

---

## UNIT 4 AGGREGATE DEMAND\*

---

### Structure

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Limitations of Simple Keynesian Model
- 4.3 Aggregate Demand Curve
  - 4.3.1 Derivation of Aggregate Demand Curve
  - 4.3.2 Slope of the Aggregate Demand Curve
- 4.4 Shift in the Aggregate Demand Curve
- 4.5 Multiplier Analysis with Aggregate Demand curve
- 4.6 Let Us Sum Up
- 4.7 Answers/Hints to Check Your Progress Exercises
- 4.8 Key Words

---

### 4.0 OBJECTIVES

---

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

- derive the aggregate demand curve with the help of IS-LM schedules;
- recognize the aggregate demand equation;
- discuss the factors responsible for the negative slope of the aggregate demand curve;
- explain the reasons behind the shifts in aggregate demand curve; and
- explain the changes in aggregate demand curve with the help of multiplier analysis

---

### 4.1 INTRODUCTION

---

In the previous block we learnt about the IS and LM curves which indicate the equilibrium in the goods market and the money market respectively. To identify the simultaneous equilibrium in both the markets we brought together both the curves. The interaction of the IS and the LM curves helped us in finding out the equilibrium levels of output and prices. Recall that we assumed the price level to be fixed. In this Unit we will relax this assumption and assume that there are changes in price level. We will derive the Aggregate Demand (AD) curve with the help of IS-LM analysis by keeping prices flexible. The position, slope and shifts of the Aggregate Demand curve will also be discussed.

---

\* Prof. Kaustava Barik, IGNOU and Dr. Nidhi Tewathia, Assistant Professor, Gargi College, University of Delhi

---

## 4.2 LIMITATIONS OF SIMPLE KEYNESIAN MODEL

---

Keynes argued that the Great Depression was not caused by a drop in the ability of the economy to supply goods, which is dependent on the amount of labour, physical capital, or technology. He argued that the economy often produced less than its full potential.

Such decline is not because it is technically impossible to produce more with the existing workers and machines. According to him, it is because of a lack of demand in the economy as a whole. Inadequate demand leads to inadequate incentives for firms to produce. As there is no demand for goods and services, firms cut down on their production. Keynes argued that the level of GDP in the economy was not primarily determined by the potential of what the economy could supply but rather by the level of aggregate demand (AD). Keynes' views seem to apply fairly well in the short run of a few months to a few years. In the short run there could be either of two situations: (i) many firms may experience a drop in demand for their output during a recession, and (ii) there is excessive demand such that firms have trouble producing enough during an economic boom. You should remember, however, that demand cannot tell the whole macroeconomic story. Supply of goods and services are equally important.

Suppose, aggregate demand were all that mattered at the macroeconomic level. In that case, the government could make the economy as large as it wanted just by pumping up more money into the economy and increasing total demand. The government could resort to large increase in government spending or by legislating large tax cuts to push up consumption. Economies do face genuine limits as to how much they can produce. Such limits are determined by the quantity of labour, physical capital, technology, and market structure that bring these factors of production together. The institutional set up, rules and regulations are also important. These factors constrain on what an economy can supply at the macroeconomic level. In view of this, these factors deserve equal importance in the discussion of macroeconomics.

Another way to look at the missing point in the simple Keynesian model is that it discusses aggregate demand without looking at the money market. The 'Keynesian Cross' only talks about the real sector of the economy, without looking at the relation between interest rate and the money market. Hence the analysis remains 'partial' than 'general' and it becomes important to understand aggregate demand in terms of equilibrium across sectors (goods market and money market).

Recall that the equilibrium in the economy is analysed through the IS and LM curves. Thus we derive the AD curve from the IS-LM model.

---

## 4.3 AGGREGATE DEMAND CURVE

---

It is important for us to understand that the aggregate demand curve is not the sum of all market demand curves in the economy.

Further, it is not a market demand curve itself (as you studied in microeconomics). It shows the relation between overall price level (P) in the economy with the total output produced in the economy.

While studying the goods market and the money market, we kept the price level fixed. In this Unit we relax that assumption, and deal with flexible prices.

#### 4.3.1 Derivation of Aggregate Demand Curve

In Unit 5 of 'BECC 133: Principles of Macroeconomics-I' we presented the simple Keynesian model. In that model the intersection between the  $45^0$  line and the aggregate expenditure (C+I+G) determined the equilibrium level of output. We assumed that the price level is constant. Thus aggregate expenditure meant real expenditure.

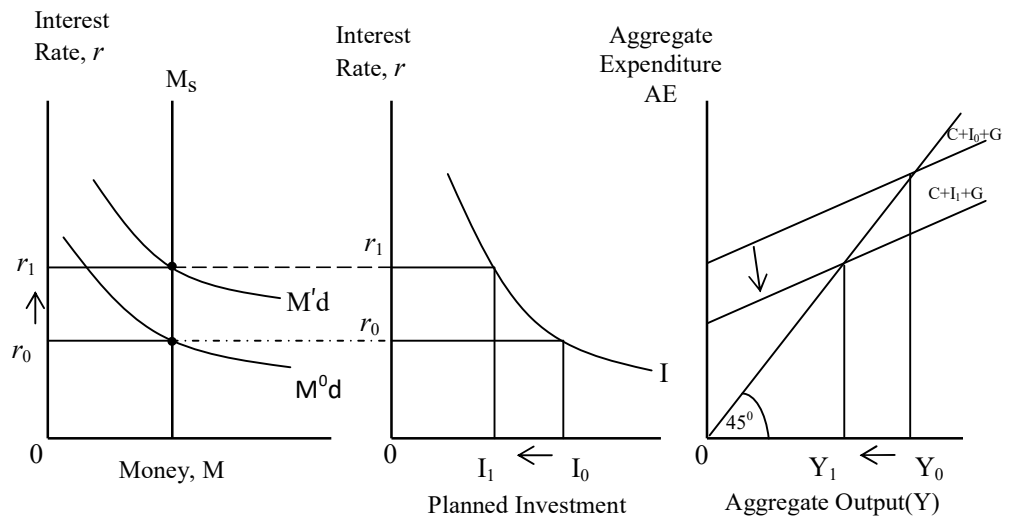
Suppose there is an increase in the price level (P) as a consequence of which the demand for money increases. Consequently, the money demand curve shifts to the right and this leads to excess demand for money at the existing interest rate.

To derive the aggregate demand curve, we need to go back to the demand for money curve (see Unit 9 of BECC 133: Principles of Macroeconomics – I). As per our knowledge, if output  $Y$  increases, the money demand curve shifts to the right. An implication of the above is that there is an increase in the interest rate ( $r$ ). In case of a decrease in  $Y$ , the reverse process takes place (see Fig. 4.1). Thus, we note that money demand depends on  $Y$ . Remember that in the money demand model, the demand for money depends on nominal income ( $PY$ ) and the interest rate ( $r$ ). Since we assumed  $P$  to be constant, an increase in real income ( $Y$ ) led to an increase in nominal income ( $PY$ ). As you know, nominal income ( $PY$ ) can increase in either of two ways: increase in real income ( $Y$ ) and increase in price level ( $P$ ). As pointed out above, an increase in nominal income shifts the money demand curve to the right, which leads to an increase in the interest rate. Thus, we can say that an increase in  $P$ , with  $Y$  constant, shifts the money demand curve to the right.

Recall that fiscal policy variables of an economy are government expenditure and tax rate. Similarly, money supply is a monetary policy variable. In the money demand analysis, we assumed that fiscal and monetary policy variables, viz., government expenditure ( $G$ ), taxes ( $T$ ) and money supply ( $M_s$ ) are constant. It implies that the government does not take any action to influence the economy when the price level changes.

Let us see what happens if the *price level* changes. Suppose there is an increase in price level ( $P$ ), because of which there is an increase in nominal income. As a result, there is an increase in the demand for money. The money demand curve shifts to the right from  $M_d^0$  to  $M_d'$ . It leads to excess demand for money at the existing interest rate  $r_0$ . We assume that money supply ( $M_s$ ) is constant so that the new equilibrium in the money market will be re-established at a higher rate of interest ( $r_1$ ).

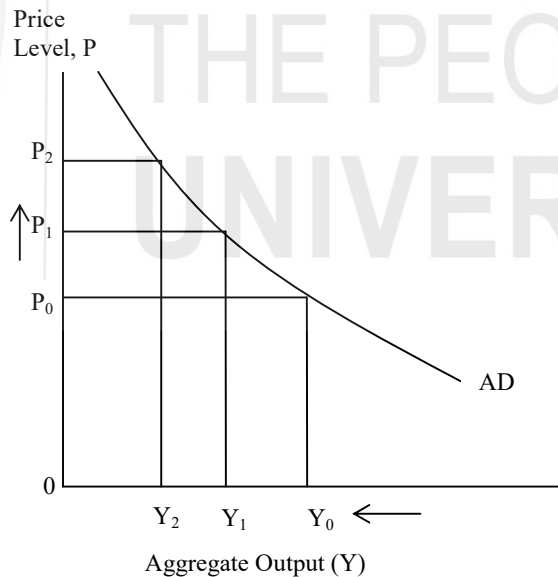
**GDP and Price Level in Short Run and Long Run**



**Fig. 4.1: Derivation of the Aggregate Demand curve**

The increase in  $r$  will lead to a decrease in planned investment from  $I_0$  to  $I_1$ . As a result, aggregate demand will decrease from  $(C+I_0+G)$  to  $(C+I_1+G)$ . Consequently, the equilibrium output will decrease from  $Y_0$  to  $Y_1$  (see Fig. 4.1).

Conversely, suppose there is a decrease in  $P$ . The consequences are as follows: the money demand curve shifts to the left; there is a decrease in  $r$ ; there is an increase in planned investment; it results in a higher equilibrium value of  $Y$ . Thus there is a negative relationship between  $P$  and  $AD$ .

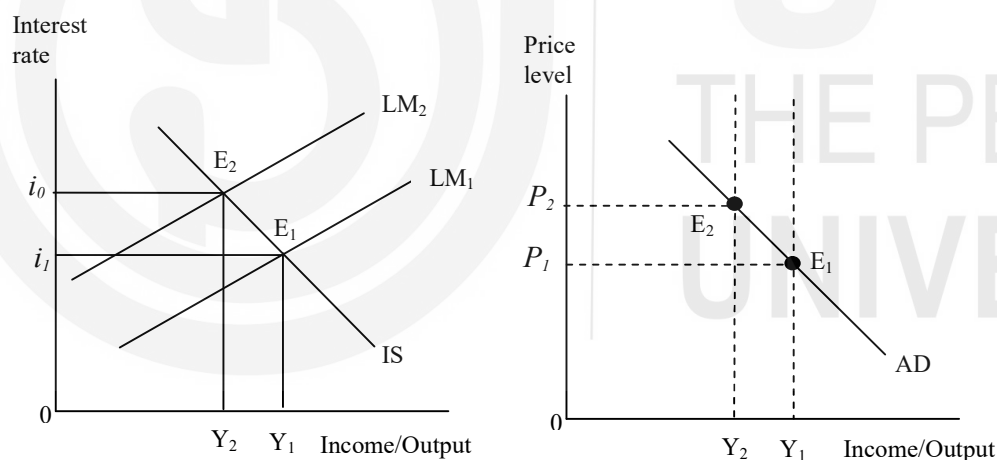


**Fig. 4.2: The Aggregate Demand curve**

We have established that there is a negative relationship between the price and aggregate output (income)  $Y$ . This relationship is called the **Aggregate Demand (AD) curve** (see Fig 4.2), It is important to remember that we have taken the policy variables  $G$ ,  $T$ , and  $M_s$  to be fixed.

Given particular values of the policy variables and given a particular value of  $P$ , we can determine the equilibrium values of  $Y$  and  $r$ . These values correspond to equilibrium in the goods market and the money market for the given value of price and the values of the policy variables. Now we change  $P$  but leave the other policy variables unchanged. This gives us new equilibrium values of  $Y$  and  $r$ . Thus, for each value of  $P$  we get an equilibrium value of  $Y$ . The AD curve is just a plot of these values. You should note that each point on the AD curve corresponds to equilibrium in the goods market and the money market.

We can plot the aggregate demand curve from the IS-LM equilibrium. Suppose the price level in the economy is  $P_1$  as shown in Fig. 4.3. The real money supply, which determines the position of the  $LM_1$  curve, is  $\bar{M}/\bar{P}_1$ . The intersection of IS and  $LM_1$  curves gives the level of aggregate demand corresponding to price  $P_1$  and is so marked in the lower panel ( $E_1$ ). Suppose the price level increases to  $P_2$ . The curve  $LM_2$  shows the LM curve based on the real money supply  $\bar{M}/\bar{P}_2$ . The  $LM_2$  curve is to the left of the  $LM_1$  curve since  $\bar{M}/\bar{P}_2 < \bar{M}/\bar{P}_1$  (remember that money supply remains unchanged at  $\bar{M}$ ). The new equilibrium is at  $E_2$ . Behind the equilibrium lies dynamic adjustment process wherein excess demand for money leads to an increase in the interest rate from  $i_1$  to  $i_2$ . Point  $E_2$  shows the corresponding point on the aggregate demand curve in the lower panel ( $E_2$ ).



**Fig. 4.3: Derivation of the Aggregate Demand curve**

If we repeat this for various levels of price, then we get a number of points indicating the intersection between price and output. If we join together these points we get the aggregate demand (AD) curve. So, the aggregate demand curve is downward sloping showing that if overall price level increases the total output in the economy falls and vice-versa. You should also note that all the points on the aggregate demand curve indicate equilibrium in the goods market as well as the money market (since these points are derived from the intersection of IS and

LM curves). It means that if there is any point away from the AD curve then simultaneous equilibrium in both the markets does not exist.

### **4.3.2 Slope of the Aggregate Demand Curve**

We just found that  $Y$  and  $P$  have a negative relationship and the aggregate demand (AD) curve slopes downwards. For a given level of the nominal money supply ( $\bar{M}$ ), higher prices mean a lower real money supply ( $\bar{M}/P$ ). Quite simply, higher prices mean that the value of the number of available rupees is low. As a result, a high price level means a low level of aggregate demand. Similarly, a lower price level means a higher level of aggregate demand. Thus, the aggregate demand curve slopes downwards. In other words, the factors which are responsible for the slope of IS and LM curves also are responsible for the slope of aggregate demand curve.

Further to understand why the aggregate demand curve slopes downwards we need to recall that economy's GDP is the sum of its consumption, investment, government expenditure and net exports. Each of these four components contributes to the aggregate demand for goods and services. If we assume that government spending is fixed by the policy, the other three components of spending which are consumption, investment and net exports depend on economic conditions and in particular, on the price level. Hence, we must examine how the price level affects the quantity of goods and services demanded for consumption, investment and net exports.

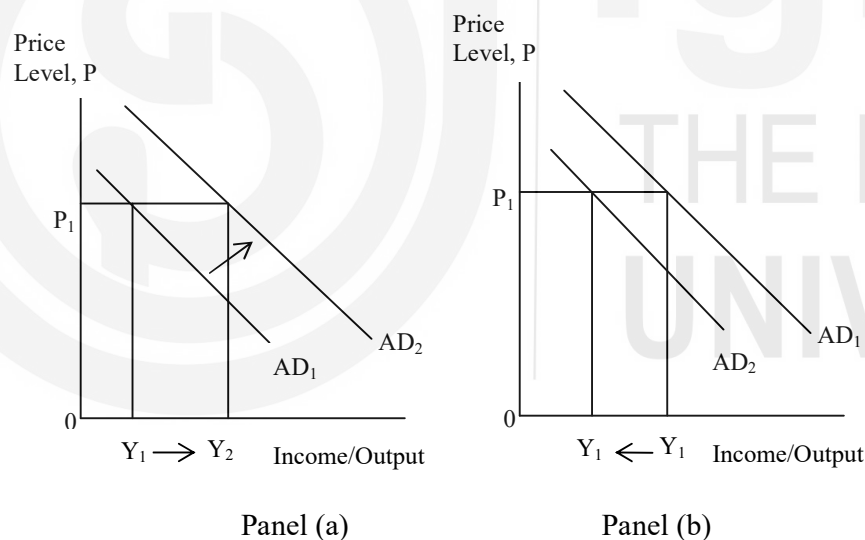
1. Price level and consumption: The effect of price level on consumption is also known as the 'wealth effect'. We all keep some amount of cash always with us. A decrease in the price level increases the real value of money and makes us wealthier which in turn encourages us to spend more. An increase in consumer spending means a larger quantity of goods and services demanded. Conversely, an increase in the price level reduces the real value of money, in turn reducing wealth, consumer spending and the quantity of goods and services demanded.
2. Price level and investment: It is also known as the 'interest rate effect'. A lower price level reduces the interest rate, encourages greater spending on investment good and thereby increases the quantity of goods and services demanded. Conversely, a higher price level raises the interest rate, reducing investment spending and the quantity of goods and services demanded.
3. Price level and net exports: It is also known as the 'exchange rate effect' or the 'international trade effect'. Exchange rate is the price of foreign currency in terms of domestic currency. Suppose there is a fall in India's price level. This will stimulate Indian net exports and thereby increase the quantity of Indian goods and services demanded by the rest of the world. Thus a decrease in prices would result in higher aggregate demand. Conversely, when India's price level rises, foreign goods become relatively cheaper. The quantity of Indian goods and services demanded by the rest of the world would decline, as

a result of which aggregate demand will decrease. This brings the point that price level and AD are inversely related.

#### 4.4 SHIFT IN THE AGGREGATE DEMAND CURVE

It is important to keep in mind that aggregate demand curve is drawn holding other things equal except the price level. Thus a change in the price level leads to movement along the AD curve. On the other hand, if there is a change in any other factor, that we assumed to be constant while deriving the AD curve, there would be a shift in the AD curve.

We gave three explanations of the downward sloping aggregate demand curve, while assuming that the money supply is fixed. So, the change in the money supply can shift the AD curve. Similarly, we have assumed that government expenditure and taxes are also fixed while drawing the aggregate demand curve in Sub-Section 4.3.1. Hence the shift in aggregate demand curve will be due to any change in the government expenditure and taxes. Essentially, it means that any factor which was kept constant while drawing the aggregate demand curve will be the reason behind the shift in aggregate demand curve. We describe the impact of changes in five factors on the AD curve. These are (i) investment, (ii) consumption, (iii) government expenditure, (iv) changes in taxes, (v) changes in net exports.



**Fig. 4.4: Shifts in Aggregate Demand curve**

In Fig. 4.4 we have shown two types of shifts in the AD curve. In Panel (a) we describe a situation where the aggregate demand curve shifts to the right, from  $AD_1$  to  $AD_2$ . Here, at each level of  $P$ , the equilibrium output ( $Y$ ) is higher. In Panel (b), on the other hand, the AD curve shifts to the left from  $AD_1$  to  $AD_2$ . In this case, there is a decrease in the equilibrium output ( $Y$ ) at each price level ( $P$ ).

Let us refer to Fig.4.4 and discuss certain cases which shift the aggregate demand curve.

- i) **Investment:** If firms are optimistic about future they plan to increase their investment. Technological advancements in computer, for example, will lead to an increase in aggregate demand, which will shift the AD curve to the right. Conversely, if firms become pessimistic about future business conditions, they would not undertake further investment. This will shift the AD curve towards the left.
- ii) **Consumption:** Let us assume that there are certain changes in economic environment such that households save a higher amount at each level of income. This could arise because of certain incentives provided by the government, or an increase in the rate of interest on saving. An increase in saving will have the effect of reduction in consumption. Due to reduction in consumption, there will be a leftward shift of the AD curve (similar to Panel (b) of Fig. 4.2). Let us consider another scenario. Suppose there is a stock market boom, which leads to windfall gains for households. It leads to unexpected increase consumption. This is likely to increase consumption, thereby shifting AD curve to the right (similar to Panel (a) of Fig.4.2).
- iii) **Government Expenditure:** Due to change in government purchases. If we drop our assumption of fixed government purchases and we let it be flexible then it is the most direct way used by the policy makers which shift the aggregate demand curve. In case there is an increase in government purchase, then the AD curve shifts to the right, and vice versa.
- iv) **Taxes:** Another factor that causes shift in the AD curve is change in the level of taxation. If there is increase in tax rates, there is decrease in the level of disposable income. A reduction in disposable income of households will lead to a reduction in aggregate consumption. On the other hand, if there is a decrease in tax rate, there is an increase in consumption of households. There are certain taxes that influence investment. If the investment tax credit increases (it is a tax rebate tied to a firm's investment spending) then it increases the investment and hence the AD curve shift rightwards.
- v) **Net Exports:** Net exports are defined as exports minus imports ( $X - M$ ). If there is an increase in exports ( $X$ ) while imports are constant, the net exports ( $NX$ ) will increase. Similarly, if there is a decrease in imports while exports remain unchanged, we witness an increase in  $NX$ . Let us discuss the impact of  $NX$  on the AD curve through an example. When Europe experiences a recession, for example, Europe buys fewer goods from the US. This reduces the US net exports at every price level. It shifts the AD curve for the US economy to the left (similar to panel (b) of Fig.



4.2). Thus we observe that a decrease in NX will shift the AD curve to the left. Similarly, an increase in the NX will shift the AD curve to the right.

- vi) **Money Supply:** An increase in money supply will lead to a reduction in the rate of interest. It is likely to increase the investment spending in the economy and finally the output level will increase. The AD curve will shift to the right. Similarly, a decrease in money supply will lead to an increase in interest rate. It will lead to a reduction in investment, which in turn will decrease AD. Thus the AD curve will shift to the left, in the case of a decrease in money supply.

We should not forget that the price level is held constant in all the above cases. In the above discussion we have included most factors that influence the IS and LM curves. The price level also influences the LM curve. But it will not result in a shift in the AD curve; rather a change in P will lead to movement along the AD curve.

**Check Your Progress 1**

- 1) Derive the aggregate demand curve with the help of IS-LM analysis.

.....  
 .....  
 .....  
 .....

- 2) Why does aggregate demand curve slope downward?

.....  
 .....  
 .....  
 .....

- 3) Give any two reasons for a shift in the AD curve to the right.

.....  
 .....  
 .....  
 .....

---

**4.5 MULTIPLIER ANALYSIS WITH AGGREGATE DEMAND CURVE**

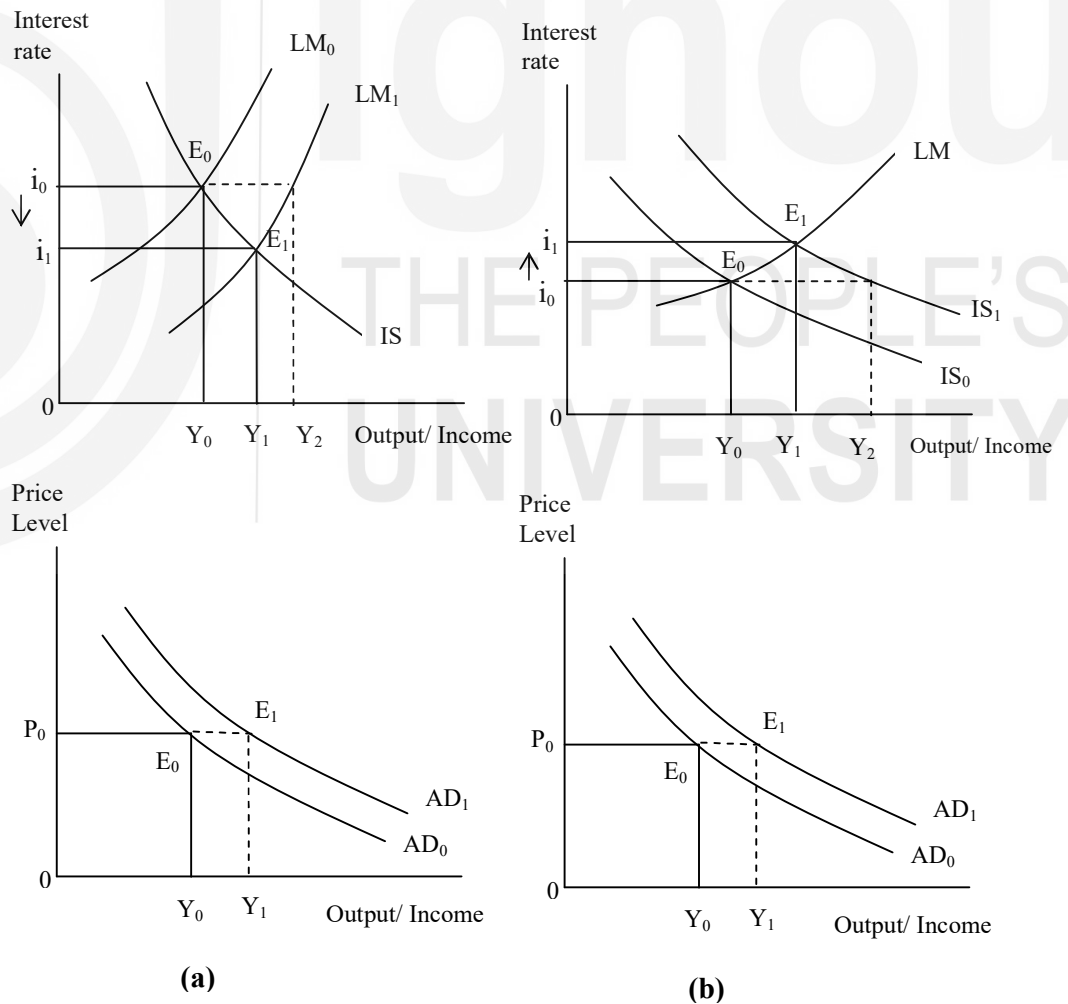
---

In general, any change in autonomous aggregate expenditure shifts the aggregate demand curve. The amount of the shift is always equal to the change in

**GDP and Price Level in Short Run and Long Run**

autonomous aggregate expenditures times the multiplier (refer to Unit 5 of BECC 133). The multiplier effect refers to the idea that an increase in spending can lead to an even greater increase in national income.

An increase in autonomous aggregate expenditure shifts the AD curve to the right. On the other hand, a reduction in autonomous aggregate expenditure shifts the AD curve to the left. If we assume a constant price level and constant interest rate, the multiplier is  $\alpha_G$ . If we consider flexible price level and interest rates (as in the case of IS-LM analysis), then we obtain two multipliers: (i) fiscal policy multiplier, and (ii) monetary policy multiplier. The fiscal policy multiplier shows the impact of changes in government spending on equilibrium income when money supply is kept constant. It is defined as the amount of change in national income for a given change in government spending, while holding the real money supply constant. The monetary policy multiplier, on the other hand, is defined as the amount of change in national income for a given change in the real money supply, while holding government spending and tax rate constant.



**Fig. 4.5: Multiplier Analysis and Aggregate Demand Curve**

Let us illustrate the above two concepts through diagrams. In panel (a) of Fig. 4.5 we explain the monetary policy multiplier. Assume that price level is constant. The equilibrium position is given by  $E_0$ , where the curves IS and  $LM_0$  intersect. Equilibrium output and interest rate are  $Y_0$  and  $i_0$  respectively. Let us assume that there is an increase in money supply so that the LM curve shifts to the right from  $LM_0$  to  $LM_1$ . The new equilibrium point is  $E_1$ . If we consider the money market only, the increase in equilibrium output will be from  $Y_0$  to  $Y_2$ . However, due to the presence of the real sector, equilibrium output changes from  $Y_0$  to  $Y_1$ . The complete shift in the LM curve is not transformed into a shift in national income

In panel (b) of Fig. 4.5 we assume that government spending has increased (IS curve shifts to the right). The equilibrium point changes from  $E_0$  to  $E_1$ . It is important to notice that the complete shift in the IS curve has not been transformed into the shift of national income, i.e.,  $Y_2$ . You should note that aggregate demand curve has shifted in such a manner that the new equilibrium income is  $Y_1$  and not  $Y_2$ . This is due to the multiplier effect. At  $Y_2$  level, either the money market is in equilibrium (panel a) or the goods market is in equilibrium (panel b). So, the economy as a whole is not in equilibrium and the impact of change in one market on the other market has to be looked at.

The AD curve shifts not by the amount of change in autonomous expenditure but by the amount of change in autonomous aggregate expenditure times the multiplier, where the multipliers are the fiscal and monetary policy multipliers.

**Check Your Progress 2**

- 1) Define Fiscal Policy and Monetary Policy multipliers.

.....

.....

.....

.....

.....

.....

- 2) Will the Aggregate demand shift whenever LM curve shifts? Give reason.

.....

.....

.....

.....

.....

- 3) Does the equilibrium level of income increase by the same amount with which the IS or LM shifts? Why or why not?

.....  
.....  
.....  
.....  
.....  
.....

---

## **4.6 LET US SUM UP**

---

After learning about IS-LM analysis in the previous block, we started this unit with an objective of looking at the impact of changes in price level on aggregate demand. We derived the AD curve with the help of IS-LM analysis. The factors which are responsible for the negative slope of aggregate demand curve were explained at length. The shifts in aggregate demand curve were also discussed. The multiplier analysis with aggregate demand curve was explained with the help of fiscal and monetary policy multipliers.

---

## **4.7 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES**

---

### **Check Your Progress 1**

- 1) The intersection of the IS and LM curves gives the level of aggregate demand corresponding to a given price. Suppose the price level increases. The LM curve will shift to the left. There will be a new equilibrium now. These equilibrium points provide the AD curve in a different panel with price on the y-axis and output on the x-axis.
- 2) We have given three reasons in Sub-Section 4.3.1. Refer to it.
- 3) We have discussed five factors which may result in a shift in the AD curve. You should discuss, in detail, any two. You should draw a diagram to show the shift in the AD curve.

### **Check Your Progress 2**

- 1) Refer to Section 4.5 and answer.
- 2) Not necessarily. The LM and IS curves may shift in such a manner that there is no change in equilibrium output. In such a case the AD curve will not shift.
- 3) Equilibrium level of output does not change by the same amount as the shift in the IS or LM curve. It shifts somewhat less than that. Refer to Section 4.5.