Market Equilibrium

Introduction of Concept of Market Equilibrium, Excess Demand and Excess Supply

Objectives

After going through this chapter you shall be able to understand the following concepts

- Concept of Market Equilibrium
- Concept of Excess Demand and Excess Supply

Introduction

Market Equilibrium is defined as a state of rest, which is determined by the rational objectives of the consumers and the producers. As learnt in the previous chapters, the rational objective of consumers is to maximise their satisfaction given their money income, while the rational objective of the producers is to maximise their profit given their cost structures.

Both the consumers as well as the producers try to maximise their respective objectives. Market equilibrium is reached at that particular point, where both the consumers as well as the producers maximise their rational objectives. Thus, we can define market equilibrium as a state or position, where the aggregate quantity that all the firms want to sell is purchased by all the consumers, i.e. where market supply equals market demand.

The price at which the market supply and market demand intersects with each other determines the equilibrium price and the corresponding quantity of output is called equilibrium output.

Important Note: *An important point to note here is that equilibrium is defined as the state of rest where there is no further incentive to change and there exists a complete balance between the two opposite market forces, i.e. market demand and market supply.*

Algebraically, Market Equilibrium is represented as:

$Q_S\ (P^e) = Q_D\ (P^e)$

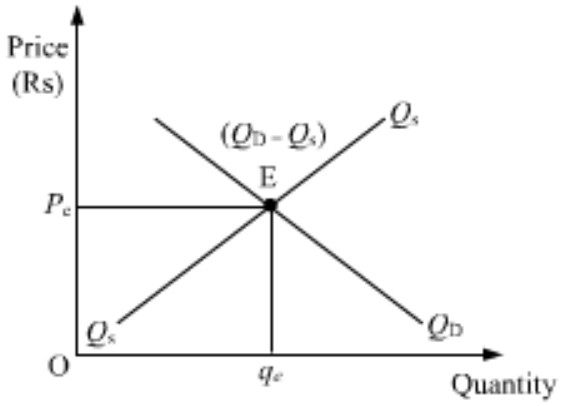
where,

Q_s represents Market Supply at the equilibrium price

Q_D represents Market Demand at the equilibrium price

P^e represents the Equilibrium Price

Graphically, market equilibrium is determined by the intersection of the market demand curve and the market supply curve. In the following figure, E represents the market equilibrium, with P^e as the equilibrium price and q^e as equilibrium quantity.



Excess Demand and Excess Supply

Excess Demand- It is defined as a situation, where the market demand exceeds the market supply at a particular market price. In other words, if at any price level, the quantity of output supplied by the producers is ***lesser*** than what is demanded by all the consumers in the market, then we face the situation of excess demand. Symbolically, the situation of excess demand is represented as:

$$Q_D\ (P^e) > Q_S\ (P^e)$$

Excess Supply- It is defined as a situation, where the market demand falls short of the market supply at a particular price.

In other words, if at any price level, the quantity of output supplied by the producers is ***more*** than what is demanded by all the consumers in the market, then we face the situation of excess supply. Symbolically, the situation of excess supply is represented as:

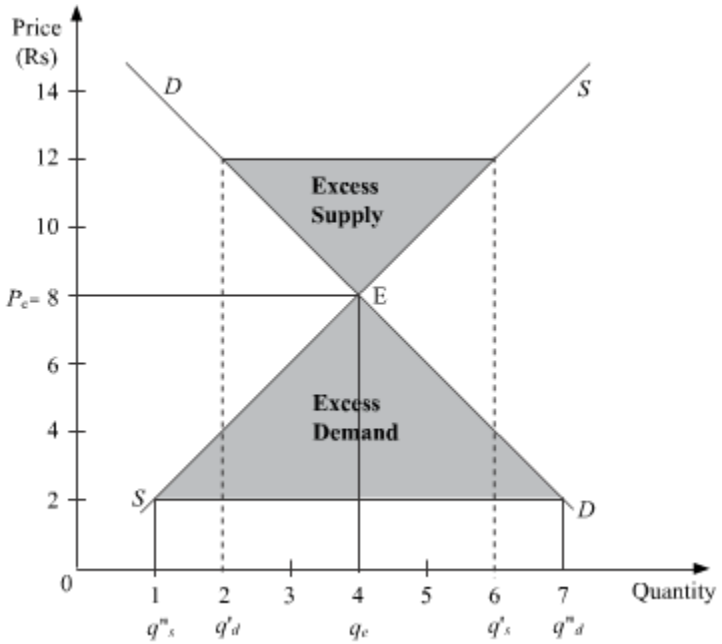
$$Q_S\ (P^e) > Q_D\ (P^e)$$

Explanation of Excess Demand and Excess Supply- Diagrammatically

Let us understand the concept of excess demand and excess supply with the help of the following schedule and graph.

Schedule

Price	Quantity Demanded	Quantity Supplied
14 12 10	1 2 3	7 6 5 } Excess Supply
8	**4**	**4 = Market Equilibrium**
6 4 2	5 6 7	3 2 1 } Excess Demand



From the graph, we can analyse that the market demand curve *DD* and the market supply curve *SS* intersects each other at the point 'E', which is known as market equilibrium. The corresponding price and quantity are regarded as equilibrium price and equilibrium quantity, OP^e and Oq^e. The equilibrium price is Rs 8 and the equilibrium quantity is 4 units.

Now, let us suppose that the price is Rs 12, then at this price as per the market demand curve *DD*, only 2 units of output is demanded, while as per the market supply curve *SS*, the producers are ready to sell 6 units of output. As the market supply is more than the market demand, so there is situation of excess supply by 4 units (i.e. 6 –2 = 4 units).

This excess supply will increase competition among the sellers; consequently, they will reduce the price in order to sell more of their output. The fall in price will continue until price becomes Rs 8, where market demand equals market supply.

On the contrary, let us suppose that if the market price is Rs 2. At this price, as per the market demand curve *DD*, 7 units of output will be demanded; while as per the market supply curve *SS*, the producers are ready to sell only 1 unit of output.

As the market demand is more than the market supply, so there is a situation of excess demand by 6 units (i.e. 7 – 1 = 6 units). This excess demand of 6 units will increase competition among the buyers; consequently, the buyers will tend to buy output at higher price (due to the competition), which as a result will increase the market price. The market price will continue to rise until it becomes Rs 8, where the equilibrium is restored.

Hence, no matter whatever is the initial price, the final price will always be the equilibrium price. That is, why the point of intersection is known as equilibrium. This implies that the market will at a state of rest with no further incentive to deviate from the equilibrium point.

Automatic Mechanisms- by Adam Smith

We can observe that the situations of excess demand and excess supply are automatically corrected by the market forces i.e. by the demand and supply. The father of economics, Adam Smith regarded these forces as the *invisible hands of the market*. As these forces automatically restore the market back to the equilibrium, so these are also known as automatic mechanisms.

He argued that in case of excess demand the invisible hands will push-up the price and will restore the equilibrium back, while in case of excess supply, the invisible hands will reduce the price and will restore the equilibrium back.

Market Equilibrium under Fixed Number of Firms

Objectives

After going through this chapter you shall be able to understand the following concepts

- Short Run Concept of Market Equilibrium under fixed Number of Firms
- Changes in Market Demand
- Changes in Market Supply
- Simultaneous Change in Market Demand and Market Supply

Introduction

We know that the situation of market equilibrium exists when the quantity demanded is equal to the quantity supplied. In the previous chapter, we studied market equilibrium under the assumption that factors affecting demand and supply (other than price) remained constant. However; the various factors affecting demand and supply can and do change at times.

In such a case, what will happen to the market equilibrium? The basic focus of this chapter is on how the changes in demand and supply (due to the factors other than price of good) affect the short run market equilibrium. Throughout this chapter, we have assumed that the number of firms in the market remains the same.

That is, in other words, neither any new firm can enter the industry in case of abnormal profits nor any old firms can exit the industry in case of abnormal losses.

Short Run Market Equilibrium under Fixed Number of Firms

The assumption of fixed number of firms implies a short run concept. As explored in the previous chapter that at equilibrium:

Quantity Demanded = Quantity Supplied

and if, *Quantity demanded > Quantity Supplied*, then there exists *excess demand*

and if, *Quantity demanded < Quantity Supplied*, then there exists *excess supply*

As explained in the previous chapter, that if there exists any imbalances such as excess demand or excess supply, then these will be automatically corrected by the invisible hands of market- demand and supply. That is, if there is excess demand, then the price will rise which will reduce the market demand and equate it to market supply, thereby, restoring the economy back to the equilibrium.

On the contrary, if there exists any excess supply, then the price will fall, which will reduce the market supply and will equate it to the market demand, hence, restoring the equilibrium back.

Thus, the invisible hands automatically ensure that demand equates supply and the market is always at equilibrium. With this quick revision of the previous chapter, we are now in a position to explore the changes in the demand and supply.

Changes in the Market Demand and Market Supply

The changes in the equilibrium price and equilibrium quantity with respect to changes in market demand and market supply can be examined under the following three situations.

1. Changes in market demand only

2. Changes in market supply only

3. Simultaneous changes in both market demand and market supply

1. Changes in Market Demand Only

We know that market demand is a function of price of the good (P_x), price of related goods (P_y) (i.e. substitute goods and complementary goods), consumer's income (Y), tastes and preferences of the consumers (T), population (N), distribution of income (Y_d) and future expectations (F_e). That is,

$D_x = f\ (P_x, P_y, Y, T, N, Y_d, F_e)$

If any factor/s other than the price of the good changes, then the market demand curve will shift, leading to a change in the equilibrium.

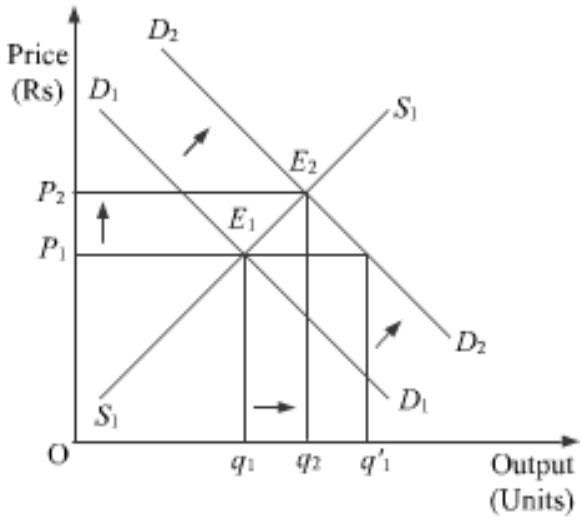
Important Note: ***In this section, as we are dealing with the changes in market demand only, so market supply is assumed to be constant.***

The changes in market demand can further be sub-divided into following two categories.

a. Increase in market demand

b. Decrease in market demand

a. *Increase in Market Demand*



Suppose D_1D_1 and S_1S_1 are the initial market demand curve and market supply curve, respectively. The initial equilibrium is established at point E_1, where the market demand

curve and the market supply curve intersects each other. Accordingly, the equilibrium price is OP_1 and the equilibrium quantity demanded is Oq_1.

Now, assume that market demand increases (may be due to an increase in the consumer's income). This shifts the market demand curve parallelly rightwards to D_2D_2 from D_1D_1, while the market supply curve remains unchanged at S_1S_1. This implies that at the initial price OP_1, there exist excess demand equivalent to ($Oq'_1 - Oq_1$) units.

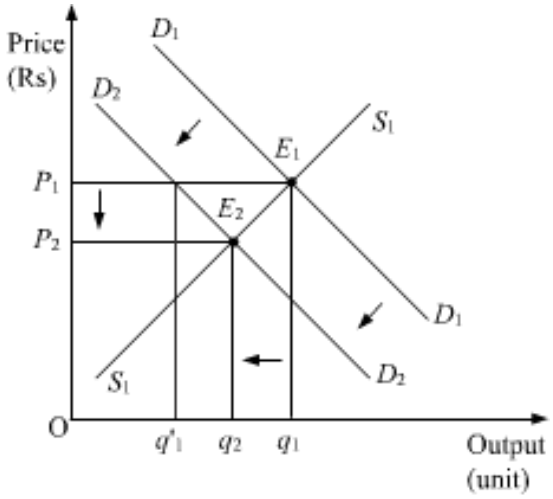
This excess demand will increase competition among the buyers and they will now be ready to pay a higher price to acquire more units of good. This will further raise the market price. The rise in the price will continue till it the market price becomes OP_2. The new equilibrium is established at point E_2, where the new demand curve D_2D_2 intersects the supply curve S_1S_1.

Observe that at the new equilibrium both market price and quantity demanded are more than the initial equilibrium. The new equilibrium quantity supplied Oq_2 and the new equilibrium price is OP_2. Hence, an increase in demand with supply remaining constant, results in rise in the equilibrium price as well as the equilibrium quantity.

To summarise,

Increase in demand ⇒ Excess demand at the existing price ⇒ Competition among the buyers ⇒ Rise in the price level ⇒ New equilibrium ⇒ Rise in both quantity demanded as well as price.

b. *Decrease in Market Demand*



Now, if market demand decreases, then the market demand curve shifts parallelly leftwards to D_2D_2. Now, at the initial price OP_1, there exists excess supply equivalent to $Oq_1 - Oq'_1$ units of output. Due to the excess supply, the competition among the

producers increases and they try to get rid of the excess stock by selling their output at comparatively lower price.

The price will continue to fall until it reaches OP_2, and the new equilibrium is established at point E_2, where the new demand curve D_2D_2 intersects the initial market supply curve S_1S_1. Hence, a decrease in market demand with supply remaining constant, results in fall in the equilibrium price as well as the equilibrium quantity.

To summarise,

Decrease in demand ⇒ Excess supply at the existing price ⇒ Competition among the producers⇒ Fall in the price level ⇒ New equilibrium ⇒ Fall in both quantity demanded as well as price.

Effect of Change in Demand on Equilibrium Price and Output			
	Shift in the Demand curve	*Equilibrium Price*	*Equilibrium Output*
Increase in Demand *Decrease in Demand*	Rightwards Leftwards	Rise Fall	Rise Fall

2. Change in Market Supply Only

Market Supply is a function of price of the good (P_x), price of related goods (P_y) (i.e. substitute goods and complementary goods), input prices (P_i), state of technology (T), government policies (G), goals of firm (G_F) and number of firms (N_F). That is,

$Q_x = f(P_x, P_y, P_i, T, G, G_F, N_F)$

If any factor/s other than the price of the good changes, then the market supply curve will shift, leading to a change in the equilibrium.

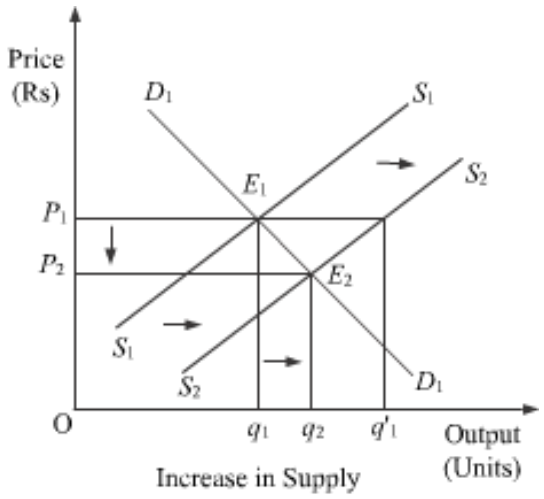
Important Note: ***In this section, as we are dealing with the changes in market supply only, so market demand is assumed to be constant.***

The changes in market supply can be sub-divided into the following two categories.

a. Increase in market supply

b. Decrease in market supply

a. *Increase in Market Supply*



Let us suppose that the initial equilibrium is at point E_1, where the equilibrium price is OP_1 and the equilibrium output is Oq_1.

Now, let us suppose that market supply increases (say, due to a fall in the input prices). This shifts the supply curve parallelly rightwards to S_2S_2 from S_1S_1. Holding demand unchanged, at the initial price OP_1, there exist excess supply equivalent to ($Oq_1' – Oq_1$) units of output.

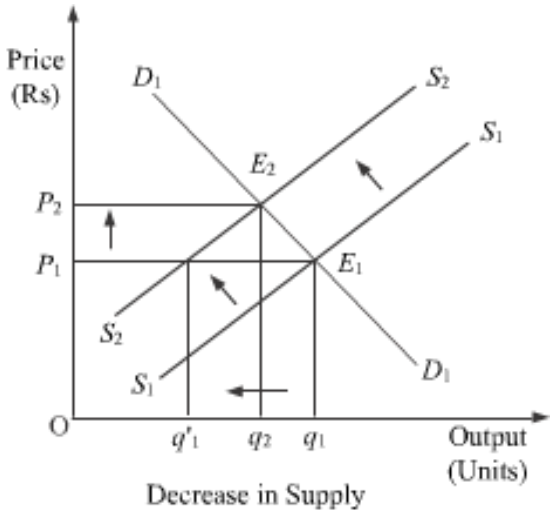
This excess supply will increase competition among the producers and consequently they would be willing to sell their output at a lower price. The price will continue to fall until it reaches OP_2, where, the new supply curve S_2S_2 intersects the initial demand D_1D_1.

The new equilibrium is established at point E_2, where the equilibrium output is Oq_2 and the equilibrium price is OP_2. Observe that at the new equilibrium, the equilibrium quantity has risen whereas, the equilibrium price has fallen.

To summarise,

Increase in supply ⇒ Excess supply at the existing price ⇒ Competition among the producers⇒ Fall in the price level ⇒ New equilibrium ⇒ Fall in price and rise in the equilibrium quantity

b. Decrease in market Supply



Let us now consider the reverse case. Now, suppose that the market supply falls. As a result, the supply curve shifts parallely leftwards to S_2S_2 from S_1S_1. Thus, at the initial price OP_1, holding demand unchanged, there exist excess demand equivalent to ($Oq_1 – Oq_1'$) units of output. This excess demand will lead some of the consumers to pay a higher price in order to obtain the extra units of output.

The rise in the market price will continue until it reaches OP_2, where the new supply curve S_2S_2 intersects the initial market demand curve D_1D_1. The new equilibrium is established at point E_2 with equilibrium price as OP_2 and equilibrium output as Oq_2. Observe that at the new equilibrium, the equilibrium price has risen, whereas, the equilibrium quantity has fallen.

To summarise,

Decrease in supply ⇒ Excess demand at the existing price ⇒ Rise in the price level ⇒ New equilibrium ⇒ Rise in price and fall in quantity demanded.

Effect of Change in Supply on Equilibrium Price and Output			
	Shift in Supply	*Equilibrium Price*	*Equilibrium Output*
Increase in Supply	Rightwards	Decrease	Increase
Decrease in Supply	Leftwards	Increase	Decrease

3. Simultaneous Change in Demand and Supply

The simultaneous change in market demand and market supply affects the equilibrium price and output depending on the magnitude of the change in demand and the supply. The simultaneous change in demand and supply can be sub-divided into following four main categories

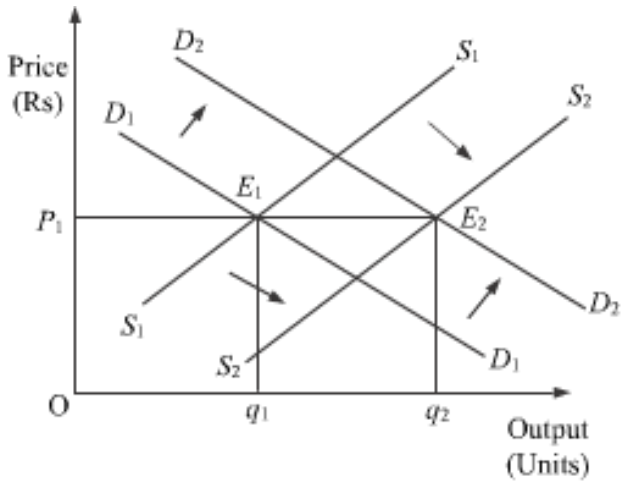
1. When there is a simultaneous increase in demand and supply
2. When there is a simultaneous decrease in demand and supply
3. When demand increases while supply decreases
4. When demand decreases while supply increases

I. When there is a simultaneous *increase* in demand and supply

The demand and supply can both increase at the same time, but the proportion of their increase may or may not be the same. In other words, it may happen that they both increase in the same proportion or one of them increases in a greater proportion than the other. Accordingly, the simultaneous increase in demand and supply can be analysed under three main situations.

1. When both demand and supply increase in the same proportion.
2. When increase in demand is greater than increase in the supply.
3. When increase in demand is lesser than increase in the supply.

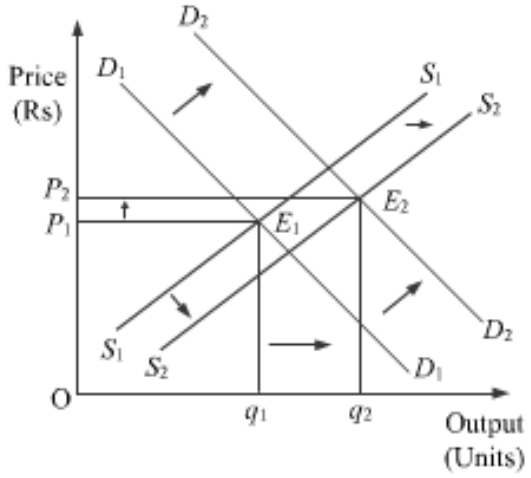
a. ***When demand and supply increase in the same proportion***



Suppose E_1 is the initial equilibrium point, with equilibrium price OP_1 and equilibrium output Oq_1. Now, let us suppose that market demand increases and as a result the demand curve shifts parallely rightwards to D_2D_2. Simultaneously, supply also increases in the same proportion to that of the demand and the supply curve shifts to the new supply curve S_2S_2.

The new demand curve and the new supply curve intersect at point E_2, which is the new equilibrium. Observe, at the new equilibrium the output has increased from Oq_1 to Oq_2, while the price has remained unchanged at OP_1.

b. ***When increase in demand is more than increase in supply***



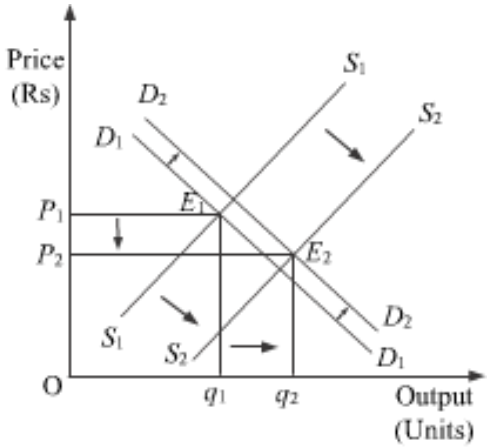
Let us now consider the case, where the increase in demand is greater than the increase in supply. Suppose, the initial equilibrium is at point E_1, with the initial equilibrium price as OP_1 and the initial equilibrium output *as* Oq_1.

Now, let us suppose that market demand increases, thereby, the demand curve shifts rightwards to D_2D_2. Simultaneously, market supply increases but by lesser proportion and the supply curve shifts parallely rightwards to S_2S_2 (observe, the shift in the supply curve is lesser than that of the demand curve).

The new supply curve and the new demand curve intersect each other at point E_2. At the new equilibrium E_2, both the equilibrium price and the equilibrium output are higher than their initial levels.

The increase in the equilibrium price is lesser than the increase in the equilibrium output.

c. ***When increase in demand is lesser than increase in supply***



Let us now consider the case, where increase in demand is lesser than increase in supply. Suppose, demand increases, consequently, the market demand curve shifts parallely rightwards to D_2D_2. Simultaneously, supply also increases and the increase in supply is greater than the increase in demand. The supply curve also shifts parallely rightwards to S_2S_2 but by more proportion (observe, the shift in the supply curve is greater than the shift in the demand curve).

The new supply curve and the new demand curve intersect each other at point E_2. At the new equilibrium E_2, the equilibrium price is lesser and the equilibrium output is higher than their initial levels. The decrease in the equilibrium price is lesser than the increase in the equilibrium output.

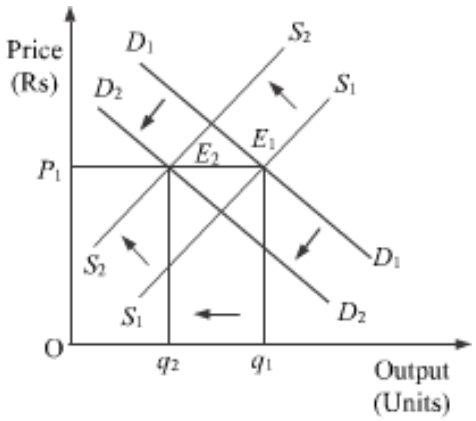
Effect of Simultaneous *increase* in Demand and Supply on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Increase in Demand = Increase in Supply	Unchanged	Increases
b. Increase in Demand > Increase in Supply	Increases	Increases
c. Increase in Demand < Increase in Supply	Falls	Increases

II. When there is a simultaneous *decrease* in demand and supply

Similar to the case of simultaneous increase in demand and supply, there can also be a simultaneous decrease in demand and supply. However, the proportion of their decrease may or may not be the same. In other words, it may happen that they both decrease in the same proportion or one of them decreases in a greater proportion than the other. Thus, the simultaneous decrease in demand and supply can be analysed under three main following situations.

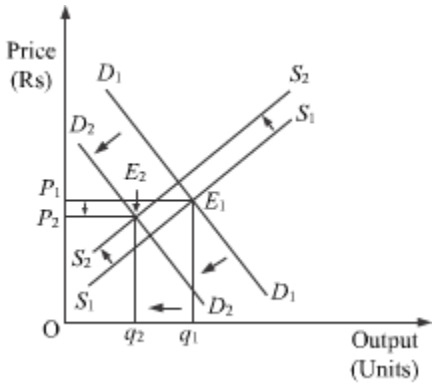
1. When both demand and supply decrease in the same proportion
2. When decrease in demand is greater than the decrease in supply
3. When decrease in demand is less than the decrease in supply

1. ***When demand and supply decrease in the same proportion***



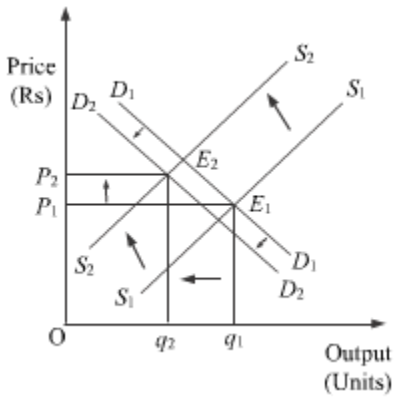
Suppose E_1 is the initial equilibrium point, with equilibrium price OP_1 and equilibrium output Oq_1. Now, let us suppose that demand decreases, consequently, the demand curve shifts leftwards to D_2D_2. Simultaneously, the supply also decreases in the same proportion to that of the demand and supply curve also shifts leftwards to S_2S_2. The new demand curve and the new supply curve intersect at point E_2, which is the new equilibrium point. At the new equilibrium, the output has decreased from Oq_1 to Oq_2, while the price remained unchanged at OP_1.

b. ***When demand decrease more than the decrease in supply***



Let us now consider the reverse case, where there is a simultaneous decrease in demand and supply, but the decrease in demand is greater than the decrease in supply. Let us suppose that demand decreases, thereby, the demand curve shifts parallely leftwards to D_2D_2. There is a simultaneous decrease in supply as well, but the decrease in supply is lesser than the decrease in demand. The supply curve also shifts leftwards to S_2S_2. The new supply curve and the new demand curve intersect each other at point E_2. At the new equilibrium, both the equilibrium price and the equilibrium output are lesser than their initial levels. The decrease in the equilibrium price is lesser than the decrease in the equilibrium output.

c. ***When decrease in demand is lesser than decrease in supply***



Now let us suppose that demand decreases. Consequently, the initial demand curve D_1D_1 parallely shifts leftwards to the new demand curve D_2D_2, while the supply curve parallely shifts leftwards to S_2S_2. The leftwards shift in the supply curve is more than the leftwards shift in the demand curve.

This indicates that the decrease in demand is comparatively lesser than that of the supply. The new equilibrium is determined by the intersection of D_2D_2 and S_2S_2 at E_2. The new equilibrium price OP_2 and the new equilibrium output is Oq_2. The increase in the equilibrium price is lesser than the decrease in the equilibrium output.

Effect of Simultaneous ***decrease* in Demand and Supply on Equilibrium Price and Output**		
	Equilibrium Price	*Equilibrium Output*
a. Decrease in Demand = Decrease in Supply	Unchanged	Falls
b. Decrease in Demand > Decrease in Supply	Falls	Falls
c. Decrease in Demand < Decrease in Supply	Increases	Falls

III. When there is Simultaneous *Increase* in Demand and *Decrease* in Supply

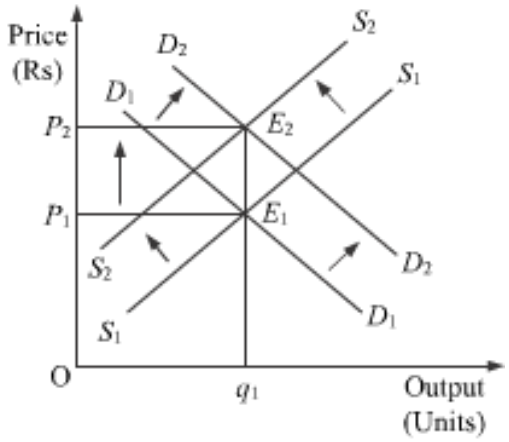
It may also happen that there exists an increase in demand along with simultaneous decrease in supply. However, the proportion of the increase in demand may or may not be same to the decrease in supply. In other words, it may happen that the increase in demand is equal, more or lesser than the decrease in supply. The following are the probable situations, when demand and supply changes in opposite directions with different magnitude.

1. When increase in demand is equal to the decrease in supply

2. When increase in demand is greater than the decrease in supply

3. When increase in demand is lesser than the decrease in supply

1. ***When increase in demand is equal to the decrease in supply***



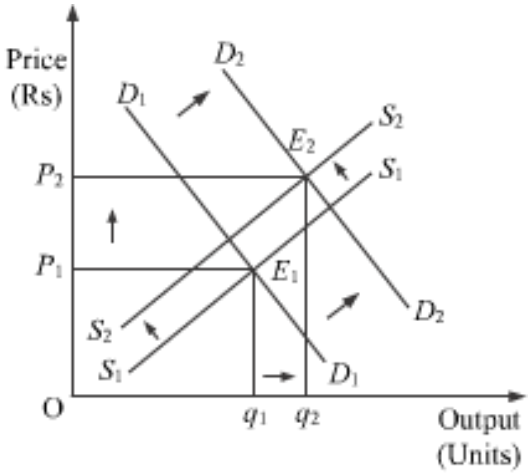
Suppose that the initial equilibrium is at E_1, with the initial equilibrium price as OP_1 and initial equilibrium output Oq_1. Now, let us suppose that the demand increases. Consequently, the initial demand curve parallely shifts rightwards to D_2D_2.

Simultaneously, supply decreases by the same proportion as the increase in demand. As a result, the initial supply curve S_1S_1 parallely shifts leftwards to the new supply curve S_2S_2.

The new equilibrium is established at point E_2, which is determined by the intersection of the new demand curve D_2D_2 and the new supply curve S_2S_2.

On comparing the initial equilibrium with that of the new equilibrium point, we can observe that while the equilibrium price has increased from OP_1 to OP_2, whereas, the equilibrium output has remained unchanged at Oq_1.

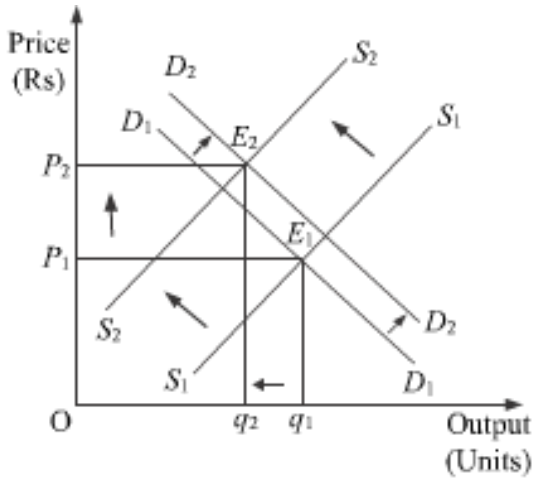
b. ***When increase in demand is greater than the decrease in supply***



The increase in demand shifts the initial demand curve D_1D_1 parallely rightwards to D_2D_2 and the decrease in supply shifts the initial supply curve parallely leftwards to the new supply curve S_2S_2. It should be noted that the shift in the demand curve is more than the shift in the supply curve.

The new equilibrium is established at point E_2, which is determined by the intersection of the new demand curve D_2D_2 and the new supply curve S_2S_2. On comparing the initial equilibrium with that of the new equilibrium point, we can observe that both equilibrium price as well as the equilibrium output has increased from OP_1 to OP_2 and from Oq_1 to Oq_2. The increase in the equilibrium price is more than the increase in the equilibrium output.

c. ***When increase in demand is lesser than the decrease in supply***



The increase in demand shifts the initial demand curve D_1D_1 parallely rightwards to D_2D_2 and the decrease in supply shifts the initial supply curve parallely leftwards to the new supply curve S_2S_2. It should be noted that the shift in the demand curve is lesser than the shift in the supply curve. The new equilibrium is established at

point E_2, which is determined by the intersection of the new demand curve D_2D_2 and the new supply curve S_2S_2. On comparing the initial equilibrium with that of the new equilibrium point, we can observe that while the equilibrium price has increased from OP_1 to OP_2, whereas, the equilibrium output has decreased from Oq_1 to Oq_2. The increase in the equilibrium price is more than the decrease in the equilibrium output.

Effect of Simultaneous *increase* in Demand and *decrease* in Supply on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Increase in Demand = Decrease in Supply	Increases	Unchanged
b. Increase in Demand > Decrease in Supply	Increases	Increases
c. Increase in Demand < Decrease in Supply	Increases	Decreases

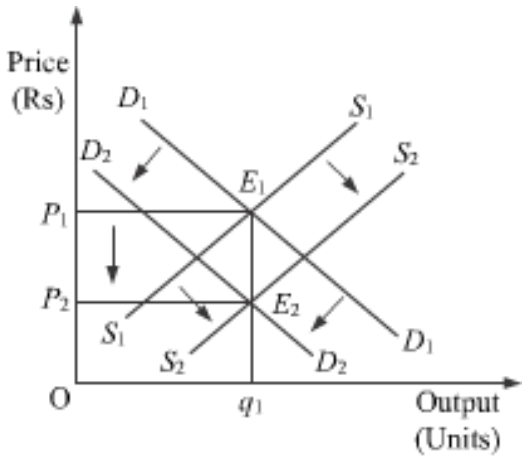
IV. When there is Simultaneous *Decrease* in Demand and *Increase* in Supply

Similar to the simultaneous increase in demand and decrease in supply, it may also happen that there exists decrease in demand along with simultaneous increase in supply. However, the proportion of the decrease in demand may or may not be same to the increase in supply.

In other words, it may happen that the decrease in demand is equal, more or lesser than the increase in supply. The following are the probable situations, when demand and supply changes in opposite directions with different magnitude.

1. When decrease in demand is equal to the increase in supply
2. When decrease in demand is greater than the increase in supply
3. When decrease in demand is lesser than the increase in supply

a. When decrease in demand is equal to the increase in supply

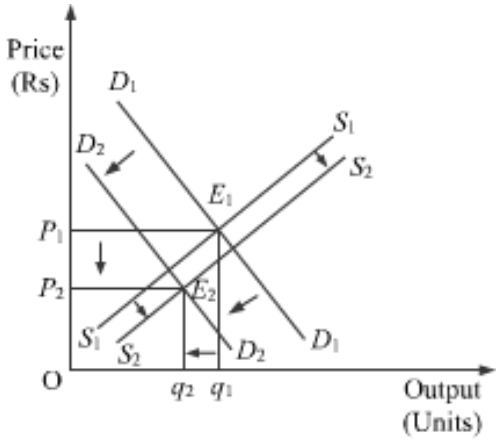


Let E_1 be the initial equilibrium point with OP_1 and Oq_1 as the initial equilibrium price and the initial equilibrium output. Now, let us suppose that the demand decreases. Consequently, the initial demand curve parallelly shifts leftwards to D_2D_2. Simultaneously, supply increases by the same proportion as the increase in demand.

As a result, the initial supply curve S_1S_1 parallelly shifts rightwards to the new supply curve S_2S_2. The new equilibrium is established at point E_2, which is determined by the intersection of the new demand curve D_2D_2 and the new supply curve S_2S_2.

On comparing the initial equilibrium with that of the new equilibrium point, we can observe that while the equilibrium price has decreased from OP_1 to OP_2, whereas, the equilibrium output has remained unchanged at Oq_1.

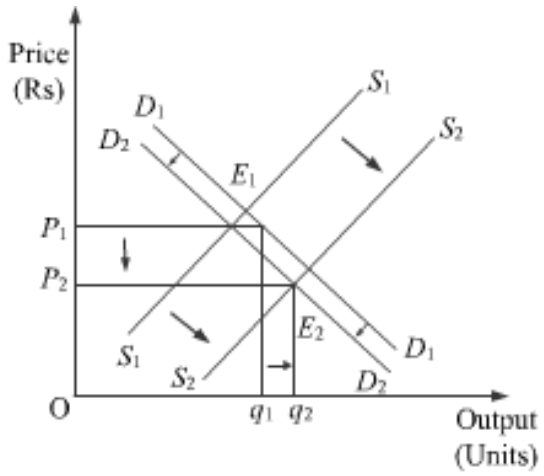
b. ***When decrease in demand is greater than the increase in supply***



The decrease in demand shifts the initial demand curve D_1D_1 parallelly leftwards to D_2D_2 and the increase in supply shifts the initial supply curve parallelly rightwards to the new supply curve S_2S_2. It should be noted that the shift in the demand curve is more than the shift in the supply curve. The new equilibrium is established at point E_2, which is determined by the intersection of the new demand curve D_2D_2 and the new supply

curve S_2S_2. On comparing the initial equilibrium with that of the new equilibrium point, we can observe that both equilibrium price as well as the equilibrium output has decreased from OP_1 to OP_2 and from Oq_1 to Oq_2. However; the decrease in the equilibrium price is more than the decrease in the equilibrium output.

c. *When decrease in demand is lesser than the increase in supply*



With the decrease in demand, the initial demand curve D_1D_1 parallelly shifts rightwards to D_2D_2 and the decrease in supply shifts the initial supply curve parallelly leftwards to the new supply curve S_2S_2. It should be noted that the shift in the demand curve is more than the shift in the supply curve.

The new equilibrium is established at point E_2, which is determined by the intersection of the new demand curve D_2D_2 and the new supply curve S_2S_2.

On comparing the initial equilibrium with that of the new equilibrium point, we can observe that while the equilibrium price has decreased from OP_1 to OP_2, whereas, the equilibrium output has increased from Oq_1 to Oq_2. The decrease in the equilibrium price is more than the increase in the equilibrium output.

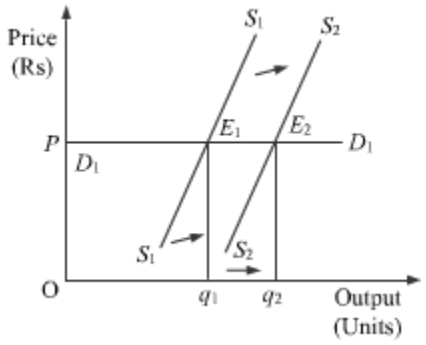
Effect of Simultaneous *decrease* in Demand and *increase* in Supply on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Decrease in Demand = Increase in Supply	Decreases	Unchanged
b. Decrease in Demand > Increase in Supply	Decreases	Decreases
c. Decrease in Demand < Increase in Supply	Decreases	Increases

SOME EXTREME CASES OF DEMAND AND SUPPLY

1. When Demand is Perfectly Elastic and Supply Changes

The analysis of changes in supply with perfectly elastic demand curve involves two different situations.

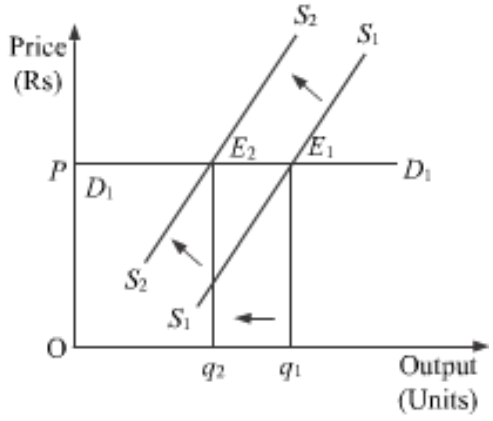
1. ***Increase in supply with perfectly elastic demand***



In the figure, D_1D_1 represents a perfectly elastic demand curve and S_1S_1 represents an upwards sloping supply curve. The perfectly elastic demand curve is also the horizontal price line, which is parallel to the *output*-axis. The initial equilibrium is determined at point E_1, where the initial demand curve and initial supply curve intersect each other.

Now, suppose that supply increases, consequently, the initial supply curve shifts parallely rightwards to S_2S_2. With the demand curve as perfectly elastic, the new equilibrium is determined at point E_2, where the new supply curve S_2S_2 intersects with the demand curve D_1D_1. We can observe that when demand is perfectly elastic, an increase in supply will result in rise in the equilibrium output from Oq_1 to Oq_2, leaving the equilibrium market price unchanged.

b. ***Decrease in supply with perfectly elastic demand***



Let us now consider the reverse case, where the supply decreases. With the decrease in supply, the initial supply curve parallely shifts leftwards to S_2S_2. The new equilibrium

point is at point E_2, where the new supply curve S_2S_2 and the demand curve D_1D_1 intersect with each other. The new equilibrium output is Oq_2 and there is no change in the equilibrium price.

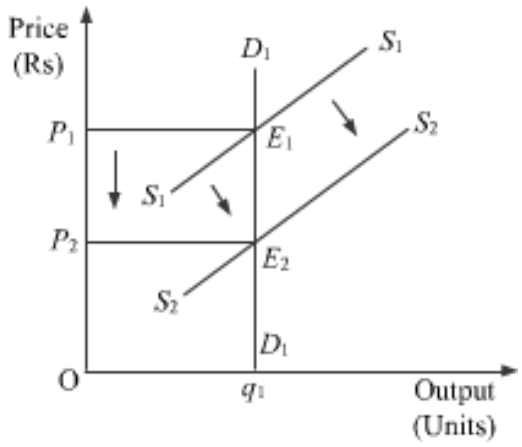
Thus, when demand is perfectly elastic, increase or decrease in supply is fully reflected in quantity without any change in the price.

Effect of Change in Supply with Perfectly Elastic Demand on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Increase in Supply	Unchanged	Increases
b. Decrease in Supply	Unchanged	Falls

2. When Demand is Perfectly Inelastic and Supply Changes

The analysis of changes in supply with perfectly inelastic demand curve involves two different situations.

1. ***Increase in supply with perfectly inelastic demand***

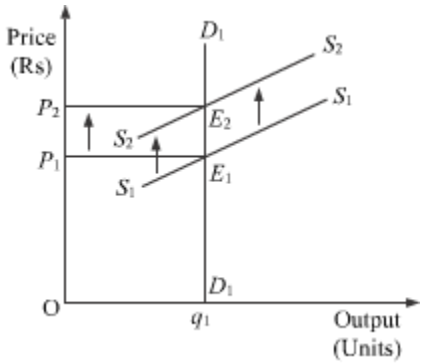


The perfectly inelastic demand implies the vertical demand curve parallel to *price*-axis. In the figure, D_1D_1 and S_1S_1 represent the initial demand curve and the initial supply curve. The initial equilibrium is determined at E_1, along with equilibrium output Oq_1 and equilibrium price at OP_1.

Let us suppose that the supply increases. Consequently, the initial supply curve parallelly shifts rightwards to S_2S_2.

The new equilibrium is established at E_2 with comparatively lower equilibrium price OP_2 and the same equilibrium output Oq_1.

b. ***Decrease in supply with perfectly inelastic demand***



With perfectly inelastic demand D_1D_1, the supply decreases and supply curve shifts to S_2S_2, consequently, the new equilibrium occurs at E_2, where the new supply curve S_2S_2 intersects with the demand curve D_1D_1. The new equilibrium price is OP_2 and the equilibrium output level Oq_1.

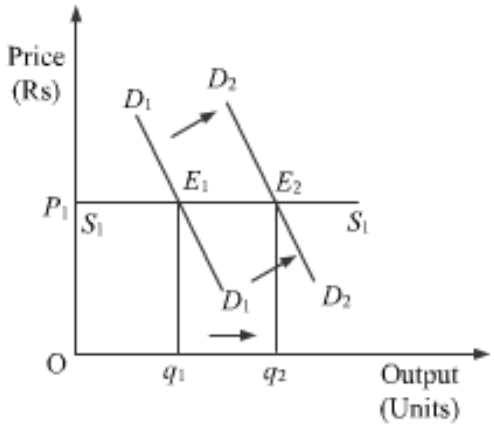
Thus, when demand is perfectly inelastic, the changes in supply fully affect the price without any change in the output.

Effect of Change in Supply with Perfectly Inelastic Demand on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Increase in Supply	Falls	Unchanged
b. Decrease in Supply	Increases	Unchanged

3. When Supply is Perfectly Elastic and Demand Changes.

The analysis of changes in demand with perfectly elastic supply curve involves the following two different situations.

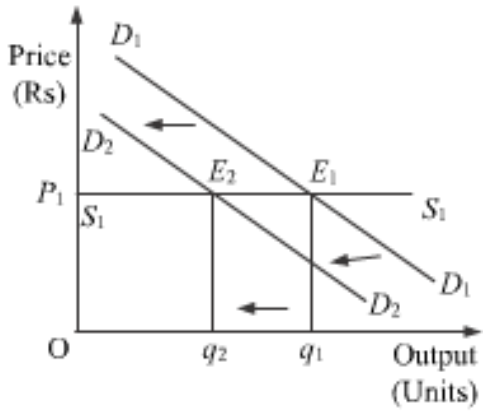
a. ***Increase in demand with perfectly elastic supply***



The perfectly elastic supply curve is indicated by the horizontal line parallel to the *output*-axis. In the figure, the initial equilibrium is at E_1, with initial equilibrium output as Oq_1 and initial equilibrium price as OP_1. Now, suppose that demand increases and the demand curve parallely shifts rightwards to D_2D_2.

With the perfectly elastic supply curve, the new equilibrium is determined at point E_2, where the new demand curve D_2D_2 intersects with the initial supply curve S_1S_1. At point E_2, the new equilibrium output is Oq_2 (which is higher than the original equilibrium output level) but the equilibrium price level is unchanged i.e. at OP_1.

b. ***Decrease in demand with perfectly elastic supply***



Now consider the reverse case, where demand decreases with perfectly elastic supply. With the decrease in demand, the demand curve parallely shifts leftwards to D_2D_2. The new equilibrium occurs at point E_2, where the new demand curve D_2D_2 intersects with the initial supply curve S_1S_1. The new equilibrium output is Oq_2, which is lower than the initial equilibrium output Oq_1, whereas, the equilibrium price is the same, i.e. OP_1.

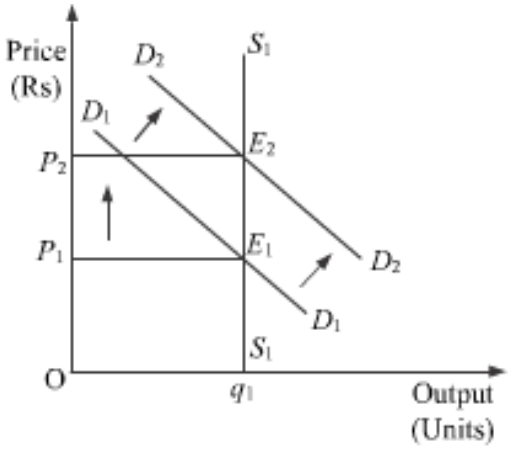
Thus, we can conclude that when the supply curve is perfectly elastic, the change in demand fully affects the equilibrium output and the equilibrium price remains unchanged.

Effect of Change in Demand with Perfectly Elastic Supply on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Increase in Supply	Unchanged	Increases
b. Decrease in Supply	Unchanged	Falls

4. When Supply is Perfectly Inelastic and Demand Changes.

The analysis of changes in demand with perfectly inelastic supply curve involves the following two different situations.

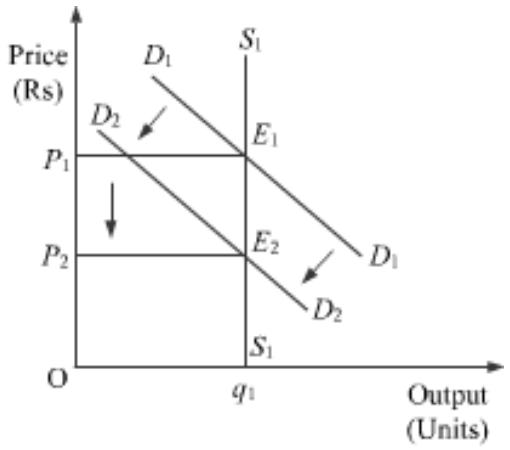
a. ***Increase in demand with perfectly inelastic Supply***



The perfectly inelastic supply is represented by the vertical supply curve parallel to the *price*-axis. The initial demand curve is D_1D_1 and the initial supply curve is represented by S_1S_1. The initial equilibrium is at E_1, with the initial equilibrium output as Oq_1 and the initial equilibrium price as OP_1.

Now suppose that demand increases and as a result, the initial demand curve parallely shifts rightwards to D_2D_2. The new equilibrium is determined at point E_2, where the new demand curve D_2D_2 intersects with the supply curve S_1S_1. The new equilibrium price is OP_2, which is higher than the initial equilibrium price OP_1, while the equilibrium output remains the same, i.e. Oq_1.

b. ***Decrease in demand with perfectly inelastic supply***



Consider, now the opposite case, where demand decreases with perfectly inelastic supply curve. As demand decreases, the demand curve shifts rightwards to D_2D_2 and the new equilibrium is determined at point E_2, with comparatively lower equilibrium price as OP_2, whereas, the equilibrium output level remained the same, i.e. Oq_1.

Thus, we can conclude that when supply is perfectly inelastic, the change in demand fully affects the equilibrium price leaving the output level unchanged.

Effect of Change in Demand with Perfectly Inelastic Supply on Equilibrium Price and Output		
	Equilibrium Price	*Equilibrium Output*
a. Increase in Supply	Increases	Unchanged
b. Decrease in Supply	Falls	Unchanged

Market Equilibrium with Free Entry and Exit, Shifts in Demand

Objectives

After going through this chapter you shall be able to understand the following concepts

- Long Run Concept of Market Equilibrium with Free Entry and Exit of Firms
- Shifts in Demand

Introduction

In the previous lesson, we have explored the short run concept of market equilibrium under the assumption of fixed numbers of firms. That is, firms were not allowed either to enter or to exit the market in presence of abnormal profits or abnormal losses. Now the question arises, "What happens when this restriction of entry and exit of firms is relaxed?" The basic focus of this lesson is to study the effect on the market equilibrium when the firms can freely enter and exit the industry.

Implication of Free Entry and Exit of Firms

This concept prevails only in the long run. The implication of free entry and exit of firms is that at long run equilibrium, individual firms will neither earn supernormal (abnormal) profits nor abnormal losses. This further implies that all the firms will operate at the point where the minimum of long run average cost curve (LAC) is equal (tangent) to the price line. The equality between the LAC curve and price line implies that all the firms in the long run are earning zero economic profit i.e. simply normal profit.

Explanation of Long Run Market Equilibrium

Let us suppose that in short run, the existing firms are earning ***supernormal profits*** (i.e. Price ≥ minimum of SAC). Due to the supernormal profits, new firms are attracted into the market. This increases the total supply of output. Consequent to the increase in the supply of the output, the market price reduces (due to excess supply). The price continues to fall until it becomes equal to the minimum of LAC curve, so that no new firms are attracted into the market. Thus, when the price becomes equal to the

minimum of LAC curve, all the supernormal profits are wiped-out and all firms earn zero economic profit.

On the contrary, let us suppose that in short run, the existing firms are incurring ***supernormal losses*** (i.e. Price < minimum of SAC), then some of the firms are forced to leave the industry. Consequently, the supply of the output reduces, thereby the market price starts rising (due to shortage in supply).

The firms will continue to exit until the market price rises sufficiently high so as to equate the minimum of LAC curve. The tangency of the price line and the LAC curve implies that the remaining firms are earning normal profit or zero economic profit in the long run.

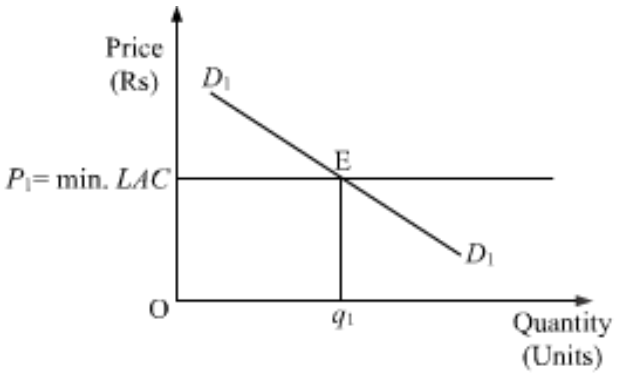
Hence, we can conclude that in the short run, no matter whether the firms are earning abnormal profits or abnormal losses; all the firms (existing firms) in the long run will earn normal profit (zero economic profit) and will face an equilibrium price that is equal to the minimum of LAC curve.

Thus, the long run market equilibrium condition is explained by the following equality.

Long Run Market Price = Minimum of LAC curve

Graphical Explanation of Long Run Market Equilibrium

The long run market equilibrium can be represented graphically as:



In the figure, D_1D_1 represents the market demand curve and P_1 represents the market price which is equal to the minimum of the LAC curve. The point E represents the market equilibrium, where the market demand D_1D_1 intersects the price line P_1. The equilibrium price is OP_1 and equilibrium output is Oq_1.

The quantity supplied is determined by the market demand at the given market price. At this equilibrium price, each firm supplies the same units of output Oq_{1f} as it is assumed that each firm is identical. Therefore, at equilibrium, number of firms in the market is equal to the number of firms required to supply Oq_1 units of output at OP_1 i.e.

equilibrium quantity demanded in the market at price OP_1 each in turn supplying Oq_{1f} amount at that price. That is,

$$n = \frac{q_1}{q_{1f}}$$

where,

n represents number of firms at market equilibrium point

q_1 denotes the equilibrium quantity demanded

q_{1f} denotes the quantity of output supplied by an individual firm

Numerical Example to Determine Number of Firms in the Market

Consider a market for commodity X such that the demand curve is given as:

$$\begin{aligned} Q_d &= 100 - p \quad \text{for } 0 \le p \le \text{Rs } 100 \\ Q_d &= 0 \quad \text{for } p > \text{Rs } 100 \end{aligned} \quad \text{.....} \quad (1)$$

Also, assume that the market consists of a 'n' number of identical firms and supply curve of each firm is given as:

$$\begin{aligned} Q_s &= 20 + p \quad \text{for } p \ge \text{Rs } 10 \\ Q_s &= 0 \quad \text{for } 0 \le p < \text{Rs } 10 \end{aligned} \quad \text{.....} \quad (2)$$

We know that with free entry and exit, market equilibrium is struck where the market price equals the minimum of the firm's average cost curve.

Therefore, the equilibrium price is p_1 = Rs 10

At this price, the market demand is given by

$q_1 = 100 - p$, i.e. 100 – 10 = 90 units [from (1)]

Also at p_1 = Rs 10, each firm supplies quantity equal to

q_{1f} = 20 + 10 [from (2)]

so, q_{1f} = 30 units

Therefore, the equilibrium number of firms

$$n_1 = \frac{\text{Equilibrium Quantity Demanded}}{\text{Quantity of Output Supplied by a single firm}} = \frac{q_1}{q_{1f}} = \frac{90}{30} = 3 \text{ firms}$$

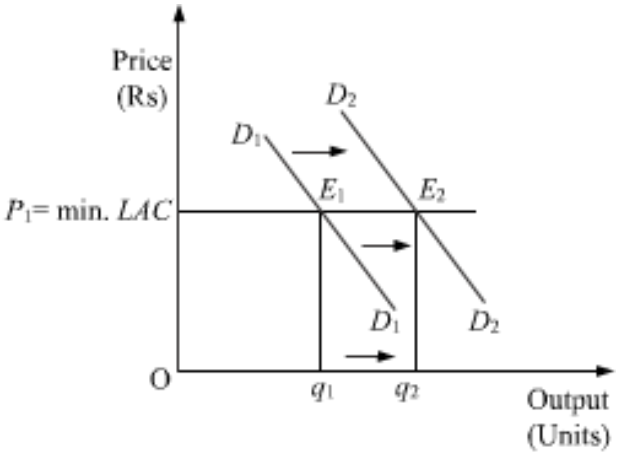
Thus, there are 3 firms at the long run equilibrium.

Shifts in Demand

As mentioned in the above section that with the assumption of free entry and exit, no matter whatever the circumstances are, equilibrium price will always be equal to the minimum of LAC curve. Let us study the different cases when there exist changes in market demand. The changes in the market demand can be of following two types.

- Increase in the market demand
- Decrease in the market demand

***Case-1*: Increase in the Market Demand**



In the figure, the curve D_1D_1 represents the market demand curve. The initial equilibrium is denoted by E_1, where the initial demand curve D_1D_1 intersects the price line P_1 = minimum of LAC curve. The equilibrium price and equilibrium output is OP_1 and Oq_1 respectively, with n_1 as number of firms at the initial equilibrium point.

Now, suppose that the market demand increases (due to the change in either tastes and preferences or in price of other goods, etc.), the initial demand curve shifts to new market demand curve D_2D_2. At the initial equilibrium price of OP_1, there exists excess demand.

Due to the excess demand, there will be some consumers who are ready to pay higher price to acquire more units of output, therefore the price tends to rise. The higher price implies the possibility of abnormal profits, which will attract new firms into the industry. Consequently, the supply will increase and the price will fall back again to OP_1, which in turn implies that all abnormal profits are exhausted.

The new equilibrium will be at E_2, where the new market demand curve D_2D_2 intersects the price line and higher output units Oq_2 will be supplied at the same market price of OP_1. At the new equilibrium point E_2, there will be greater number of firms i.e. 'n_2' due to the entry of some firms (while at initial equilibrium point E_1, it was only n_1) each supplying higher quantity of output Oq_2 and at the same price 'OP_1'.

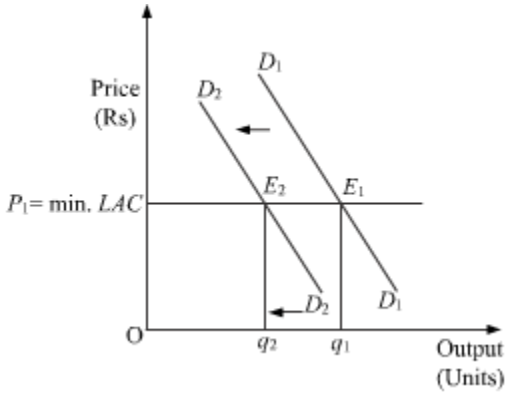
↑ Market Demand ⇒Demand curve Shifts rightwards ⇒ Excess Demand ⇒ Market Price ↑ ⇒ Abnormal Profits ⇒ New Firms enter the industry ⇒ Market Supply ↑ ⇒Market Price ↓ and becomes equal to OP_1 ⇒ New Equilibrium at E_2 with greater total output supplied Oq_2 and higher number of firms n_2

Therefore,

	Price	Output	No. of firms at Equilibrium
At E_1	P_1 = min. LAC	Oq_1	n_1
At E_2	P1 = min. LAC	Oq_2	n_2

Such that $\boldsymbol{Oq_2 > Oq_1}$ and $\boldsymbol{n_2 > n_1}$

***Case-2*: Decrease in Market Demand**



In the figure, the curve D_1D_1 represents the market demand curve. The initial equilibrium is denoted by E_1, where the initial demand curve D_1D_1 intersects the price line P_1 = minimum of LAC curve. The equilibrium price and equilibrium output is OP_1 and Oq_1 respectively, with n_1 as number of firms at the initial equilibrium point.

Now, suppose that the market demand decreases (due to the change in factors other than the price of the good), the initial demand curve shifts leftwards to the new demand curve D_2D_2 from D_1D_1. Now at the initial market price of OP_1, there exists excess supply.

Due to the excess supply, some firms are ready to sell their output at comparatively lower price to increase their sale, therefore, the market price tends to fall. This will reduce the profit margin of the firms; therefore the firms will start quitting the market.

As more and more number of firms continues to quit the industry, the market supply reduces and the market price continues to rise (due to fall in output supplied). The rise in the market price will continue until it becomes equal to the initial price line OP_1. The new market equilibrium occurs at point E_2, where the new market demand curve D_2D_2 intersects the price line.

The total quantity supplied is equal to the quantity demanded 'Oq_2' but the equilibrium price level remains same at OP_1. As some of the existing firms have left the industry, so the new equilibrium E_2, is associated with lesser number of firms, say 'n_2' compared to that of 'n_2' at the initial equilibrium.

↓ Market Demand ⇒Demand curve Shifts leftwards ⇒ Excess Supply ⇒ Market Price ↓ ⇒ Abnormal Losses ⇒ Old Firms exit the industry ⇒ Market Supply ↓ ⇒Market Price ↑ and becomes equal to OP_1 ⇒ New Equilibrium at E_2 with lesser total output supplied Oq_2 and lesser number of firms n_2

Therefore,

	Price	Output	No. of firms of Equilibrium
At E_1	P_1 = min LAC	Oq_1	n_1
At E_2	P_1 = min LAC	Oq_2	n_2

Such that $\boldsymbol{Oq_2 < Oq_1}$ and $\boldsymbol{n_1 > n_2}$

Summary: Change in the Market Demand- *With Free Entry and Exit of Firms*

Change in Market Demand	Price	Output	No. of firms

When Demand Increases	P_1 = min LAC Same	Higher output than the initial equilibrium i.e. $Oq_1 < Oq_2$	Higher number of firms than the initial equilibrium i.e. $n_1 < n_2$
When Demand Decreases	P_1 = min LAC Same	Lesser output than the initial equilibrium i.e. $Oq_1 > Oq_2$	Lesser number of firms than the initial equilibrium i.e. $n_1 > n_2$

Price Ceiling, Price Floor and Wage Determination

Objectives

After going through this chapter you shall be able to understand the following concepts

- Concept of Price Ceiling
- Concept of Price Floor or Minimum Support Price
- Concept of Wage Determination in the Labour Market

Introduction

In the following lesson, we will study about the application of demand and supply. We will analyse experiences from our daily life that there exists many situations when the prices of certain commodities suddenly rise very high or becomes too low. One of the recent experiences is the sudden rise in the price of onions. Suddenly, all of us were concerned about such an acute rise.

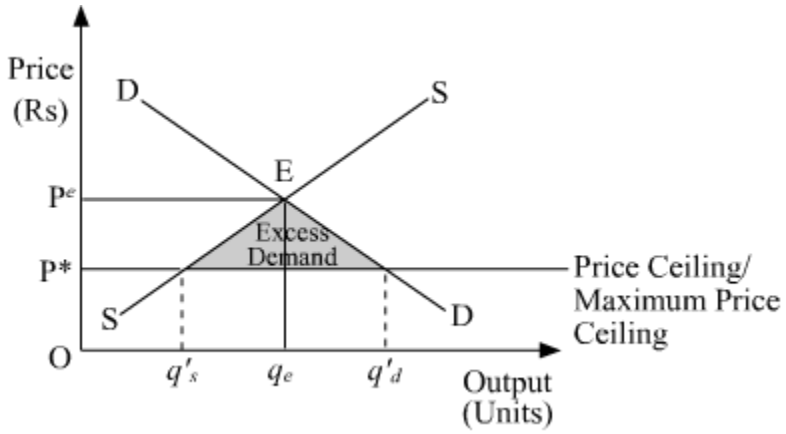
It was particularly in this case, when it became inevitable for the government to intervene in the market to control and regulate the prices. Let us examine the following two extreme cases when the government intervention is much needed to safeguard the interests of the consumers and of the sellers.

1. Price Ceiling

2. Price Floor

Price Ceiling

It is the legislated or government imposed maximum level of price that can be charged by the seller. Usually, the government fixes this maximum price much below the equilibrium price, in order to preserve the welfare of the poorer and vulnerable section of the society. For example, the Government of India imposes price ceiling in the market of wheat, rice, sugar and other necessity goods. Let us understand the effect and rationale behind imposing price ceiling by taking the example of the onion market.



Let *DD* represents the demand curve depicting the market demand for onions and *SS* represents the supply curve depicting the market supply of onions. The equilibrium as determined by the intersection of market demand curve and market supply curve is at E with equilibrium output Oq^e and equilibrium price OP^e.

Now, let us suppose that government imposes price ceiling at *OP** which is much lower than the equilibrium price OP^e. The imposition of the price ceiling will enable the poor people to afford onions at a comparatively lower price of *OP**.

Thus, the government by imposing price ceiling interferes the market forces and artificially lowers the market price. However; at *OP**, there exists an excess demand as the demand for onions (*q'd*) exceeds the supply of the onions (*q's*).

Effects of Imposition of Price Ceiling

As we can see in the above section that the main rationale behind imposing the price ceiling was to safeguard the welfare of the poor people but in turn, it created another problem; the problem of shortage. In order to counter the problem of shortage, the government opt for rationing the onions (or any other necessity good) through fair price shops (or ration shops).

Rationing implies allocation of fixed quota of goods on per-head basis to each family. As in India, rationing of kerosene, rice, wheat, etc. is done by distributing ration cards to the people below the poverty line and each family (according to per-head basis) are not allowed to buy more than the fixed quota at the rationed price.

The inefficiencies of the ration shops along with the excess demand give rise to another serious problem of '**Black marketing**'. It refers to the problem when goods are sold at higher price than the legislated price fixed by the government. This further worsens the situation for the poor people, as the goods are diverted from the ration shops to the black market. Therefore, in order to safeguard the welfare of the poorer section, the

government together with imposing price-ceiling should also work towards increasing the efficiency of the fair price shops and other distribution channels.

The following are the consequences and effects of price ceiling.

1. ***Excess demand***- Due to artificially lowering the price, the demand becomes comparatively higher than the supply. This leads to the emergence of the problem of excess demand.

2. ***Enhances Welfare***- The imposition of the price ceiling ensures the access of the necessity goods within the reach of the poor people. This safeguards and enhances the welfare of the poor and vulnerable sections of the society.

3. ***Fixed Quota***- Each consumer gets a fixed quantity of good (as per the quota). The quantity often falls short of meeting the individual's requirements. This further leads to the problem of shortage and the consumer remains unsatisfied.

4. ***Inferior Goods***- Often it has been found that the goods that are available at the ration shops are usually inferior goods and are adulterated and infiltrated.

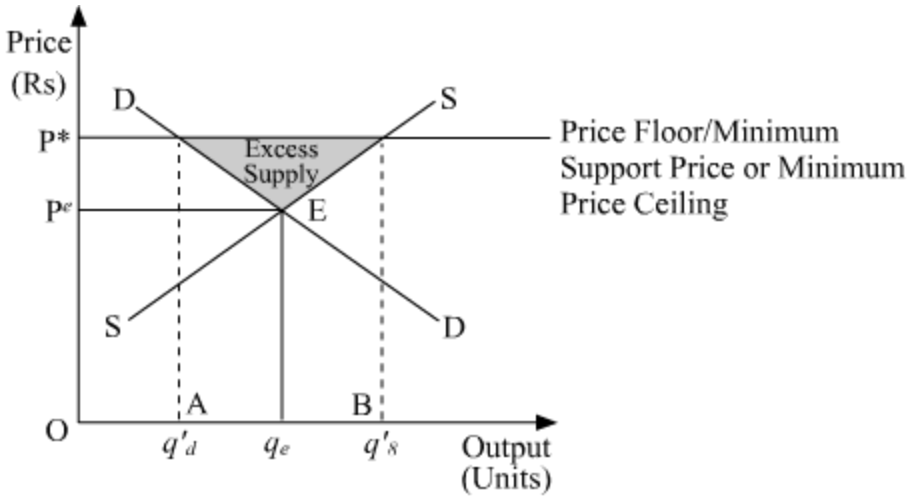
5. ***Black Marketing***- The needs of a consumer remain unfulfilled as per the quota laid by the government. Consequently, some of the unsatisfied consumers get ready to pay higher price for the additional quantity. This leads to black-marketing and artificial shortage in the market.

Price Floor or Minimum Support Price or Minimum Price Ceiling

On the contrary to the concept of the price ceiling, price floor implies legislated or government fixed minimum price that should be charged by the seller. The minimum price is fixed above the equilibrium price.

For example, in India, minimum wage is fixed to safeguard the welfare of labourers and minimum support price is fixed to safeguard and protect the interests of the farmers by ensuring minimum returns to them.

Let us analyse how the imposition of Minimum Support Price (MSP) works in a wheat market. In the following figure, *DD* represents the market demand and *SS* represents the market supply of wheat. The point '*E*' represents the market equilibrium point, where the market demand and market supply intersect. The equilibrium price is OP^e and equilibrium output is Oq^e.



Now, assume that the government imposes price floor at price $OP^{\bullet}$. At this price, the quantity demanded is *q'd*, whereas, the farmers are ready to supply *q's* units of wheat. As quantity supplied (q' *s*) is more than quantity demanded (*q' d*), so there exists a situation of excess supply of *AB* units of wheat (i.e. *q's – q'd*).

In this particular graph, *q'd* units of wheat is purchased in the open market by the traders and the consumers at price $OP^{\bullet}$. The excess units (*AB*) of wheat is purchased by the government at price $OP^{\bullet}$ and stores it as ***buffer stocks***. The buffer stocks are drawn down to ensure smooth flow of wheat and other important food grains in the years of bad monsoon and at the time of any natural calamity such as, flood, drought, etc.

Effects of Imposition of Price Floor

The following are the consequences and effects of price floor.

1. ***Assurance to the Farmers***- The imposition of the price floor assures the farmers that whatever they produce will get sold in the market. This implies that the farmers can produce to their maximum.

2. ***Assurance of Returns***- Due to the price floor, the farmers need not to bother about the sale of their output. This ensures a minimum guaranteed return to their investment in the production process.

3. ***Higher Income***- The minimum guaranteed returns in form of minimum price and minimum wage to labourers result in increase in the income of the poor people.

4. ***Burden on Consumers***- Price floor exerts additional pressure on the consumers and the traders, as they need to buy the products at comparatively higher price ($OP^{\bullet}$ in the figure) instead of the equilibrium price (OP_e).
5. ***Burden on Government***- It also puts extra burden on the government revenues. It becomes mandatory for the government to purchase the excess produce, even if it runs

a sufficient volume of buffer stocks.

6. ***Higher Taxes***- The government tries to shift the burden (associated with purchasing the excess produce at higher price) to the consumers and the traders in form of higher taxes.

Wage Determination under Perfect Competitive Market

Till now we studied about the goods market, where goods are demanded by the consumers and supplied by the producers at an equilibrium price that is determined by the intersection of the demand curve and supply curve of that particular good. Now, we will explore a similar situation in a factor market (say labour market).

In Economics, factors of production such as labour are also treated as a good or commodity. Accordingly, there exists a market named labour market, where labour (more specifically labour services) are traded. Similar to a good market, there exists demand for and supply of the labour services.

The labourers are the suppliers (or owners) of the labour services and the producers demand (or hire) the labour services. The supply curve for the labour services (labour, hereafter) depicts the quantity of labour (in working hours) that a particular labourer is willing to supply at corresponding labour prices (i.e. wages).

On the other hand, the demand curve of the labour depicts the quantity of labour (in working hours) demanded by the producers at different wage rate.

Demand for Labour by Profit Maximisation Producer

Let us now see how a profit maximising producer decides how much quantities of labour should he/she demands for maximising his/her profits. A profit maximising producer will continue to hire labour units until the additional benefits due to the additional labour is more than the cost of that labour unit.

That is, in other words, a particular firm will employ labour up to a point where the marginal cost of employing the last unit of labour hired equals the marginal benefit earned by the firm by hiring that particular unit of labour. The cost of labour units refers to the cost incurred to hire the labour units, i.e. wage (w).

The additional benefits implies a ***product*** (multiply) of the marginal product of additional unit of labour and additional revenue (i.e. marginal revenue) fetched by selling the additional unit of the output produced (by that unit of labour). This can be algebraically represented as:

Additional Benefits due to additional unit of labour = Marginal Product of that unit of Labour × Marginal Revenue received by selling the output produced by the unit of labour

The product of marginal product of labour and marginal revenue is referred to as ***marginal revenue product of labour*** i.e. MRP_L. That is,

$MRP_L = MP_L \times MR_L$ **(1)**

As stated above that a profit maximising producer will continue to hire the units of labour until the additional cost equals the additional benefit due to the last unit of labour (i.e. MRP_L). Therefore,

$w = MRP_L$

or, $w = MP_L \times MR_L$ **(2)**

As we know that in a perfect competitive market price equals to the marginal revenue, i.e.

$w = MP_L \times P$

The product of marginal product and price is referred to ***value of marginal product of labour*** i.e. VMP_L. That is,

$w = VMP_L = MP_L \times P$

or, $w = VMP_L$

Hence, a producer is governed by the following criteria.

$w > VMP_L$	Profit can be increased by hiring *more* units of labour
$w = VMP_L$	Profit is maximum, so firm should *stop* hiring labour units
$w < VMP_L$	Profit can be increased by *reducing* units of labour employed

Determination of Equilibrium Wage Rate and Equilibrium Quantity of Labour

As we know that in a good market, the equilibrium is determined by the intersection of demand and supply curves of the good, similarly, in a labour market, the equilibrium is determined by the intersection of demand and supply curves of ***labour***. Let us first consider the market demand curve and market supply curve of labour in order to determine the equilibrium in the labour market.

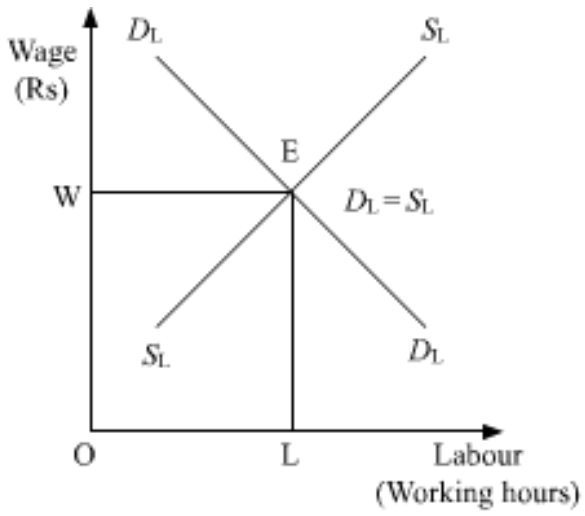
The market demand curve of labour is obtained by horizontal summation of the demand curves of all the individual firms in the market. It is a downward sloping demand curve which implies that higher units of labour are demanded at lower wage rates and vice-versa.

The market demand curve for labour is also known as ***derived demand*** as the demand for labour is due to (derived from) the change in the demand for the goods. That is, in other words, if the producer faces a higher demand for his goods, then he will increase the production of goods by hiring more units of labour and vice-versa.

The market supply curve of labour is obtained by horizontal summation of the supply curves of all the individual labourers in the market. An individual labourer needs to trade-off between working hours and leisure. Higher working hours implies less time for leisure, on the other hand, lower working hours implies more time for leisure.

That is, an individual labourer can either work for more working hours or can enjoy more of leisure hours. Consequently, the supply curve for labour is an upward sloping curve implying more working hours (and lower leisure hours) at higher wage rates and vice-versa.

The equilibrium in the labour market is determined by the intersection of the demand curve and the supply curve of labour. The following figure depicts the equilibrium in a labour market.



In the figure, D_LD_L represents the demand curve for the labour and S_LS_L represents the supply curve for the labour. The equilibrium as determined by the intersection of demand curve and the supply curve is at E. The equilibrium wage rate is *OW* and the corresponding hour of labour is the equilibrium quantity of labour i.e. *OL* working hours.