CHAPTER 17

AGGREGATE DEMAND CURVE WITH VARIABLE PRICES

INTRODUCTION

In modern macro-economics, new concepts of aggregate demand and aggregate supply which relate them to general price level have been developed. These new concepts of aggregate demand and aggregate supply are especially used for analyzing the problem of inflation in an economy. Aggregate demand is the total spending which competitors, businessmen, government and foreigners are willing to make on aggregate output of goods and services produced in the economy at different price levels during a given period. That is, aggregate demand indicated how much output the consumers, businesses, government and foreigners are willing to buy at each price level and the associated output.

We will explain below the concepts of aggregate demand and aggregate supply curves with flexible prices and then study what causes shifts in AD and AS. In the last section we shall see the intersection between the aggregate demand supply and the determination of equilibrium level of GNP and price level.

AGGREGATE DEMAND CURVE [WITH FLEXIBLE PRICES]

The aggregate demand curve explain the relationship between total spending and price levels and it slopes downward from left that to the right. This means that at higher price levels, the total spending or quantity of aggregate output demanded is less and at lower price level the spending or total purchase of aggregate output of goods and services is higher. This has been explained in figure below.

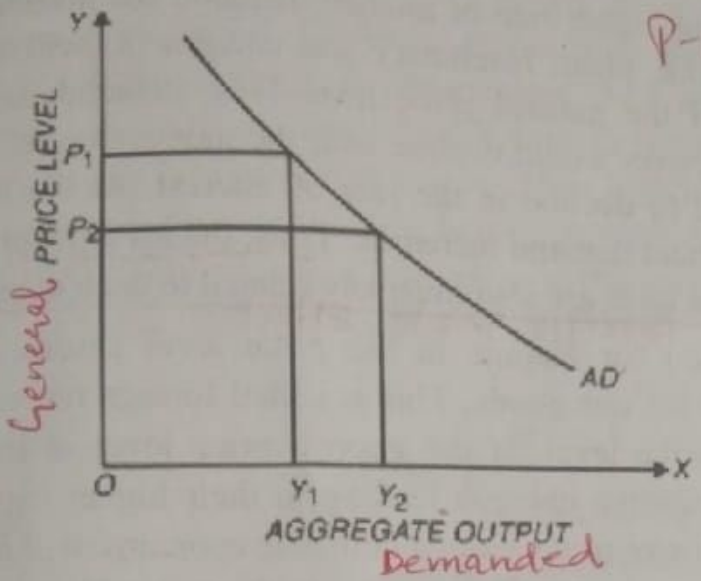

Fig. 17.1

Aggregate output demanded per period of time is measured along the X-axis, and the general price level along the Y-axis. It is understood that the aggregate demand for output falls at higher general price levels and increases at lower price levels, or in other sense why aggregate demand (AD) curve slopes downward. The following reasons are responsible for this relationship:—

(1) First, changes in the general price level affect the purchasing power of money and other monetary assets and fixed nominal values being held by the public. With rise in the general price level, the real value of these monetary assets will fall as a result the people feel poorer than before. This includes the people to consume less then before which leads to decline in quantity of output purchased by them. Contrary when the price level falls, the real value of the monetary assets will increases as a result it will includes them to buy more goods then before. This is called real balance effect of the change in the price level.

(2) The second reason for the downward-sloping shape of aggregate demand curve is the effect of change in general price level on the rate of interest and on investment demand. At a higher price level, general the people require more money for transactions. This will lead to increase in the demand for money for transactions purposes. Given the money supply, an increase in demand for money will cause the rate of interest

to go up. At the higher rate of interest, demand for investment in new capital goods (i.e. plant, machinery and equipment) will decrease. On the contrary, if the general price level falls, demand for money for transaction purposes would decline and, the money supply being given, this would lead to decline in the rate of interest. At the lower rate of interest, investment demand increases. Thus, the investment demand and the general price level are also inversely related to each other.

(3) Third reason for change in the price level causes a change in foreign demand for our goods. This is called foreign trade effect of the change in the price level. If the general price level in India falls, its exports would become cheaper leading to their higher exports. On the other hand, the lower price level at domestic economy will induce Indian people to buy more Indian goods instead of imported ones. Thus, fall in general price level in India will lead to more exports and lesser imports causing expansion in aggregate demand for Indian goods. On the contrary increase in price level in India would lead to decline in its exports (i.e. foreign demand for Indian goods) and increase in its imports. Thus, rise in Indian price level will cause a decline in net exports.

In short, the aggregate demand for consumption, investment and net exports increases with a decline in the price level and declines with the rise in the price level. This means that aggregate demand curve showing the relationship between aggregate output demanded and the general price level slopes downward to the right as is shown in figure above.

price level slopes downward to the right as is shown in Figure 10.1.

Derivation of Aggregate Demand Curve

We can now derive the aggregate demand curve using Keynesian income-expenditure framework and incorporating price level into the model. It should be noted that Keynesian aggregate expenditure curve ($C + I + G + X_n$) shows planned aggregate expenditure at various levels of national income (*i.e.*, real GNP), the aggregate demand curve (AD), which we are considering here shows equilibrium aggregate expenditure (*i.e.* equilibrium quantity of aggregate output demanded) at various price levels. In order to derive this aggregate demand curve with flexible prices we ask the question what is the effect of change in the price level on the economy's aggregate expenditure ($C + I + G + NX$) function.

As has been explained above, a change in the price level causes a change in the quantity demanded through producing three effects, namely, *real balance effect*, *interest rate effect*, and *foreign trade effect*. Let us suppose the price level falls. As explained above, with a lower price level real purchasing power of the money balances or financial assets with fixed nominal values held by the people will increase. As a consequence, the people will start feeling themselves richer. Thus lower price level will induce people to consume more at each level of national income. That is, consumption function curve in the income expenditure model will shift above which in turn will cause upward shift in the aggregate expenditure ($C + I + G + X_n$) curve. This is illustrated in Figure 10.2. In panel (*a*) at the top of this figure, we have shown the determination of equilibrium level of real national income (*i.e.*, equilibrium level of aggregate output demanded). Initially, at a price level P_0, the aggregate expenditure function curve ($C + I + G + X_n$) intersects the 45° line at point E_0 according to which Y_0 is the equilibrium quantity of real GNP or aggregate output demanded. At the level Y_0 of GNP, planned aggregate expenditure is equal to the value of aggregate national output. Thus, at the initial price level P_0 the equilibrium quantity of aggregate output demanded is Y_0. Therefore, in the panel (*b*) at the bottom we represent aggregate output Y_0 directly against price level P_0.

Suppose the price level falls from P_0 to P_2. With this real purchasing power of the money balances and financial assets held by the people will increase and they will be induced to consume more than before. As a result, consumption function curve will shift above causing upward shift in the aggregate expenditure curve to the new higher position $(C_2 + I + G + NX)$. It will be seen from Figure 10.2 that this new aggregate expenditure function curve $C_2 + I + G + NX$ intersects the 45° line at point E_2 yielding greater quantity of aggregate output demanded Y_2. Thus, in panel (*b*) at the bottom we show aggregate output Y_2 against the lower price level P_2.

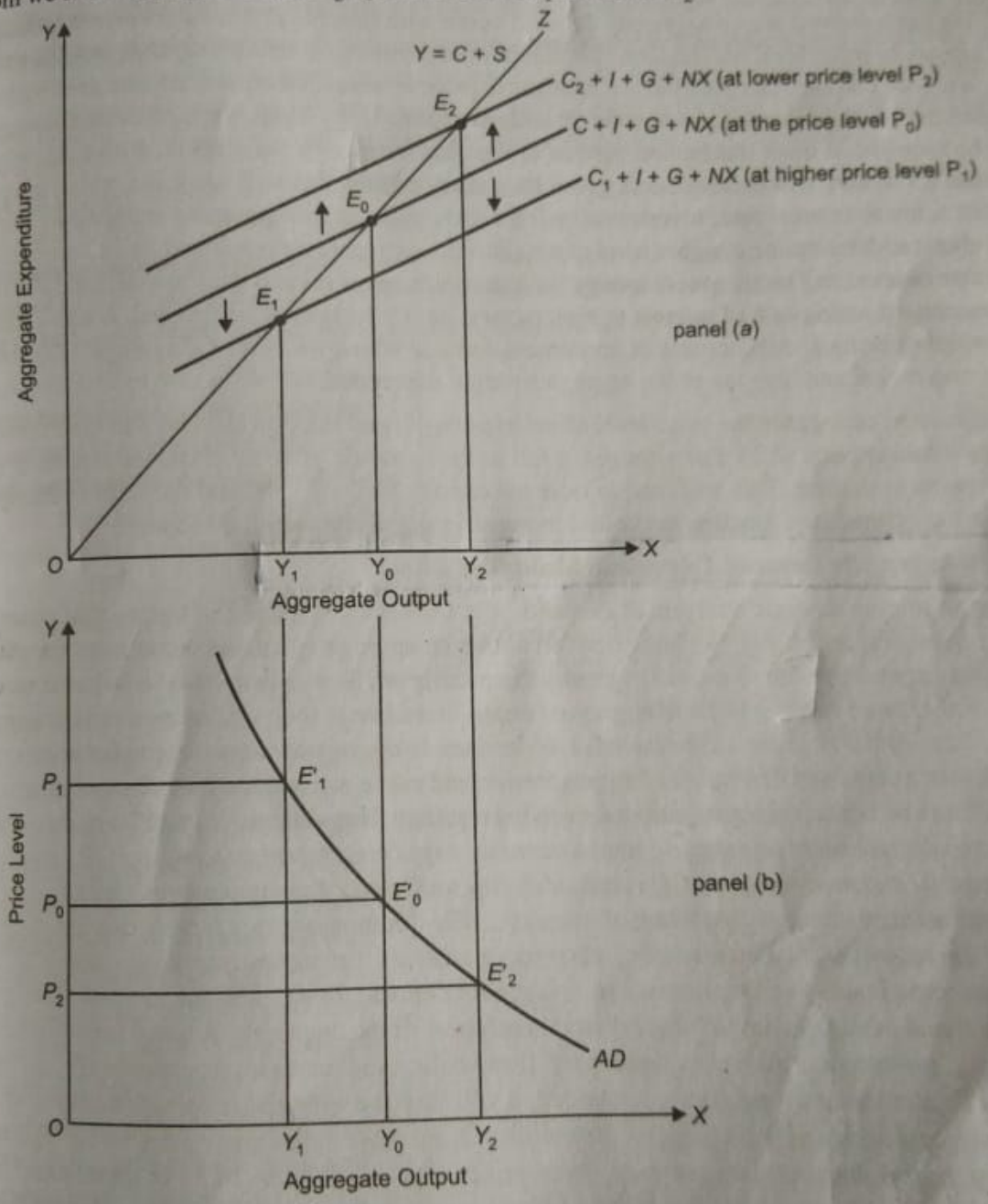

Fig. 10.2. *Derivation of Aggregate Demand Curve*

This shows that at a lower price level, more aggregate output is demanded.

Now, suppose instead of fall in price level the price level rises from P_0 to P_1. At a higher price level, the real value of money balances and financial assets with fixed nominal value will decrease. As a result, people will feel poorer than before causing them to spend less on consumption than before at each level of national income. This will cause a downward shift in the consumption function causing

the whole aggregate expenditure function curve to shift downward to the new lower level $C_1 + I + G + NX$. It will be seen from the upper panel of Fig. 10.2 that the new aggregate expenditure curve $C_1 + I + G + NX$ intersects the 45° line at point E_1 and determines equilibrium at a lower national income Y_1 at which aggregate output demanded and produced are equal. Accordingly, against a higher price OP_1, we plot a smaller aggregate output Y_1 demanded. It will be seen from the panel (*b*) at the bottom of Fig. 10.2 that aggregate demand curve obtained by plotting various equilibrium quantities of aggregate output demanded at different price levels slopes downward to the right.

We have derived above aggregate demand curve with flexible prices by considering the effects of changes in price level on consumption function and through it on aggregate expenditure curve. Similarly, we can consider the effect of changes in price level on two other components of aggregate expenditure, such as investment demand (I) and net exports (NX). Thus, when price falls, less money will be required to meet transaction motive of demand for money. As a result, with a fall in price demand for money will decrease and, given the money supply, this will cause the rate of interest to fall. At a lower interest rate, investment will increase causing the aggregate expenditure curve to shift above and determine a higher level of equilibrium aggregate output demanded. Conversely, the rise in price level will require more money for transaction purposes and therefore demand for money will increase causing rate of interest to rise, money supply remaining unchanged. A rise in interest rate will thus bring about decrease in investment demand which will shift the aggregate expenditure curve downward and thus lower the aggregate output demanded.

Similarly, changes in the price level affect exports (X) and imports (M) and will therefore cause change in net exports (NX). For example, a fall in the domestic price level causes exports to go up and imports to decline. This will tend to raise net exports ($NX = X - M$) and will lead to the upward shift in the expenditure function curve and increase in aggregate output demanded.

Shift in Aggregate Demand Curve and Multiplier Effect

As in microeconomic analysis of demand, it is important to know the factors that cause shift in aggregate demand curve. We have derived above an aggregate demand curve from the shifts in aggregate expenditure curve caused by changes in price level. Now, *when some factors other than the price level change causing shifts in aggregate expenditure curve*, they will cause a shift in aggregate demand curve, that is, *there will be increase or decrease in aggregate output demanded at every price level*. In our analysis of derivation of aggregate demand curve, we assumed the changes in aggregate expenditure and hence aggregate output demanded resulting from changes in price level. In our above analysis of derivation of aggregate demand curve *we kept Government expenditure (G), taxation (T), investment (I) and money supply (M) constant as they were treated as autonomous of changes in price level* (and induced changes in the rate of interest). *When these non-price factors change, aggregate demand curve will shift*. For example, when expectations of investors regarding earning of future profits increase leading to the increase in investment demand, this will cause increase in aggregate output demand at each given price level and therefore shift the aggregate demand curve to the right. Similarly, if government adopts expansionary fiscal policy and increases its expenditure, say by ΔG, it will cause more quantity of goods demanded, it will shift the aggregate expenditure curve upward. As a result, equilibrium level of aggregate output will increase at the given price level. This means shift in aggregate demand curve at each given price. Consider Figure 10.3. In upper panel of this figure, to begin with, aggregate expenditure curve at a given price level, say P, is $C + I + NX + G$ which intersects 45° line at point E yielding equilibrium level of national income or output equal to Y_1. In panel at the bottom, the equilibrium output demanded Y_1 is shown against the given price level P. Now suppose the Government increases its expenditure by ΔG. As a result, with price level remaining fixed at P, aggregate expenditure curve in the upper panel shifts upward to the higher position ($C + I + NX + G + \Delta G$), which intersects 45° line at point H yielding a higher level of equilibrium output Y_2. Since price remains fixed at P, the greater quantity Y_2 of equilibrium output demanded is shown

on a *higher aggregate demand* curve. This means aggregate demand curve has shifted outward as a result of increase in Government expenditure. We have taken one price level P and have shown how increase in Government expenditure causes greater aggregate demand at that given price. Similarly, we can take other price levels and corresponding aggregate expenditure curves in the upper panel and show how increase in Government expenditure will mean greater aggregate demand than before at each price. In this way, we find the entire aggregate demand curve has shifted to the right as a result of increase in Government expenditure, that is, more aggregate output is demanded at each price.

Multiplier effect. It will be recalled that increase in Government expenditure or investment has a multiplier effect on aggregate output depending on the size of multiplier. In our Figure 10.3 increase in Government expenditure by ΔG has caused aggregate output to increase by Y_1Y_2 or RT. Thus the increase of Y_1Y_2 in GNP or increase in aggregate output demanded by RT is given by

$$\Delta Y = Y_1Y_2 = RT = \Delta G \frac{1}{1-mpc}$$

where *mpc* is the marginal propensity to consume and $\frac{1}{1-mpc}$ is the value of multiplier. As in case of increase in Government expenditure, *reduction in taxes* will also increase aggregate output demanded at each price level and will therefore cause a shift in aggregate demand curve.

Similarly, *increase in money supply* (M) will cause a rightward shift in aggregate demand curve. In the derivation of a given aggregate demand curve, money supply in the economy is held constant. If at a given price level, money supply is increased, the interest rate will fall. The fall in interest rate will cause investment demand to increase. Aggregate output demanded will thus be greater at the given price level. Thus, expansion in money supply brings about shift in aggregate demand curve to the right.

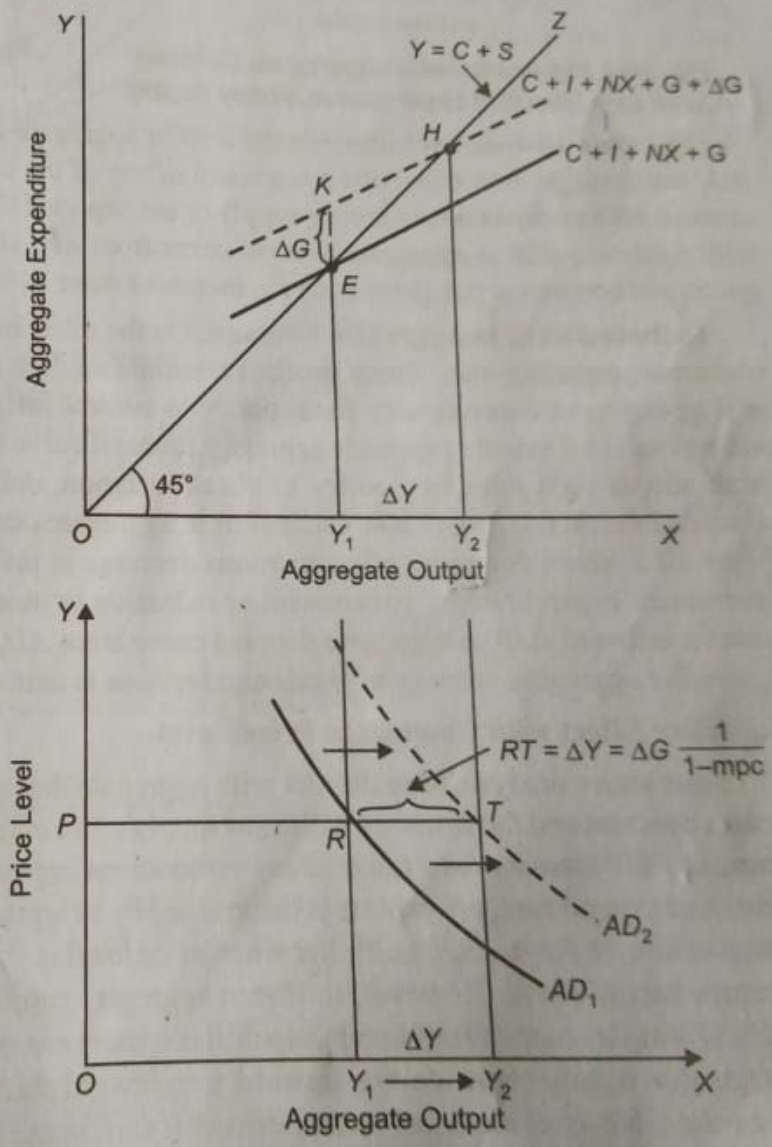

Fig. 10.3. *Shift in Aggregate Demand Curve in the Bottom Panel Corresponding to the Shift in C + I + NX + G*

Likewise, changes in foreign demand for our goods and our demand curve for imported goods, which we have so far not included in our analysis, also influence aggregate demand curve for imported goods, which we have so far not included in our analysis, also influence aggregate demand of the economy. For example, if foreign exchanges rate of rupee falls, that is, if rupee depreciates against US dollar, this will encourage our exports and discourage our imports and will lead to the increase in net exports (NX) and will therefore lead to the shift in aggregate demand curve to the right.

CHAPTER 18

AGGREGATE SUPPLY CURVE WITH VARIABLE PRICES

INTRODUCTION

Aggregate supply curve shows various amounts of aggregate output which the producers in the economy are willing to produce and sell in the market at various price levels. The classical economists assumed that there normally prevailed full employment of resources in the economy in other words according classical economists full employment is the normal feature of an economy. According to them, if at any time there is deviation from the full employment level, the wages, interest and prices quickly and automatically work to restore equilibrium at the full employment level. Thus, in the classical theory, the aggregate supply curve to output is perfectly inelastic (i.e. vertical straight line) at the output level corresponding to full-employment level of resources. This vertical straight line supply curve relating aggregate supply to price level of the classical theory of income and employment is shown figure below as the AS curve.

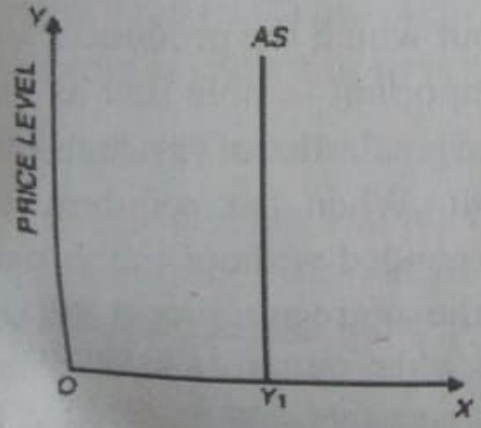

Fig. 18.1 Aggregate Supply

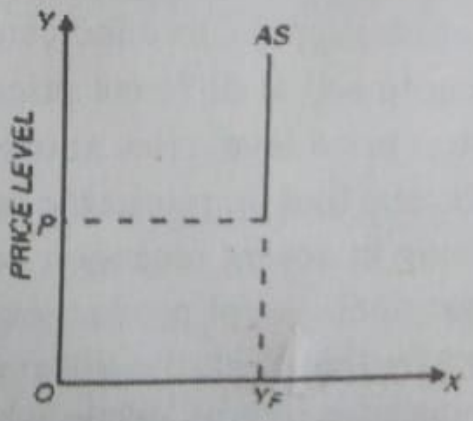

Fig. 18.2 Aggregate Supply

Now we take up Keynes's case. Keynes considered the situation of economic depression of 1929-34 when the economy was operating at less than full employment of resources. He observed that in such a situation money wage rates were sticky. With the assumption of average and marginal product being fixed more output can be produced and supplied at the given price level in response to increase in aggregate demand. But when full employment of labour and capital stock is attained and aggregate demand increases further, the price level will rise in response to the increase in aggregate demand. Keynes's aggregate supply curve depicting the relationship between price level and the aggregate supply is shown in figure. We see that upto the level of aggregate output OYF aggregate supply is a horizontal straight line (i.e. perfectly elastic) showing thereby that more is produced and supplied at the same price level OP. OY_F is the full employment level of aggregate output (p.e. potential GNP) and therefore beyond that point aggregate curve becomes vertical (i.e. perfectly inelastic).

It may however be noted that Keynes recognized that as the aggregates supply approaches the full-employment level, cost of output per unit tends to rise due to the rise in wage rate and also due to the law of diminishing returns to the other factors employed. According to Keynes, the rise in price level before full employment will not be much made us compared post-full employment level.

It is evident from the above analysis that the shape of aggregate supply curve is a highly controversial issue. As mentioned above, aggregate supply curve indicates the total output which the producers are willing to sell at different price levels. It is important to note that as the average price level rises above the current marginal cost of product and producers find it profitable to expand output. When the economy is working in severe recession output can be expanded without much rise in marginal cost of production and therefore the aggregate supply curve is nearly flat. With the given stock of capital when output is expanded, diminishing returns occur which cause the aggregate supply curve to slope upward gently. But as the firms industry in the economy approach their full capacity output, their marginal costs sharply rise which mean a rising aggregate supply curve. When the resources of the economy are fully employed, aggregate supply curve (AS) becomes a vertical straight line as is shown in the figure above.

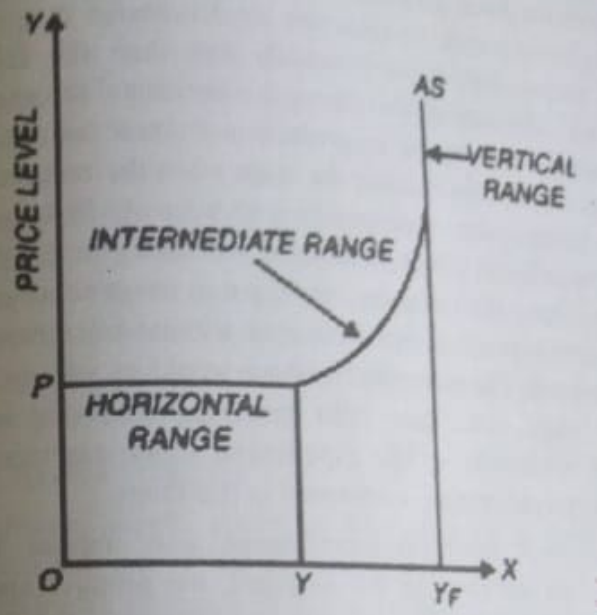

Fig. 18.2

For the present purpose, it is useful to think of aggregate supply curve as comprising of three segments or ranges: (1) the horizontal range, (2) the intermediate (or upward sloping) range, and (3) the vertical range. This aggregate supply curve having three distinct segments is shown in figure.

HORIZONTAL RANGE

Since Keynes and his followers thought that aggregate supply curve was horizontal, this range is also called Keynesian range. It may be noted that the shape of aggregate supply curve is governed by what happens to unit cost of production as output expands or contracts. It will be noticed from figure 18.2 that we have taken Y_F as the full employment level of output, that is, Y_F is the capacity production. This represents the level of output which is produced when available resources of the economy are fully employed. Therefore, this full-

curve will shift to the right. As labour force grows and supply of capital is increased through investment, the short-run aggregate supply curve will shift to the right implying that more output will be produced for sale at any given price level.

Q. 2. State the three-stage Aggregate Supply Curve.

Ans. The aggregate supply curve is a concept in macroeconomics that, with the addition of the aggregate demand curve, shows the equilibrium level of prices and quantity in an economy. It is also used to analyze changes in gross domestic product (GDP). The aggregate supply curve is derived by using two, and sometimes three stages. These stages are defined as short, medium and long run aggregate supply.

The Aggregate Supply Curve. The aggregate supply curve is a term used in macroeconomics that describes the relationship between the quantity of goods and services and price. In sum, it depicts how much of a certain good can be produced at a given price level. Graphically the aggregate supply curve is upward-sloping when price is depicted on the *y*-axis and quantity is depicted on the *x*–axis. The line is not straight. However, but starts off with a small slope after intersecting the *y*-axis and gradually becomes more steep as quantity increases. The curve eventually becomes nearly vertical. This change in slope is due to the fact that aggregate supply is broken down into three stages. Each stage is affected by different factors.

First Stage Short Run Aggregate Supply. The first stage in an aggregate supply curve is known as short run aggregate supply, often abbreviated as SRAS. Some economists also describe this as the Keynesian stage. It is assumed that a firm has two resources available for production labour and capital. In the short run a firm can only increase labour, but not capital. This is because capital, which encompasses assets such as buildings and machinery takes time to implement. Also, as wages are assumed to be static in the short run, increases in labour only result in increased quantity, but not price. This is why the SRAS curve is almost horizontal at this stage.

Second Stage Medium Run Aggregate Supply. Medium run aggregate supply or MRAS is regarded as the intermediate level as unlike the SRAS curve capital can now be altered in quantity. However, similar to the SRAS curve wages can be changed although not quickly. It is assumed that it takes time to give workers a pay raise. This is known as sticky wages. As a result the MRAS curve has a steeper slope than that of the SRAS curve, but not quite as steep as the long run aggregate supply curve.

Third Stage Long Run Aggregate Supply. The third and final stage of the aggregate supply curve is known as the long run aggregate supply curve (LRAS). In the long run it is assumed that labour wages and capital are all controllable. Furthermore, technological improvements are inevitable in the long run. Technology has the effect of increasing levels of production while holding labour and capital constant. This is because increased technology makes the production process more efficient. As a result the LRAS curve is almost a vertical line. With an increase in technology, this vertical line will shift to the right. A vertical line tells us that a given quantity of goods produced is achievable at any price level.

Q. 3. Explain long run Aggregate Supply Curve.

Ans. The long-run aggregate supply is determined by three real factors such as availability of labour, the quantity of capital stock and the state of

curve, but not quite as steep as the long run aggregate supply curve.

Third Stage Long Run Aggregate Supply. The third and final stage of the aggregate supply curve is known as the long run aggregate supply curve (LRAS). In the long run it is assumed that labour wages and capital are all controllable. Furthermore, technological improvements are inevitable in the long run. Technology has the effect of increasing levels of production while holding labour and capital constant. This is because increased technology makes the production process more efficient. As a result the LRAS curve is almost a vertical line. With an increase in technology, this vertical line will shift to the right. A vertical line tells us that a given quantity of goods produced is achievable at any price level.

Q. 3. Explain long run Aggregate Supply Curve.

Ans. The long-run aggregate supply is determined by three real factors such as availability of labour, the quantity of capital stock and the state of technology. In the long run price level is variable and the aggregate supply curve is vertical. On the other hand, Keynes considered the short-run aggregate supply which is perfectly elastic at the fixed price level in the period of depression.

However, in the modern or new Keynesian macroeconomics short-run aggregate supply curve slopes upward. Further, this short-run aggregate supply fluctuates over the course

Same as in H.L Ahuja

And full employment is said to exist in spite of the existence of frictional and structufal unemployment. The quantity of real GDP produced and supplied when there is full employment (that is, when there exists only natural rate of unemployment) is called potential GDP. It may be noted again that potential GDP depends on full employment of labour, the full use of the existing stock of capital and the available technology. The long-run aggregate supply describes the relationship between the quantity of real GDP and the price level in the long run when real GDP equals potential GDP. The long-run aggregate supply curve is a vertical line (at potential GDP) level as shown by LAS in Figure. 5.6. The long-run aggregate supply is vertical because potential GDP does not vary with price level, that is, it is independent of the price level. The reason for the independence of potential GDP from the price level is that the movement along the long-run aggregate supply curve involves not only the change in price level of goods but also prices of factor inputs such as wages of labour etc.

For example, when there is 5 per cent decrease in the prices of goods and services, this is matched by the same (i.e. 5 per cent) decline in wage rate and other factor prices so that relative prices and real wage rate remain unchanged. This explains why it is profitable to produce the same quantity of real GDP at lower price level of goods and services.

When price level of goods and services falls, the cost also falls as wage rate and other factor prices fall by the same percentage. Therefore, aggregate supply of output (i.e. real GDP) in the long run also remains constant at potential GDP level.

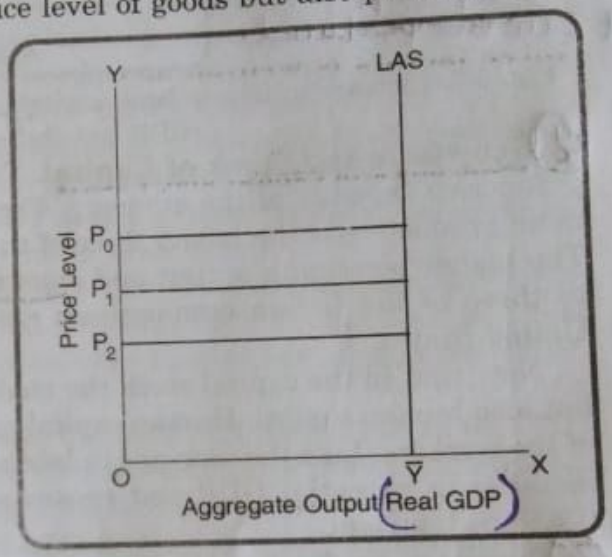

Fig. 5.6. Long Run Aggregate Supply Curve

It is evident from above that long-run aggregate supply curve is the same as the classical aggregate supply curve.

Changes in Long-run Aggregate Supply Curve. Long-run aggregate supply curve is a vertical straight line at the level of potential GDP. Changes in price level bring about a movement along the long-run aggregate supply, but the quantity of aggregate supply remains fixed at the level of potential GDP. It is changes in potential GDP that causes a shift in the long-run aggregate supply curve.

The following factors cause a change in potential GDP resulting in a shift in the long-run aggregate supply curve :

1. The change in the full employment quantity of labour.
2. Change in the stock of capital.
3. Progress in technology.

(1) Increase in Labour Force Labour is an important resource of production. Over time, given the capital stock and the state of technology, potential GDP will increase as full-employment quantity of labour force increases. Therefore, the increase in the full-employment quantity of labour force causes a shift in the long-run aggregate supply curve to the right as shown in Figure 5.7.

It may be noted that changes in labour employment over the business cycle cause fluctuations in real GDP. But these changes in real GDP that take place over the business cycle are not changees in potential GDP. Changes in potential GDP occur due to changes in labour force and stock of capital, and improvement in technology.

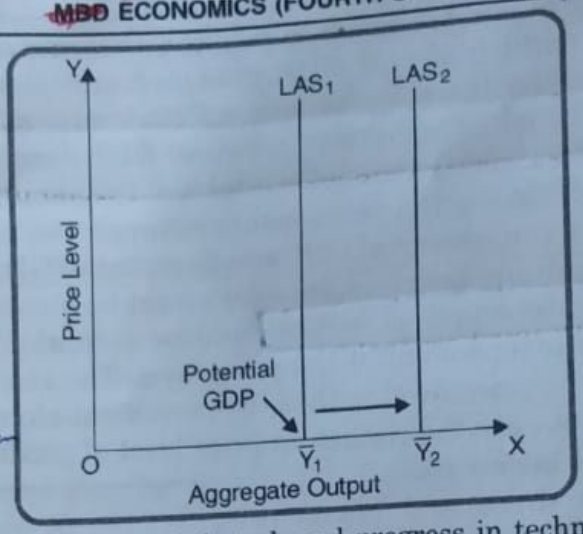

Fig. 5.7. Increase in labour force, capital stock and progress in technology increases potential GDP and shifts LAS curve to the right

(2) Growth in the Stock of Capital. The stock of capital in an economy determines the productive capacity of the economy. The larger the stock of capital in the economy, the more productive is the labour force of the economy and the greater is its potential GDP. The higher per capita output and potential GDP of the American economy as compared to those of the Indian economy are mainly due to the greater stock of capital in the United States.

Note that in the capital stock the modern economists include not only physical capital but also human capital. Human capital means the acquired skills, education and training of the workers. Like the increase in labour force, growth in capital stock also brings about increase in potential GDP and causes a shift in the long-run aggregate supply curve (LAS) to the right.

(3) Progress in Technology. Progress in technology enables firms to produce more from the given resources, Empirical research studies have shown that technological progress is by far the most important source of increase in GDP over the past two centuries. It is due to advances in technology that a modern worker, both in industry and agriculture, produces many times more output than the worker in the olden times. Thus, even with the fixed quantities of labour and capital, progress in technology raises potential GDP and causes shift in the long-run aggregate supply curve to the right.

We have shown long-run aggregate supply curve LAS and short-run aggregate supply curve together in Fig. 5.8. It will be seen that short-run aggregate supply curve at potential GDP level and beyond potential GDP level Y, it becomes highly steep.

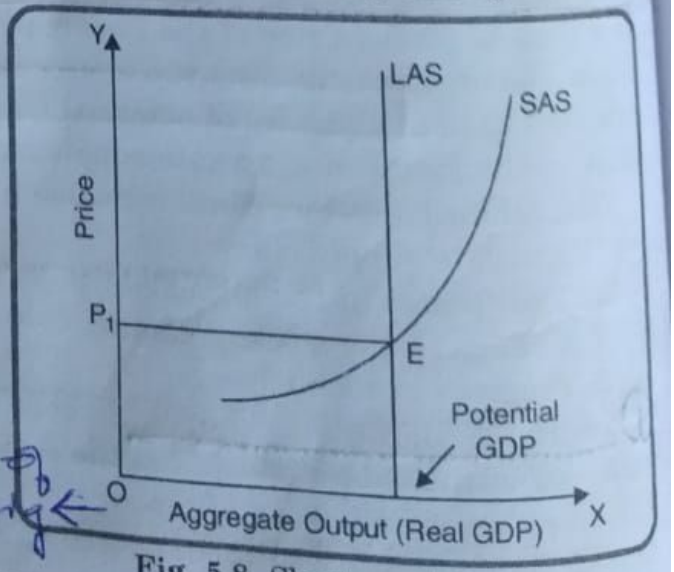

Fig. 5.8. Short run AS curve

Q. 4. What is Potential GDP and why does it matter ?

Ans. Potential gross domestic product (GDP)

supply curve.

...fore does not cause a shift in the long-run aggregate

Changes in Potential GDP and Aggregate Supply Curve

As explained above, changes in potential GDP are brought about by changes in labour force, capital-stock and state of technology. Any increase in potential GDP increases both the long-run and short run supply curves. This is illustrated in Fig. 10.17. To start with, with potential GDP equal to $\bar{Y}_1$ the long run aggregate supply curve is LAS_1.

If due to increase in either labour force or stock of capital or improvement in technology potential GDP rises to $\bar{Y}_1$, the long run aggregate supply increases causing a rightward shift in the long-run aggregate supply curve to LAS_2. Moreover, increase in potential GDP effected by either increase in labour force or capital stock or improvement in technology would also increase the short-run aggregate supply and shift the short-run aggregate supply curve (SAS) to the right. This will be observed from Fig. 10.17 where along with the rightward shift in the long-run aggregate supply curve from LAS_1 to LAS_2 the short-run aggregate supply curve also shifts to the right from SAS_1 to SAS_2.

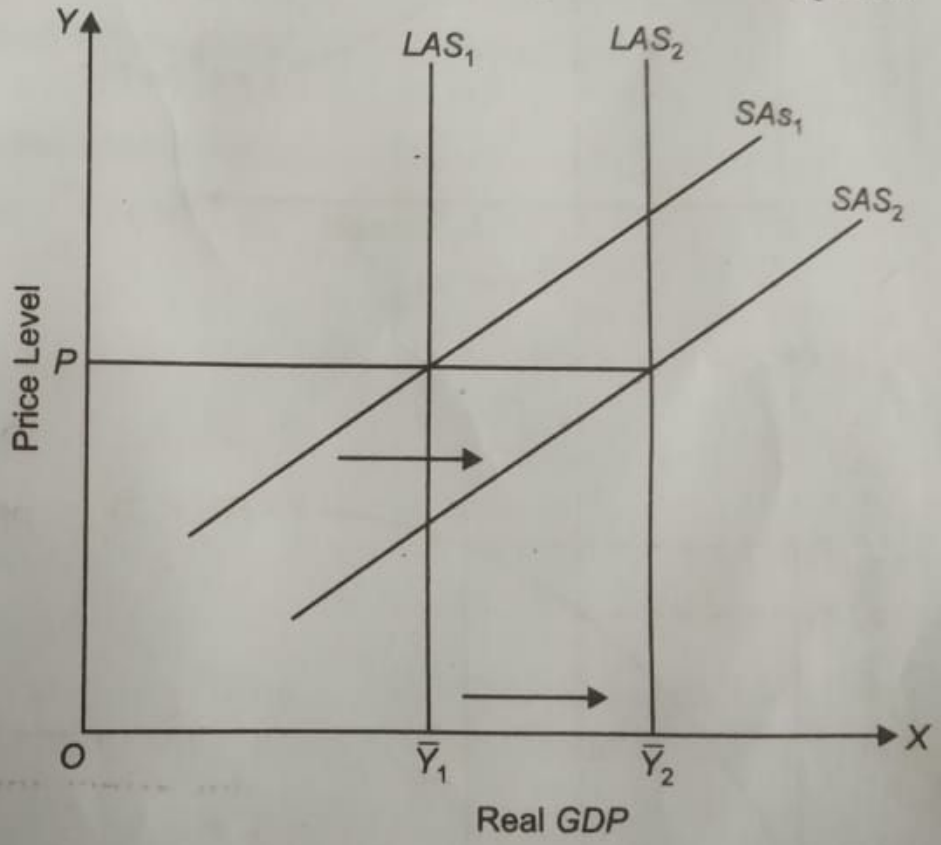

Fig. 10.17. *Increase in Potential GDP affects both the long-run and short-run aggregate supply curves.*

(SAS) the long-run aggregate supply curve (*LAS*) at the level of current real price level as shown by point *E* in Figure 10.19. When the actual price level rises above the expected price level ($P > P^e$ or $P - P^e > 0$) . the real wage rate will fall and consequently more labour will be employed resulting in more aggregate output. With this we will move towards right form *E* on short-run supply curve *SAS*. This implies that the level of unemployment will fall below the natural rate of unemployment.

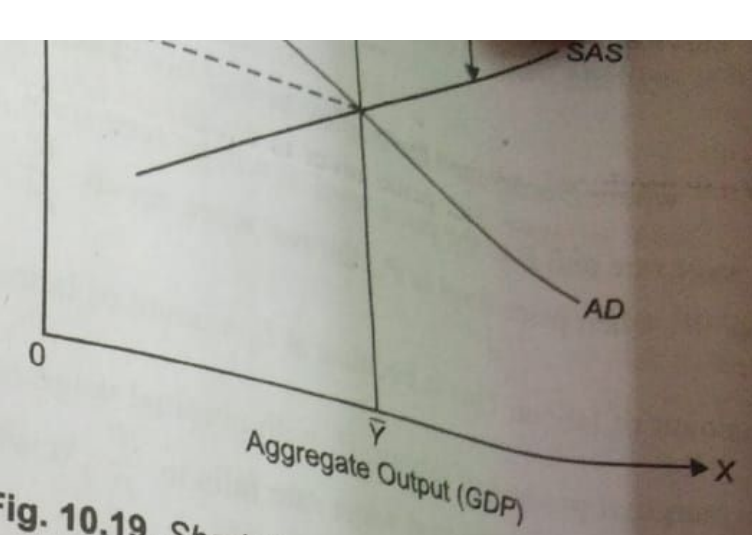

Fig. 10.19. *Short-Run and Long-Run Aggregate Supply Curve*

On the other hand, when actual price level falls below the expected price level ($P < P^e$ or $P - P^e < 0$) real wage rate will rise above the target wage rate. This will induce the firms to reduce the quantity of labour employed resulting in smaller aggregate output produced. As a result, with the initial equilibrium at point *E*, the economy will be move to the left of point *E*. With this, real GDP will be below the potential GDP ($\bar{Y}$) and rate of unemployment well rise above the natural rate of unemployment.

MACROECONOMIC EQUILIBRIUM : AS-AD MODEL

Having explained the concepts of aggregate demand and aggregate supply with variable price level. Now we shall explain how macroeconomic equilibrium is reached between the aggregate supply

and aggregate demand to determine the amount of real GDP and the price level. As there is difference between the long-run and the short run aggregate supply curves, the long-run equilibrium differs from the short-run macroeconomic equilibrium. while long-run equilibrium is the state towards which the economy is moving short-run equilibrium is the actual state of the economy in the short run as it fluctuates around potential GDP. The purpose of AS-AD model is to explain how the various events, fiscal and monetary policies bring about changes in both real GDP and price level. We explain below both the short-run and long-run macroeconomic equilibrium.

Short-Run Macroeconomic Equilibrium

Short-run macroeconomic equilibrium occurs at the price level at which aggregate output demanded equals aggregate supply of output. That is, short-run equilibrium is reached at the price level at which aggregate demand curve *AD* intersects the short-run aggregate supply curve *SAS*. This is shown in Fig. 10.20 where *AD* is the aggregate demand curve and *SAS* is the aggregate supply curve. It will be seen that the short-run macroeconomic equilibrium occurs at point *E* at which the price level is P_0 and the real GDP is Y_0. If price level is different from P_0, the economy will not be in equilibrium. Suppose, for example, price level is P_2, the quantity of the real GDP demanded at P_2 is less than the quantity P_2B of real GDP supplied. This means the firms will not be able to sell all their output. As a result ,unintended inventories will pile up and firms will cut both production and prices. The process of cutting production and prices will continue until the equilibrium price level P_0 is reached and real GDP produced and sold is Y_0.

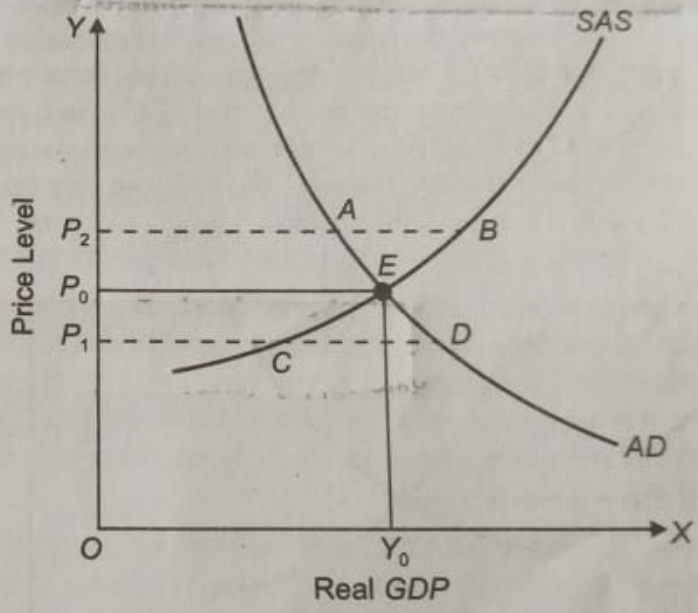

Fig. 10.20. *Short-Run Macroeconomic Equilibrium: Joint Determination of GDP and Price Level*

Now suppose that price level is P_1. It will be seen from Fig. 10.20 that at price level P_1 the quantity of aggregate output demanded (P_1D) exceeds the aggregate quantity suppled (P_1C). Thus at the price level P_1, the people will not be able to get all the goods and services they want to buy. As a result, inventories of goods with the firms will decrease below the desired level to meet the higher demand. This will induce firms to increase production and raise prices. The production and price level will rise until price level P_0 is reached and real GDP produced is Y_0 which meets the demands of the people fully at the price level P_0. Thus, the price level P_0 and real GDP equal to Y_0 represents the short-run macroeconomic equilibrium.

It is worthwhile to note that in the short run the money wage rate is fixed. *It does not adjust to bring macro equilibrium at full-employment level of real GDP.* Thus, in the short run macro equilibrium can be attained with real GDP less than or greater than potential GDP (*i.e.* the level of GDP at which there is full employment of labour) depending on the level of aggregate demand. It is only in the long run when money wage rate adjusts that equilibrium is restored at potential GDP.

Further, it may be noted that fluctuations in the economy occur due to changes in the factors that cause changes in either aggregate demand or aggregate supply. For example, changes in money supply, the government expenditure, taxes, investment demand by business firms or consumption demand of households will bring about changes in aggregate demand and cause shift in the short-run macroeconomic equilibrium. On the other hand, changes in money wage rate and other resource prices such as oil price stock will cause a shift in aggregate supply curve and bring about a change in the short-run macroeconomic equilibrium

It is important to note that, according to Keynes, this equilibrium at less than full-employment level when there prevails recession in the economy comes into existence in the short run due to deficiency of aggregate demand caused by a fall in private investment by the business class. He argued that unless the Government intervenes in the economy through adoption of expansionary fiscal policy (that is, increasing its expenditure and cutting taxes) and finance its budget deficit through deficit financing, a free-market economy cannot be brought into equilibrium at full employment. (i.e. potential GDP) level. He emphasized that *a free-market economy was not self-correcting through any adjustment in wages and prices to restore equilibrium at full-employment level*. According to him, without intervention by the Government, under employment equilibrium with recession prevailing in the economy will persist in the long run. Keynes therefore did not discuss how through adjustment of wages and prices the long-run equilibrium of a free market economy is reached. On the other hand, classical economists, monetarists and New Classical economists believe in the establishment of long-run equilibrium at full employment level through automatic adjustments in wages and prices . We explain below their viewpoint.

Long-Run Macroeconomic Equilibrium

The long-run macroeconomic equilibrium occurs at the price level where the aggregate demand curve intersects the long run aggregate supply curve which is vertical at the potential GDP level. Thus, long-run equilibrium occurs when real *GDP equals potential GDP. But this long-run equilibrium of price level and real GDP is reached when money wage rate adjusts so that the short-run aggregate supply curve shifts to intersect the long-run aggregate supply curve (LAS) at the point at which*

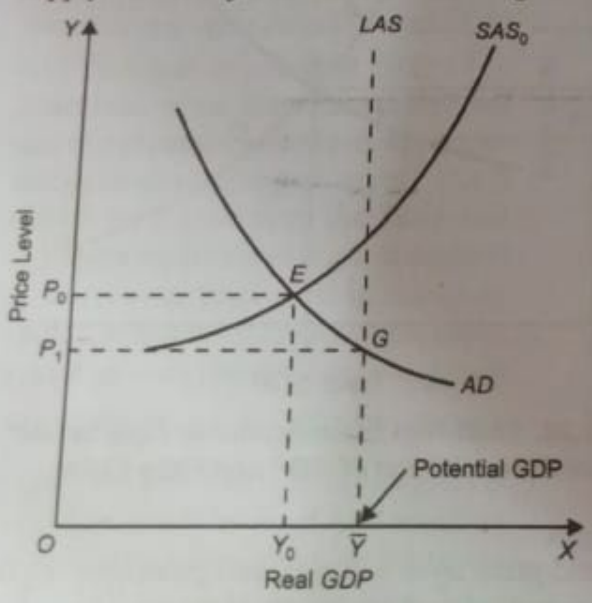

Fig. 10.21. *Short-Run Equilibrium at Less Than Full-Employment (or Potential GDP)*

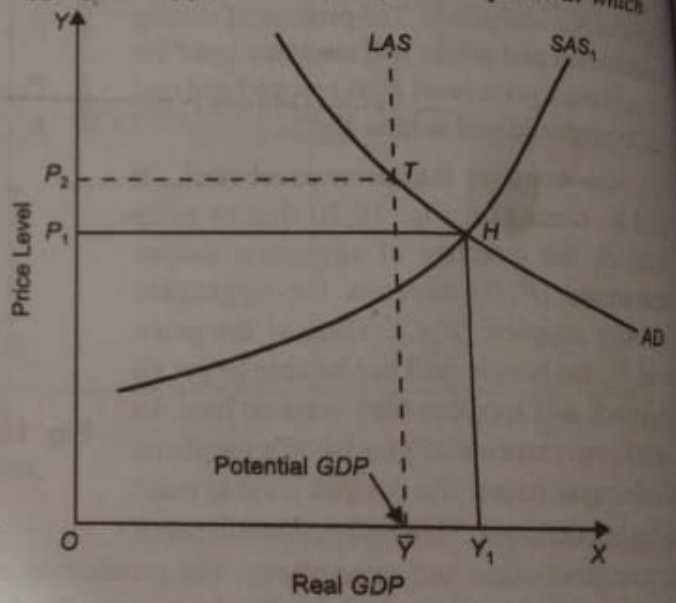

Fig. 10.22. *Short-Run Equilibrium at More Than Full-Employment Level with Inflation.*

aggregate demand curve intersects the latter. The long-run macro equilibrium and how it is reached is illustrated in Figures 10.21 & 10.22. From Fig. 10.21 it will be seen that the short-run aggregate supply curve SAS_0 intersects the given aggregate demand curve *AD* at point *E* and determines the price level equal to P_0 and real GDP equal to Y_0 in the short run. Thus in this short-run macroeconomic equilbrium, real GDP which is equal to Y_0 is less than the potential GDP (remember that the potential GDP corresponds to full employment of labour, with the given stock of capital and the given state of technology). *The difference $Y_0\bar{Y}$ between the short-run equilibrium GDP and the potential GDP is called* **recessionary gap** *which exists because at the short-run equilibrium price level P_0 aggregate demand is not sufficient for the purchase of potential GDP. Besides, the production of less than*

potential GDP implies that in the short-run equilibrium, there will exist cyclical unemployment, that is, the rate of unemployment will exceed the natural rate of unemployment.

If money wage rate is flexible as classical economists, monetarists and new classical economists think they are, then in the short run equilibrium at point E with more than natural rate of unemployment, money wage rate will fall. As a result, short-run aggregate supply curve (SAS) will shift to the right. This rightward shift in the short-run aggregate supply curve will continue until it intersects the long-run aggregate supply curve (LAS) at point G (see Figure 10.19) where the given aggregate demand cuts the latter. At the new equilibrium point G price level has fallen to P_1 and aggregate quantity of output demanded has increased to the potential GDP. Point G in the of Figure 10.19 represents the long-run equilibrium at full-employment level, that is, the level at which only natural rate of unemployment prevails.

Let us consider the opposite case when the short-run equilibrium is initially at more than potential GDP, that is, above full employment level. Suppose in Fig. 10.22 initially with aggregate demand curve AD and the short-run aggregate supply curve SAS_1, the short-run equilibrium is at point H at which the price level is P_1 and real GDP is Y_1 which is greater than potential GDP equal to $\bar{Y}$. (see Fig. 10.21).

Now, the question may be asked how real GDP has risen to the level which is more than the potential GDP. The answer is that even beyond potential GDP, real GDP rises as labour-employment increases by reduction in rate of unemployment more than the natural rate and the given capital stock is utilised more intensively. The amount $\bar{Y}Y_1$ by which real GDP which is equal to Y_1 exceeds potential GDP $\bar{Y}$) represents the ***inflationary gap*** as this gap creates inflationary pressures in the economy

When equilibrium of the economy is established at more than full-employment or potential GDP level, unemployment falls below the natural rate of unemployment, shortage of labour will emerge which will push up wages. With the rise in money wages short-run aggregate supply curve will shift to the left and this process of rise in wages and leftward shift in short-run aggregate supply curve SAS will continue until it intersects the long-run aggregate supply LAS at point T (in Fig. 10.20) at which long-run equilibrium is estabilieshed.

Again, it may be noted that, according to Keynes, equilibrium at more than full employment when inflation prevails in the economy comes into existence due to the excess of aggregate demand over aggregate supply cannot be automatically corrected through adjustment in wages and prices. He rightly argued that inflation in the economy can be overcome by *demand management policy*, that is, by reducing aggregate demand through contractionary fiscal policy *(i.e.*, reducing Government expenditure and imposing taxes) and tightening of monetary policy (*i.e.* raising interest rates) by the central Bank of the country. It is only classical, monetarist and new classical economists who believe in automatic adjustment of wages and prices to achieve long-run equilibrium at full-employment.

It follows from above that equilibrium between aggregate and aggregate supply can be there at less than full-employment level (*i.e.* at less than potential GDP), at more than full-employment level (*i.e.* at more than potential GDP or at full employment level of potential GDP.

2. The intermediate upward-sloping range, and
3. The highly steep range.

This aggregate supply curve having three distinct segments is shown in Figure 5.3.

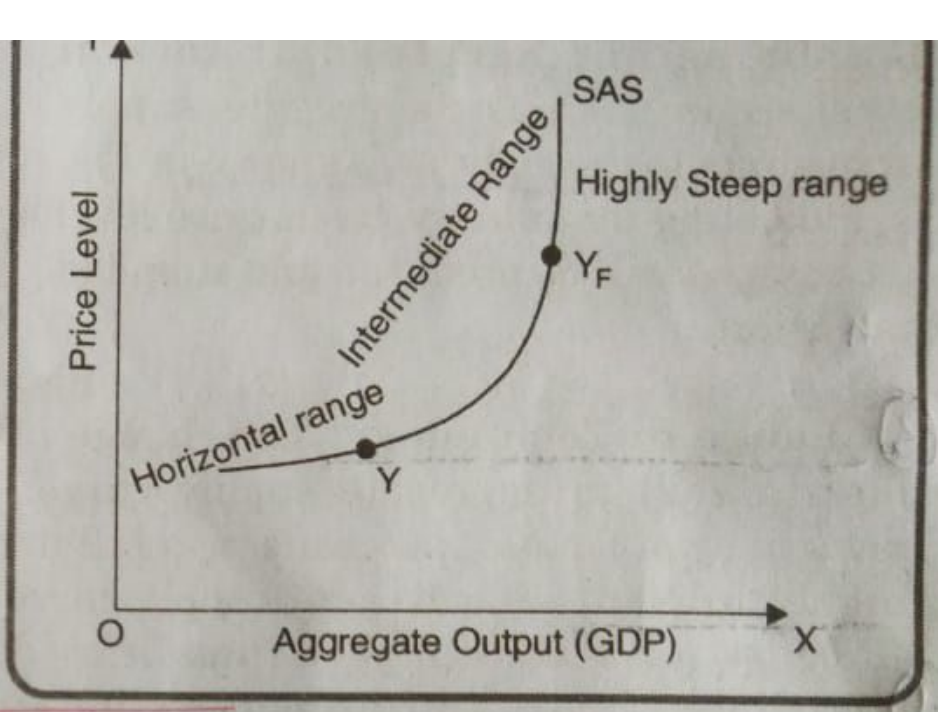

Fig. 5.3. Short-run Aggregate Supply Curve with Three Ranges

Shifts in Short-Run Aggregate Supply Curve. In explaining the upward-sloping nature of short-run aggregate supply we stated that aggregate supply curve depicts the relationship between price level and aggregate output (i.e., real GDP), other factors such as wages, input prices, technology and indirect taxes that determine aggregate supply being held constant. Now, it is the changes in these other determining factors that cause a shift in the aggregate supply curve. We explain below the factors that cause a shift in aggregate supply curve.

(1) **Change in Wage Rate.** Change in wage rate of workers is an important factor that causes a shift in short-run aggregate supply curve. For example, when wage rate of workers

increases, it causes a leftward shift in short-run aggregate supply curve. This is because increase in wages raises cost per unit of output. With a given price of output, higher wage rate means profit per unit of output will decline. As production becomes less profitable, it is likely that firms will cut back on production and supply less output. Now when wage rate of workers increases, it causes a leftward shift in short-run aggregate supply curve as shown in Fig. 5.4.

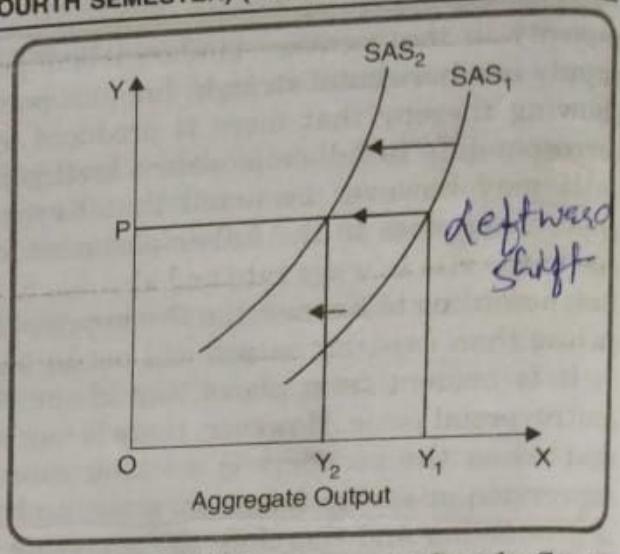

Fig. 5.4. Leftward Shift in Aggregate Supply Curve

(2) **Prices of Inputs.** Changes in prices of other inputs such as energy (for example, crude oil) and raw materials also bring about a shift in short-run aggregate supply curve. It is well known that increase in price of crude oil by OPEC in 1973 and again in 1979 affected aggregate supply by raising cost per unit of production. This caused a leftward shift in short-run aggregate supply curve as shown in Fig. 5.4. This leftward shift in the aggregate supply curve implies that at any given price level less output is supplied than before.

On the other hand, when price of crude oil falls as has happened at several occasions in the past, aggregate supply curve shifts to the right as is shown in Fig. 5.5 indicating that at any given price level more output will be produced and supplied than before.

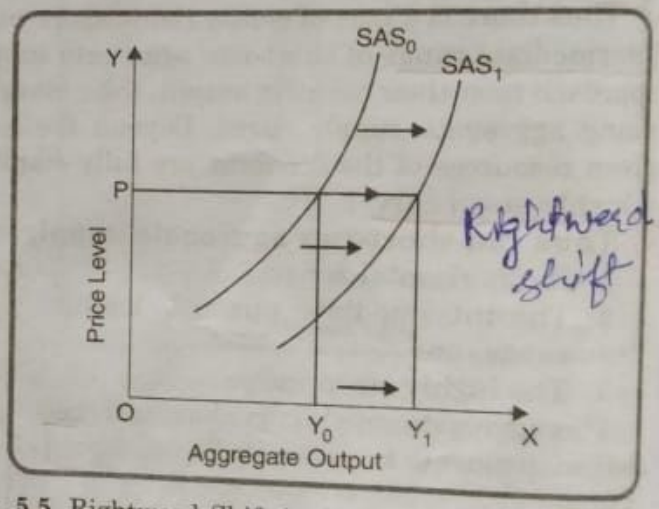

Fig. 5.5. Rightward Shift in Aggregate Supply Curve

(3) **Change in Technology.** The change in technology is another important factor that causes a shift in aggregate supply curve. When there is improvement in technology productivity of factors rises causing a fall in the unit cost of production. This brings about a rightward shift in aggregate supply curve showing that at any given price level more will be produced and supplied than before.

(4) **Business Taxes and Subsidies.** Increase in rates of business taxes such as excise duty, sales tax, customs duties raise per unit cost of production just as rise in wage rate. (Note that tax is considered as cost of production as it raises the supply price of output). Thus, by levying business taxes or increasing their rates causes a leftward shift in the aggregate supply curve.

On the other hand, lowering of taxes as happened during the recent global slowdown (2007 – 09), caused by bursting of sub–prime housing loans bubble in United States, will cause a shift in the aggregate supply curve to the right. Provision of subsidies on products of various industries also causes a shift in the aggregate supply curve to the right.

(5) **Available Supply of Resources.** Lastly, a very important factor determining the position of aggregate supply curve is the avaialble quantity of resources. When the available supplies of resources such as labour and capital increase, the short-run aggregate supply