand) and inventories will increase. In both the cases, there will be a movement towards Y_1. At E, the firms are selling exactly what people demand. In case of a deviation from Y_1, we have positive or negative unplanned inventory investment.

$$UI = Y - AD$$

where UI is unplanned inventory.

When Y > AD, we find that UI is positive, i.e., there is an addition to the stock of inventory. When Y < AD, we find that UI is negative, i.e., the existing inventory is to be used in order to meet the aggregate demand. It is also called unplanned inventory disinvestment. This leads us to the equilibrium condition Y = AD.

At equilibrium, there is no unplanned inventory investment. Aggregate demand is also indicated by planned spending. Hence, we can say that at equilibrium, planned spending equals income.

10.3 CONSUMPTION FUNCTION

One of the major determinants of aggregate demand is consumption expenditure or consumption. We generally observe that consumption expenditure rises as the income level rises. Hence, we assume that the consumption and income are positively related. For simplicity, we ignore for the time being that there is no role of the government. Hence, instead of 'disposable income' we consider 'income' for finding out consumption. Another issue to consider is that in case income is zero, the individuals still consume and hence the consumption function is not entirely dependent on income. In such a situation, the individuals are expected to sell off their assets such as stocks, bonds, etc. Let us have a look at the consumption function now.

$$C = \bar{C} + cY$$

$$\bar{C} > 0 \qquad \text{and} \quad 0 < c < 1$$

You should note that $\bar{C}$ is the intercept, i.e., the level of consumption when income is zero. For each rupee increase in income, the level of consumption increases by *c*. This is the *slope of the consumption function*. It is also known as *marginal propensity to consume* (mpc). You should note that *mpc* will lie between zero and one, which indicates that when *mpc* = 0, consumption is not rising due to rise in income and when *mpc* = 1 the consumption is rising by the same amount as the rise in income. In other words, it means if c = 0, then $C = \bar{C}$.

Fig. 10.2 shows the consumption function. The *mpc* is positive and hence the curve is upward sloping.

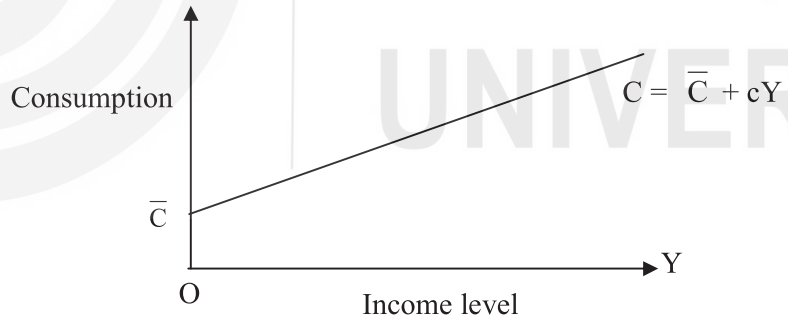

Fig. 10.2: Consumption Function

We can find out the level of saving in the economy from the consumption function. If the fraction *c* is consumed then the remaining portion, i.e., (1 – *c*) should be saved because, by assumption, income is either consumed or saved.

$$S \cong Y - C$$

$$S \cong Y - \bar{C} - cY$$

$$S = -\bar{C} + (1 - c)Y$$

Saving is also an increasing function of income with the slope $(1 - c)$. The marginal propensity to save (*mps*) in the case of saving function is given by

$$mps = (1 - c) = s$$

The negative intercept $(-\bar{C})$ can be written as $\bar{S}$. Thus the saving function is given by

$$S = \bar{S} + sY$$

We know that income is the sum of consumption and saving.

$$Y = C + S$$

Dividing both sides by income (Y), we get

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

In the above equation, the ratio of consumption to income (C/Y) is called *average propensity to consume* (APC). Similarly the ratio of saving to income (S/Y) is called *average propensity to save* (APS). Thus, we can re-write the above equation as

$$APC + APS = 1$$

10.3.1 Relationship between Consumption and Aggregate Demand

Assuming that the government sector and the foreign sector are absent, we are left with consumption and investment as the two components of aggregate demand.

$$AD = C + I$$

$$\bar{C} + cY + \bar{I} = AD$$

$$AD = \left(\bar{C} + \bar{I}\right) + cY$$

$$AD = \bar{A} + cY$$

where $\bar{I}$ is planned investment, which is taken as fixed. You should note that $\left(\bar{C} + \bar{I}\right)$ is mentioned as $\bar{A}$ in the above equation, where $\bar{A}$ is the autonomous expenditure (i.e., independent of income level). The aggregate demand (AD) curve is obtained by vertically adding $\left(\bar{I}\right)$ investment to the consumption curve. As investment is autonomous, it does not affect the slope of the consumption function. Looking at Fig. 10.3, we get an idea of the AD curve. Equilibrium takes place at point E with equilibrium level of output at Y_0 and equilibrium aggregate demand at AD_0. Slope of AD curve is *c* because of which AD curve is a parallel version of the consumption curve.

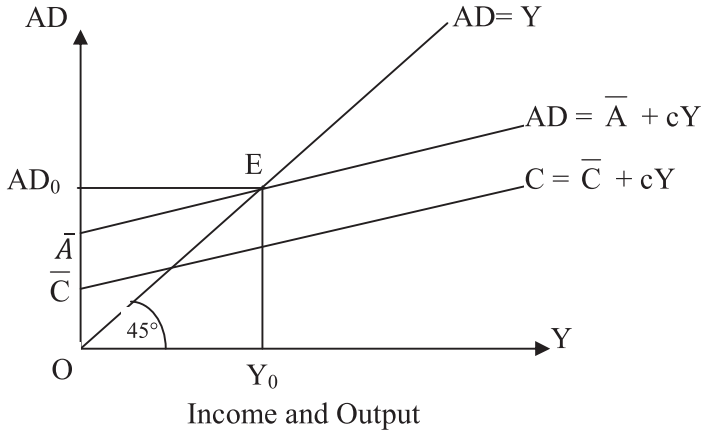

Fig. 10.3: Aggregate Demand and Consumption Function

On the left of Y_0 and on the right of Y_0, AD is not equal to Y, i.e., economy experiences disequilibrium. In such cases, as discussed earlier, either the inventory is built up or it is run down. Equilibrium is maintained at the output level where AD = Y. As the 45° line crosses AD curve, we call it 'Keynesian Cross'.

10.3.2 Formula for Equilibrium Output

The equilibrium condition Y = AD can also be written as

$$Y = \bar{A} + cY$$

$$Y - cY = \bar{A}$$

$$Y(1 - c) = \bar{A}$$

Equilibrium level of output and income Y_0, will be equal to $Y_0 = \left(\frac{1}{1-c}\right)\bar{A}$

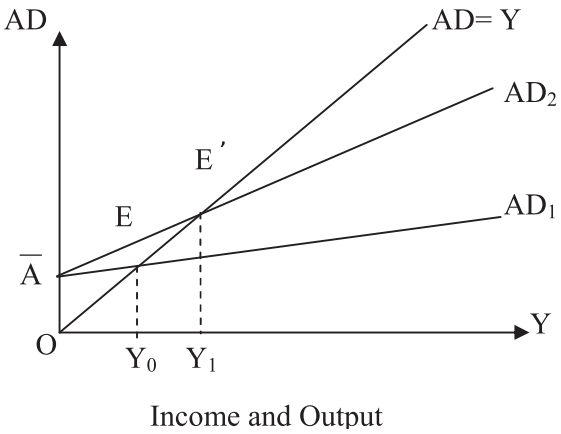

Fig. 10.4: Equilibrium Output and mpc

We observe that the *mpc* is in the denominator, with a negative sign. This means that Y and c are positively related. And clearly, Y and $\bar{A}$ are also positively related. Given the intercept, a steeper aggregate demand i.e. higher *mpc* will lead to a higher income and output level (Fig. 10.4).

Similarly, higher intercept (implying higher autonomous expenditure), while the *mpc* is constant, will lead to higher equilibrium output and income level (Fig. 10.5).

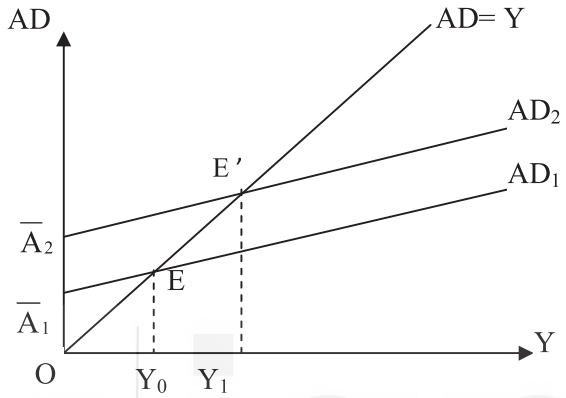

Fig. 10.5: Equilibrium Output and Autonomous Spending

In simple words, in case individuals spend a higher fraction of their additional income, it will influence the income level positively and the output level will rise. The higher consumption expenditure sends the signal to the producers that more goods and services are spent at and hence the production is required to be increased. That is why a higher value of *mpc* leads to higher levels of output and income.

Check Your Progress 1

1) Explain the consumption function with the help of a diagram.

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2) What does a horizontal AD curve represent?

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3) What is the relationship between *mpc* and the AD curve?

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4) Derive saving function through the consumption function.

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5) Explain the concept of 'Keynesian Cross' through a diagram.

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10.4 MULTIPLIER

Investment leads to increase in production capacity and therefore the level of output increases. As you know from Unit 2, aggregate output and aggregate income of an economy are the same. Thus a question arises – How much the equilibrium level of income rises if autonomous spending rises by Re.1? Seems that if, autonomous demand or spending rises by Re.1, then at equilibrium, the level of income shall also rise by Re.1. But this is not the case, as we discuss below.

10.4.1 Concept of Multiplier

Suppose output increases by Re.1 to match the rise in autonomous spending. This rise in output and income in turn gives rise to induced spending as consumption rises as a result of rise in income.

Round	Increase in demand this round	Increase in production this round	Total increase in income
1	$\Delta\overline{A}$	$\Delta\overline{A}$	$\Delta\overline{A}$
2.	$c\Delta\overline{A}$	$c\Delta\overline{A}$	$\Delta\overline{A} + c\Delta\overline{A} = (1+c)\Delta\overline{A}$
3.	$c.c\Delta\overline{A}$	$c.\ c\Delta\overline{A} = c^2\Delta\overline{A}$	$\Delta\overline{A} + c\Delta\overline{A} + c^2\Delta\overline{A} = (1+c+c^2)\Delta\overline{A}$
-	-	-	$-\left(\frac{1}{1-c}\right)\Delta\overline{A}$

This induced expenditure would be ($c \cdot \Delta\bar{A}$). Production increases further to meet this induced expenditure. By now the output and income have increased by ($\Delta\bar{A} + c.\Delta\bar{A}$), that is., by $(1 + c)\,\Delta\bar{A}$. This will further give rise to induced expenditure and so on.

As $0 < c < 1$, $c^2 < c$ and $c^3 < c^2$, the induced expenditure keeps becoming smaller as the number of rounds progress.

$$\Delta\bar{A}D = \Delta\bar{A} + c\Delta\bar{A} + c^2\Delta\bar{A} .....$$

$$= \Delta\bar{A}\ (1 + c + c^2 + ...) = \Delta\bar{A}\ (\tfrac{1}{1-c})$$

We are dealing with a geometric series here so the equation simplifies to

$$\Delta AD = \left(\frac{1}{1 - c}\right)\Delta\bar{A} = \Delta Y_0$$

Cumulative change in aggregate spending is, thus, equal to a multiple of the increase in autonomous spending and the multiple is $\frac{\Delta Y}{\Delta A} = \frac{1}{1-c}$. This multiple is called the *multiplier*. The multiplier is the amount by which equilibrium output changes when autonomous AD increases by one unit. If we denote the multiplier as α, it is equal to $\frac{1}{1-c}$.

You should note that here we are dealing with a two sector closed economy comprising households and firms; there is neither government nor foreign trade. When we include the government and foreign trade, the above formula will change.

Examples: Let us now find out the value of the multiplier for various value of marginal propensity to consume, given by *c*.

$c = 0.5 \qquad \alpha = \dfrac{1}{1 - 0.5} = 2$

$c = 0.4 \qquad \alpha = \dfrac{1}{1 - 0.4} = 1.66$

$c = 0.25 \qquad \alpha = \dfrac{1}{1 - 0.25} = 1.33$

$c = 0.6 \qquad \alpha = \dfrac{1}{1 - 0.6} = 2.5$

From the above examples, we find that a higher *c* leads to a higher α.

Diagrammatically, higher *c* means (see Fig. 10.4) steeper AD and we already have discussed that steeper AD means higher Y. We conclude by saying that a change in the output will be larger than the change in autonomous spending due to multiplier effect. In other words, if an economy for some reason experiences a

shock that reduces income, then people whose incomes have gone down will spend less and this will reduce equilibrium income further.

In Fig. 10.6, we show the impact of an increase in aggregate demand on equilibrium output. We assume that aggregate demand increases from AD to AD' due to an increase in the autonomous component from $\bar{A}$ to $\bar{A}'$ (say, there is an increase in autonomous investment due to which the autonomous component increases). As a result, the equilibrium point shifts from E to E'. You should note that AD = $\bar{A}$ + cY and $AD' = \bar{A}'$ + cY where $\bar{A}' > \bar{A}$. In Fig. 10.6 note that $E'P$ is the change in autonomous spending ($\Delta \bar{A}$) while $E'P$ is the change in aggregate demand (ΔAD). Change in the output level, i.e., Δ Y is the difference between Y_1 and Y_0.

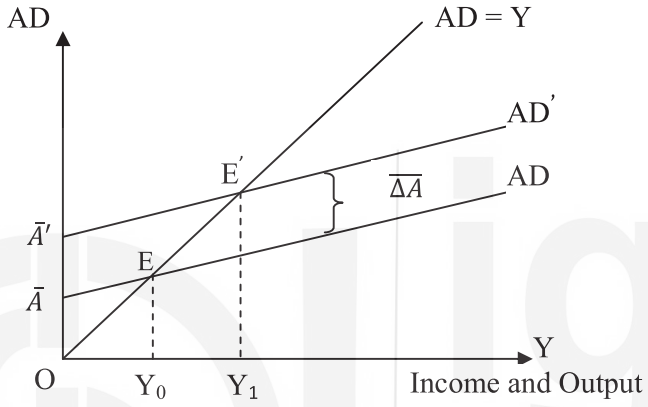

Fig. 10.6: Multiplier

Change in the equilibrium output is equal to the change in aggregate demand ($\Delta Y_0 = \Delta AD$). Looking at the change in aggregate demand, we can say that

$\Delta AD = \Delta \bar{A} + c\Delta Y_0$

Since $\Delta AD = \Delta Y_0$

we can say, $\Delta Y_0 - c\Delta Y_0 = \Delta \bar{A}$

Or, $(1 - c)\,\Delta Y_0 = \Delta \bar{A}$

Or, $\Delta Y_0 = \dfrac{1}{1-c}\Delta \bar{A}$.

10.4.2 Investment Multiplier

Autonomous investment ($\bar{I}$) is a part of autonomous spending/expenditure $(\bar{A})$, hence any change in $\bar{I}$ will lead to a multiplier effect on the equilibrium level of income and output. The whole analysis remains the same as mentioned in the previous sub-section. But, to specifically calculate the change in income due to change in investment, we use the following:

$$\Delta Y_0 = \frac{1}{1-c}\,\Delta \bar{I}$$

For example, if c = 0.2 and $\Delta\bar{I}$ = Rs. 50 crore, let us find out the change in the equilibrium level of income and output.

$$\Delta Y_0 = \left(\frac{1}{1-0.2}\right) \times 50 \text{ crore}$$

$$= \left(\frac{50}{0.8}\right) \text{crore}$$

$$= \text{Rs. } 62.5 \text{ crore}$$

The equilibrium level of income (Y_0) was initially Rs. 120 crore. Now after an increase in autonomous investment of Rs 50 crore, the equilibrium level of income reaches to Rs. 182.5 crore (Rs 120 crore+ Rs. 62.5 crore). An increase of Rs. 50 crore in investment leads to an increase of Rs. 62.5 crore in the output. If we calculate the investment multiplier, it will be $\frac{\Delta Y_0}{\Delta\bar{I}} = \left(\frac{1}{1-c}\right) = 1.25$.

10.4.3 Limitations of Multiplier

In the discussion above, we saw that income increases much more than the initial investment because of the 'multiplier'. There are certain limitations to the multiplier however.

(a) As you know, aggregate output of an economy cannot be more than the full employment output level. Thus output, income and employment can expand till the economy has unutilized resources.

(b) It is implicitly assumed that income received is spent on consumption or saved in financial institutions (so that banks use the money in extending loans). If income received is not spent at any of the subsequent stages, rather kept as idle cash at hand, then the value of the multiplier will decrease.

(c) It is assumed that there is no shortage of consumption goods in the economy. If there is a shortage of consumption goods, the households or individuals who are the income recipients will not be able to spend on consumption. It will result in a decline in the MPC and hence the multiplier.

(d) It is assumed that there is no time lag between income received, and expenditure incurred. Sometimes there is a time lag (interval) between the receipt of income and the spending of it, and similarly between the spending and its re-appearance as income. If the time lag is long, there is a decrease in the level of expenditure on consumption in subsequent periods. This will lead to a smaller value of multiplier.

(e) It is assumed that there is idle production capacity in the economy and there is no increase in prices due to increase in aggregate demand. If the

price level rises, consumption may be lower, and value of the multiplier will be affected.

Despite these limitations, the investment multiplier is an important tool of policy analysis.

Check Your Progress 2

1) Explain the concept of investment multiplier.

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2) Find out the investment multiplier if *mpc* = 0.8.

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10.5 LET US SUM UP

Consumption function is an upward sloping curve, having a positive relationship with the income level. Marginal propensity to consume (mpc) takes values between 0 and 1. The remaining fraction i.e., (1 – c) is known as marginal propensity to save (mps). With the help of consumption function, we derived aggregate demand curve. Assuming government and foreign sector to be absent, the aggregate demand is made up of consumption and autonomous investment. Hence, the slope of AD curve is same as the slope of consumption function. Intersection of the 45° line with the AD curve is known as 'Keynesian Cross' and gives us the equilibrium level of income and output. This level of income and output are dependent upon the autonomous investment $(\overline{A})$ and the slope of AD curve (that is, c). The multiplier tells us by how much income and output will change if autonomous spending changes. As $\overline{A}$ changes, the output and income changes by manifold. The investment multiplier, often denoted by α, is given by $\frac{1}{1-c}$.

10.6 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) Explain Fig. 10.2.

2) Horizontal AD curve means that the aggregate demand is independent of income and output level.

3) Explain Fig. 10.3. The slope of consumption function is also the slope of AD curve.

4) $C = \bar{C} + cY$

$C + S = Y$

$(1 - c) = s$ as $c + s = 1$

So, $S = \bar{C} + (1 - c)Y$

$S = \bar{S} + sY$

5) Refer to Fig. 10.3 and describe the intersection between 45^0 line and AD curve.

Check Your Progress 2

1) Refer to Section 10.4 for the answer.

2) $$\alpha = \frac{\Delta Y}{\Delta I} = \frac{1}{1 - 0.8}$$

$$= \frac{1}{0.2} = 5$$

UNIT 11 FISCAL POLICY IN KEYNESIAN MODEL*

Structure

11.0 OBJECTIVES

After going through this Unit, you should be in a position to

- identify the changes in the Keynesian model when government sector is introduced;
- explain the government spending multiplier and how it is different from investment multiplier;
- explain the change in equilibrium output level due to introduction of government sector;
- discuss the role of automatic stabilizers;
- explain the change in AD curve when government expenditure or tax rate change;
- identify the components of government budget; and
- explain how the budget surplus changes as government expenditure or tax rate change.

11.1 INTRODUCTION

This Unit is an extension of the previous one. In this Unit we introduce the government sector in the Keynesian model. We extend our two-sector model to a three sector model; thus there are three economic agents, viz., households, firms and government. Thus AD = C + I + G.

Once we introduce the government sector, certain changes are needed to be carried out in the Keynesian model. Government has the power of earning

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revenue by imposing taxes. Government also spends money for the welfare of people. Sometimes, government needs to borrow when its revenues are less than expenditure. Such a situation is called *budget deficit*. When revenue exceeds government expenditure, it is a situation of *budget surplus*. Government exercises *fiscal policy* by varying the tax rate or changing the level of government expenditure. The objective of government intervention is to smoothen the operation of the economy.

11.2 THE GOVERNMENT SECTOR

Government affects the equilibrium level of income and output as it purchases goods and services. Hence, government purchases (G) is an important component of the aggregate demand (AD).

$$AD = C + \bar{I} + G \qquad \ldots(11.1)$$

where, $\bar{I}$ is planned or autonomous investment, which is independent of income. In other words, we assume that investment is fixed or constant.

As government sector collects tax from individuals, there may be certain changes in the consumption function ($C = \bar{C} + cY$). Consumption is dependent upon disposable income (Y_D) instead of total income. We know that

$$Y_D = Y - TA$$

where Y is the aggregate income and TA is the tax. Another component which finds its way in the disposable income is government transfers (TR) such as subsidies, pensions, scholarships, etc. These are an addition to the individual's income (Y) but there is no corresponding output. So,

$$Y_D = (Y - TA + TR) \qquad \ldots(11.2)$$

By substituting Y_D in place of Y in (11.1), we get AD as

$$AD = \bar{C} + cY_D + \bar{I} + G$$

By substituting the value of Y_D from (11.2) we have

$$AD = \bar{C} + c(Y - TA + TR) + \bar{I} + G \qquad \ldots(11.3)$$

We assume that government expenditure is fixed at $\bar{G}$; also government makes a constant amount of transfer $\overline{TR}$. Government collects a fraction of income (tY) as taxes.

So,
$$G = \bar{G}$$
$$TR = \overline{TR}$$
$$TA = tY$$

Now the consumption function can be written as:

$C = \bar{C} + c(Y + \overline{TR} - tY)$

$= \bar{C} + c\overline{TR} + c(1 - t)Y$ …(11.4)

It is important to note here is that transfers ($\overline{TR}$) are increasing the consumption spending by ($c\overline{TR}$), i.e., marginal propensity to consume times the amount of transfers. On the other hand, income tax lowers the consumption spending at each level of income. This is because taxes affect disposable income (Y_D) and not the income (Y) as such. So, the marginal propensity to consume (mpc) out of disposable income remains *c* but marginal propensity to consume out of income is c(1 – t) where (1 – t) is a function of income after deduction of taxes. Let us explain this with the help of an example.

Let us assume that marginal propensity to consume from disposable income is 80 per cent and tax rate is 20 per cent. Thus c = 0.8 and t = 0.2; and mpc out of income is c(1 – t) = 0.8(1 – 0.2) = 0.8(0.8) = 0.64.

Now, going back to the AD in equation (11.3) we find that

$AD = [\bar{C} + c\overline{TR} + \bar{I} + \bar{G}] + c(1 - t)Y$

$AD = \bar{A} + c(1 - t)Y$ …(11.5)

We have taken all the autonomous terms together and denote it by $\bar{A}$. As pointed out earlier, income and output levels get affected with the introduction of the government sector. We will see the change algebraically as well as with the help of a diagram. As you know from the previous Unit, equilibrium is attained when

Y = AD.

Thus, by substituting values from equation (11.5), we obtain

$Y = \bar{A} + c(1 - t)Y$

Or, $Y - [c(1 - t)Y] = \bar{A}$

Or, $Y - (c - ct)Y = \bar{A}$

Or, $Y(1 - c + ct) = \bar{A}$

This gives us $Y = \dfrac{\bar{A}}{1 - c + ct}$ … (11.6)

In Fig. 11.1 we present two AD curves; AD_1 shows absence of government sector and AD_2 in the presence of government sector. Thus AD_2 includes taxes and transfers. We observe that AD_2 is flatter than AD_1 and has a higher y-intercept than AD_1. It is because the slope of AD_2 is c(1– t) instead of c. The vertical intercept includes

$(c\overline{TR} + \overline{G})$ in addition to $(\overline{C} + \overline{I})$, the vertical intercept of AD_1.

Thus $\overline{A_1} = \bar{C} + \bar{I}$, and $\overline{A_2} = \bar{C} + \bar{I} + c\overline{TR} + \bar{G}$

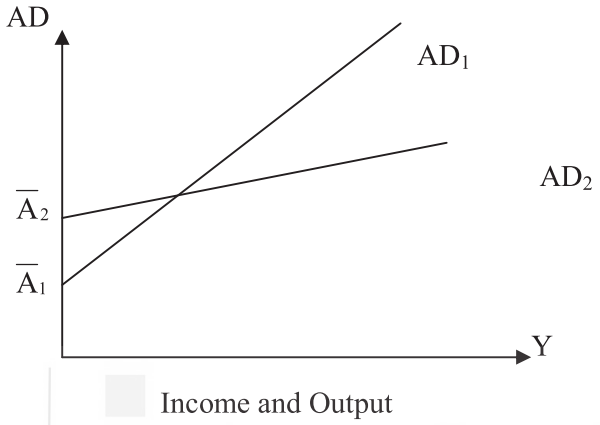

Fig. 11.1: Government Sector and the AD Curve

Fig. 11.2 shows the effect of government sector's presence on equilibrium levels of income and output. We consider two cases. In the first case, when the government sector is not present, equilibrium takes place at point E_1 where the 45° line intersects AD_1.

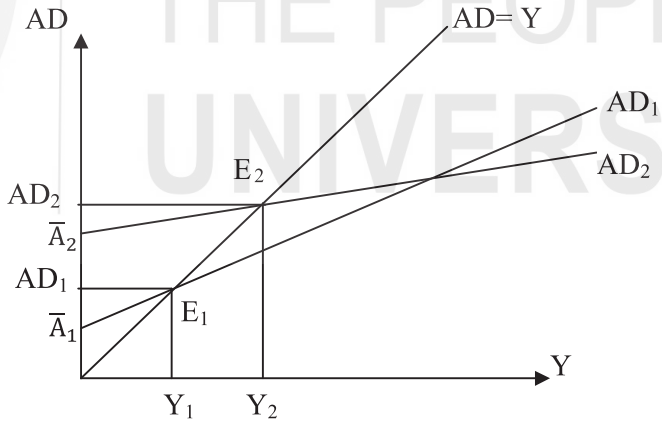

Fig. 11.2: Government Sector and Equilibrium

This intersection gives us Y_1 as the equilibrium output. Now as government spending $\bar{G}$ and other components like taxes and transfers come into existence, AD_1 becomes flatter and changes its y-intercept also. The new curve is labeled as AD_2. The second Keynesian cross happens at point E_2.

This new equilibrium gives us the equilibrium output as Y_2. We notice that Y_2 is greater than Y_1. Hence, we can say that introduction of the government sector increases the level of income and output in the economy.

Check Your Progress 1

1) Explain the changes in the consumption function when we introduce the government sector.

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2) Write down the AD equation in the presence of government sector.

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3) Explain the new equilibrium income in the presence of government sector.

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11.2.1 Government Spending and the Multiplier

Let us re-write the multiplier by introducing the government sector.

$$\frac{\Delta Y}{\Delta \bar{A}} = \frac{1}{1-c+ct} \quad \text{or} \quad \frac{1}{1-c(1+t)}$$

As seen in the previous Unit, in the absence of the government sector, the multiplier is $\frac{1}{1-c}$. We see that the government purchases of goods and services make a substantial difference in the economy. The value of the multiplier is reduced. Let us denote the government multiplier as α_G . So, we can say that $\alpha_G < \alpha$. Let us explain with the help of an example.

If c = 0.8 and t = 0.2 then

$$\alpha = \frac{1}{1-c} = \frac{1}{1-0.8} = 5.$$

Now let us find out $\alpha_G = \frac{1}{1-c+ct}$

$$= \frac{1}{1-0.8+0.8(0.2)}$$

$$= \frac{1}{0.2+0.16}$$

$$= \frac{1}{0.36} = 2.77$$

Thus we observe that the value of the multipler gets reduced in the presence of the government sector.

11.2.2 Automatic Stabilizers

Automatic stabilizers are the revenue and expenditure items in the government budget which automatically change with the state of the economy in such a way as to stabilize GDP. We found that imposition of income tax lowers the value of the multiplier, α. Why does income tax reduce the value of the multiplier? It reduces the value of the multiplier because the increase in consumption out of changes in income gets reduced due to imposition of taxes. When such stabilizers are in place, the change in autonomous expenditure (for example, $\bar{I}$) will have smaller effect on output. Presence of such stabilizers reduces the volatility in the economy, particularly during various phases of business cycle. When the economy is passing through the expansion phase of a business cycle and income is increasing, imposition of progressive taxes on income increases government revenue automatically and consumption is reduced. On the other hand, when the economy is passing through the recession phase, tax burden is automatically reduced because of reduced income. These stabilizers act as *shock absorbers* to the economy.

11.2.3 Effect of Change in Government Spending and Tax Rate

Let us now consider the changes in fiscal policy. Fiscal Policy tools are government spending, transfers and tax rate. Government changes the magnitude of these tools as per the situation of the economy.

Let us consider the diagrammatic representation of fiscal policy initiative. Initial level of equilibrium output is Y_0 as shown in Fig. 11.3. Autonomous spending i.e., $\overline{G}$ changes, hence $\overline{A}_0$ shifts up to $\overline{A}_1$ and AD_0 shifts parallel upwards to AD_1. As per the equilibrium condition, the equilibrium income and output becomes Y_1 from Y_0. Is the increase in income same as increase in autonomous spending? By how much has the income expanded?

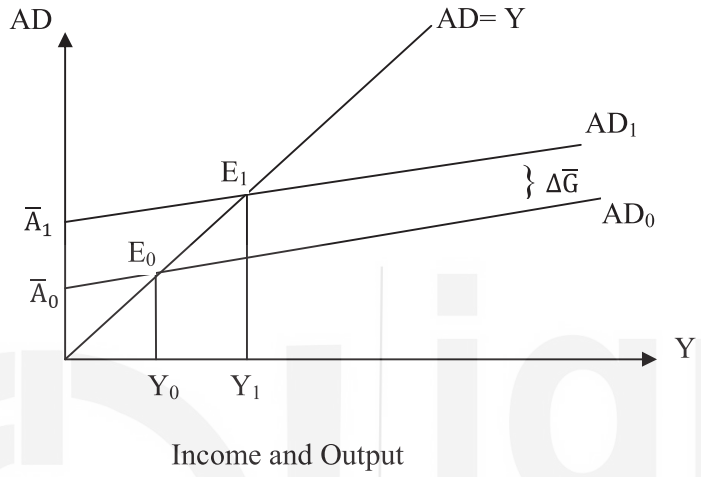

Fig. 11.3: Equilibrium Output and Government Spending

Change in autonomous government spending is equal to the change in AD,

$$\Delta Y_0 = \Delta \overline{G} + c(1-t)\,\Delta Y_0$$

We have assumed that $\overline{C}$, $\overline{TR}$ and $\overline{I}$ are constant. Thus, the change in equilibrium income is,

$$\Delta Y_0 = \frac{1}{1-c(1+t)}\Delta \overline{G}$$

$$= \alpha_G . \Delta \overline{G}$$

The other tool, i.e., income tax, is generally reduced so that individuals get higher disposable income. Fig. 11.4 shows the effects of reduction in income tax rate. It means that there is a decrease in 't', which in turn increases the slope of the AD curve. Initial equilibrium income is Y_0, i.e., intersection between AD_0 and the 45° line. As AD_0 swivels out to AD_1, the new equilibrium occurs at E_1 which gives us the new equilibrium level of output as Y_1. As income tax rate decreases, the equilibrium income and output increases. To find out the change in equilibrium income, we need to equate the change in income to the change in AD. There are two components of change in AD, namely,

1) Change in spending at the initial level of income due to reduction in the tax rate;

2) Change in spending due to higher income.

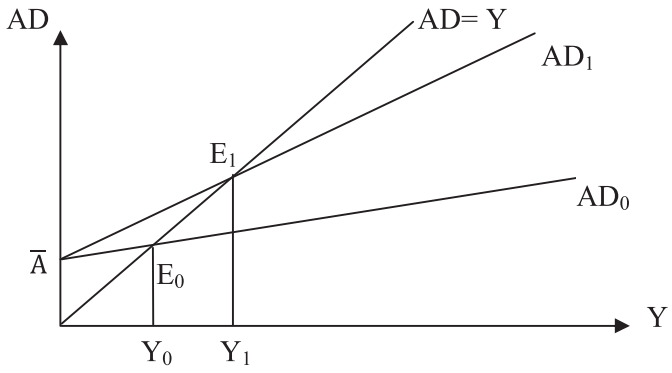

Fig. 11.4: Changes in the Income Tax Rate

By combining the two components, we can write,

$$\Delta Y_0 = -cY_0\Delta t + c\,(1 - t')\,\Delta Y_0$$

where, t′ is the new tax rate. As,

$$Y_0 = \left(\frac{1}{1-c+ct}\right).\bar{A}$$

So,

$$\frac{\Delta Y_0}{\Delta t} = \frac{-c}{(1-c+ct)^2}.\bar{A}$$

and $\bar{A} = Y_0(1-c+ct)$

Using the value of ($\bar{A}$), we get

$$\frac{\Delta Y_0}{\Delta t} = \frac{-c}{(1-c+ct)^2}.Y_0(1-c+ct)$$

$$\frac{\Delta Y_0}{\Delta t} = \frac{-cY_0}{(1-c+ct)}$$

or $$\Delta Y_0 = \frac{-cy_0}{(1-c+ct)}.\Delta t$$

where $\frac{-cy_0}{1-c+ct}$ is the income tax multiplier, which is normally denoted by α_t.

Similarly, the effect from transfer payment can be written as:

$$\frac{\Delta Y_0}{\Delta TR} = \frac{c}{1-c+ct} = \alpha_{TR}$$

$$\Delta Y_0 = \left(\frac{c}{1-c+ct}\right).\Delta TR$$

because

$$Y_0 = \frac{c\overline{TR} + \overline{A}}{(1-c+ct)}$$

where $c\overline{TR}$ is separately written as $\overline{A}$ comprising of other autonomous spending. A reduction in the transfer would lower the equilibrium output and vice-versa. A rise in the transfers will shift the AD curve parallel upwards and a fall in the transfers will shift the AD curve parallel downwards.

11.3 GOVERNMENT BUDGET

Budget is a term which is very important for every individual. The households are interested in knowing how much of income they will receive and what is their expenditure for a given time period.

Similarly, the government needs to find out its sources of revenues and areas where it needs to spend. Hence, the government budget is of great importance. In this context, we will use the term budget to represent government budget. Budget is a record of revenues and expenditure. If government is experiencing a budget deficit, it means government is spending more than earning. In case it experiences a budget surplus, then the government spending is less than the revenue. Generally, budget deficit is faced by majority of the governments. . Algebraically,

Budget Surplus (BS) = $\overline{TA} - \overline{G} - \overline{TR}$

$= tY - \overline{G} - \overline{TR}$

where $TA = tY$

It is common knowledge that when income level is low, the revenue also becomes low, which lead to budget deficit and vice versa. Fig. 11.5 shows that the sum of $\overline{G}$ and $\overline{TR}$ exceeds tY when income levels are low and vice-versa.

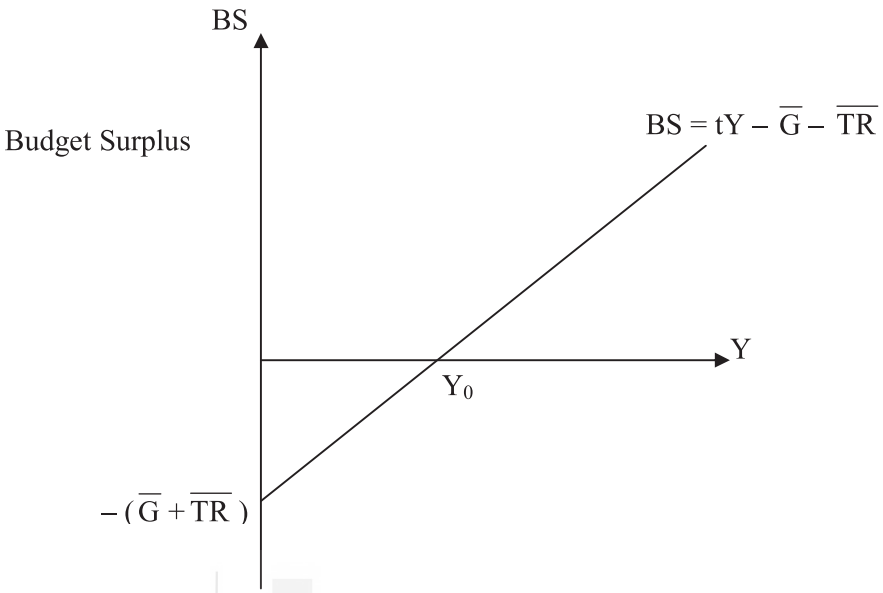

Fig. 11.5: Government Budget

The income level Y_0 shows no deficit and no surplus. On the left of Y_0, government runs in deficit and on the right of Y_0, surplus exists. This is because, at high income level, the government tax receipts are large. If the income does not increase due to fiscal policy tools, government deficit can still decrease. An increase in the investment (I) will lead to an increase in Y which in turns raises the tax receipts and that is how the budget deficit decreases. It follows that, during the time of recession, budget deficits are observed.

Impact of Budget, Taxes and Government Spending

It seems logical to think that an increase in the government spending $(\overline{G})$ would decrease the budget surplus (BS), however it does not hold true always. Because increase $\overline{G}$ has a multiplier effect on the equilibrium level of income and output, this leads to higher tax receipts. There is a possibility that, the negative effect of such rising $(\overline{G})$ is compensated by the positive effect of rising tax receipts, which does not reduce the budget surplus. Let us see, algebraically, how the increased government spending reduces the budget surplus.

$\Delta Y_0 = \alpha_G.\Delta G$ (due to higher government spending)

Due to change in income, tax revenues also change, i.e.,

$$\Delta TA = t.\Delta Y_0$$
$$= t.\ \alpha_G.\Delta G$$

Change in the budget surplus (BS), will be

$$\Delta BS = \Delta TA - \Delta \overline{G}$$

$$= t\alpha_G.\Delta\overline{G} - \Delta\overline{G} \qquad = (t.\alpha_G - 1)\,\Delta\overline{G}$$

$$= \left[\frac{t}{1-c+ct} - 1\right]\Delta\overline{G}$$

or

$$= \left[\frac{t}{1-c(1-t)} - 1\right]\Delta\overline{G}$$

$$= \left[\frac{t-1+c(1-t)}{1-c(1-t)}\right]\Delta\overline{G}$$

$$= (-)\left[\frac{1-t-c(1-t)}{1-c(1-t)}\right]\Delta\overline{G}$$

$$= (-)\left[\frac{(1-t)-c(1-t)}{1-c(1-t)}\right]\Delta\overline{G}$$

$$= (-)\left[\frac{(1-t)(1-c)}{1-c(1-t)}\right]\Delta\overline{G}$$

Now, let us consider a numerical example, where c = 0.8, t = 0.25 and ΔG = Re.1

$$\Delta BS = (-)\left[\frac{(1-0.8)(1-0.25)}{1-0.8(1-0.25)}\right]\text{Re.1}$$

$$= (-)\frac{(0.2)(0.75)}{1-0.8(0.75)}$$

$$= -\frac{0.15}{1-0.6}$$

$$= -\frac{0.15}{0.4}$$

$$= \text{Rs.} - 0.375.$$

So a one rupee increase in government spending reduces the government surplus by Rs. 0.375. Similarly, the tax hike will lead to a positive effect on the budget surplus.

If the government raises the tax rate and government purchases by the same amount, then what will be impact on the budget surplus? The response will include the explanation of a concept called '*balanced budget multiplier'*. The equilibrium budget will be unchanged as the multiplier will be equal to 1.

The equilibrium income can be affected by due to change in the autonomous expenditure which includes the autonomous investment, autonomous government

kspending and government transfers and tax policy or tax rates. To evaluate the impact of change in government sending we need to assume that only one component of the autonomous spending changes that is the government expenditure. Hence, like investment multiplier, the government expenditure multiplier is

$$\alpha_G = \frac{1}{1-c} \text{ and or } \Delta Y_0 = \frac{1}{1-c}\Delta\overline{G}$$

Similarly for the change in tax rate, the tax multiplier is

$$\alpha_T = \frac{-c}{1-c}$$

$$\text{or } \Delta Y_0 = \frac{1}{1-c}(-c * \Delta\overline{T}) = \frac{-c}{1-c}\Delta\overline{T}$$

Now change in income due to both the changes in government expenditure and tax rate is:

$\Delta Y = \alpha_G.\Delta G + \alpha_T.\Delta T$

$\Delta Y = \alpha_G.\Delta G + \alpha_T.\Delta G$ (as $\Delta G = \Delta T$)

$\Delta Y = (\alpha_G+\alpha_T)\Delta G$

$$\Delta Y = \left[\frac{1}{1-c} + \left(\frac{-c}{1-c}\right)\right]\Delta G$$

$$\Delta Y = \left(\frac{1-c}{1-c}\right)\Delta G$$

$$\Delta Y = \Delta G \Rightarrow \Delta Y/\Delta G = 1$$

We found that output rises exactly by the amount of increase in government spending. Thus balanced budget multiplier = 1

Check Your Progress 2

1) What are automatic stabilizers? Explain.

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2) Calculate the government spending multiplier given the following:

c = 0.6 t = 0.12

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3) How does AD curve changes when there is a change in government spending? Does it also change equilibrium level of income and output?

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4) Explain, in short, the concept of Budget Surplus.

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5) How does the balanced budget multiplier work?

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11.4 LET US SUM UP

In this Unit we introduced the government sector into the Keynesian model and re-defined the aggregate demand. As the government sector is included, the fiscal policy tools like taxes, transfers and government spending are exercised by the government. The government multiplier and the tax multiplier were found to be smaller than the investment multiplier. Due to automatic stabilizers, the volatility in the economy is reduced. Subsequently, we understood the concept of government budget.

Government borrows at the time of deficit which makes it difficult for the private firms to arrange funds. As government spending increases, the budget will go in deficit. At the same time, however, equilibrium output increases, which in turn increases the tax receipts. The balanced budget multiplier shows how the output increases by the same amount as the government spending increases.

11.7 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1) $C = \bar{C} + c(Y + \overline{TR} - tY)$

$= \bar{C} + c\overline{TR} + c(1-t)Y$

2) $AD = \bar{A} + c(1-t)Y$, where $\bar{A} = \bar{C} + c\overline{TR} + \bar{I} + \bar{G}$

3) Refer to Fig. 11.2.

Check Your Progress 2

1) Refer to Sub-section 11.2.2.

2) $\frac{1}{1-c+ct} = \frac{1}{1-0.6+0.6(0.12)}$

3) Refer to Sub-section 11.2.3. Yes, it changes equilibrium level of income and output. It increases.

4) Budget surplus is excess of government revenue over government spending.

5) Refer to Sub-section 11.3.1.