When Price is increase quantity demand is decrease and supply is increase.

$Q_{Dx} \propto \frac{1}{P_x}$ } Market

$Q_{Sx} \propto P_x$

Chapter 6

$10 + MCDs

When Price decrease and demand increase and supply decrease.

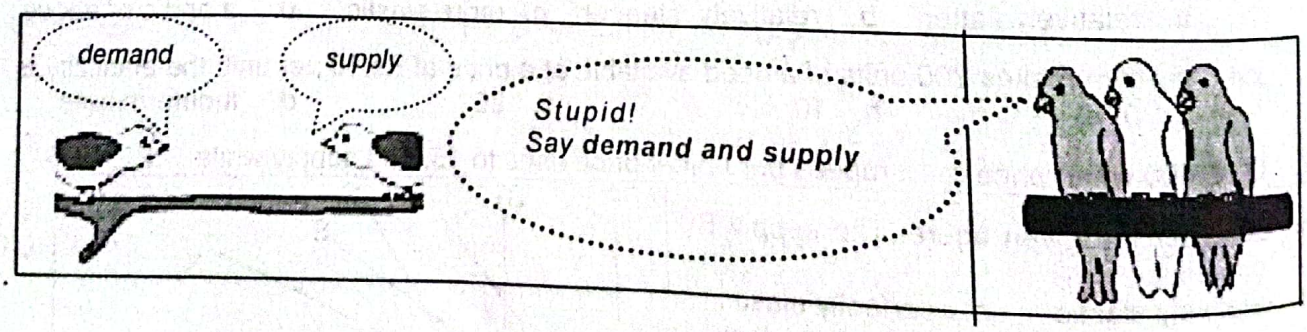
MARKET EQUILIBRIUM AND DETERMINATION OF MARKET PRICE

'In determination of price, demand and supply are like blades of scissors which together cut cloth'.

Every one of us, whether as buyer or seller, is affected by changes in prices. So it is natural that we should be interested to know how the prices of commodities are determined. In a way, we can say that it is one of the most important topics of economics.[1] In all modern economies innumerable and complicated activities are taking place among producers or sellers of goods and buyers. How these activities are going on smoothly. How it happens that what the consumers desire to buy for consumption is readily available in the shops although consumers do not give prior orders for production of such goods. Suppose you want to have a taxi to reach office, just step out of your house, and there is taxi on the road to fulfil your desire. You had never given a prior order to some driver to bring taxi on road. Then what is the magic that your desired commodity is immediately available. This is all due to existence of market prices. Prices bring order in economic activities by performing three important functions (i) **prices provide information** (ii) **prices provide incentive.** (Iii) **Prices bring equality between demand and supply of goods**. To illustrate, suppose we start with an example of a situation where too much sugar is available in Lahore but there is shortage in Islamabad where prices rise sharply. Consumers of sugar in Islamabad will clamour for sugar. However high prices serve as a signal and warning that consumption of sugar must be reduced. On the other side the high price will act as information and signal for the producers and sellers that there are eager buyers in Islamabad. It will provide them incentive to reap high profits by sending sugar from Lahore to Islamabad.

Market

Markets determine the prices of goods and services, and these prices guide decisions about what and how much to buy or sell



[1] **"Water is essential** for man's existence. Diamonds are beautiful but not essential. Yet normally the price of water is very low and the price of diamonds is very high. This **paradox** puzzled economists for many generations. Adam Smith, often regarded as founder of modern economics was unable to provide a satisfactory answer. It was not until the last half of the nineteenth century that a solution was found. Neo-classical economists put forward the theory that price is fixed by demand and supply for that good". A.G.D. See graphic illustration in explanatory notes at the end of chapter.

MARKET EQUILIBRIUM (or DETERMINATION OF PRICE)

Prices of commodities are determined by the interaction of two forces of demand and supply. Demand has inverse relation with price i.e. when price rises, less quantity is demanded. On the other hand, supply has direct relation with price i.e. if price increases, more quantity is supplied. It is the equality of these two forces which settles the price of a commodity at a particular level in the market. If at any time, the quantity demanded and quantity supplied are not equal, price starts moving. The movement of price causes opposite changes in demand and supply. A fall in price extends demand but contracts supply. While a rise in price contracts demand and expands supply. The movement of price, upward or downward, continues till such a **price** is reached **at which demand becomes just equal to supply.** This is called **equilibrium price.**[2] **The equilibrium of market refers to a situation where forces of demand and supply balance each other.**[3]

There are two kinds of markets, perfect market, in which number of sellers is very large i.e. conditions of perfect competition prevail and imperfect market whereas in monopoly (single seller) or monopolistic competition some sellers are present. In both types of markets, the basic principle of determination of prices is the same i.e. equality of demand and supply. However, there is some difference in details. Here we are discussing market equilibrium under perfect competition only.[4]

Example: wheat market under perfect competition.

Table 6.1

Price of Wheat (Rs./Kg.)	Quantity demanded (million tons)	Quantity supplied (million tons)	Market condition		Price will change
4	26	0	D > S	Shortage	Rise
8	24	4	D > S	Shortage	Rise
12	22	12	D > S	Shortage	Rise
16	**20**	**20**	**D = S**	**neither**	**Equilibrium**
20	18	28	D < S	Surplus	Fall
24	16	36	D < S	Surplus	Fall

The table shows that when price of wheat is Rs. 4 per kg., no body is willing to grow or sell wheat at this price. Price will rise. Suppose it goes to Rs.8. Can this price stay in the market? The answer is 'no'. The producers and sellers consider the price still very low. Most sellers refuse to sell any quantity while some offer very small quantity for sale. The quantity demanded is in excess of quantity supplied. The buyers face **shortage of wheat.**

---

2 **Market clearing price**: Equilibrium price is also called market clearing price.

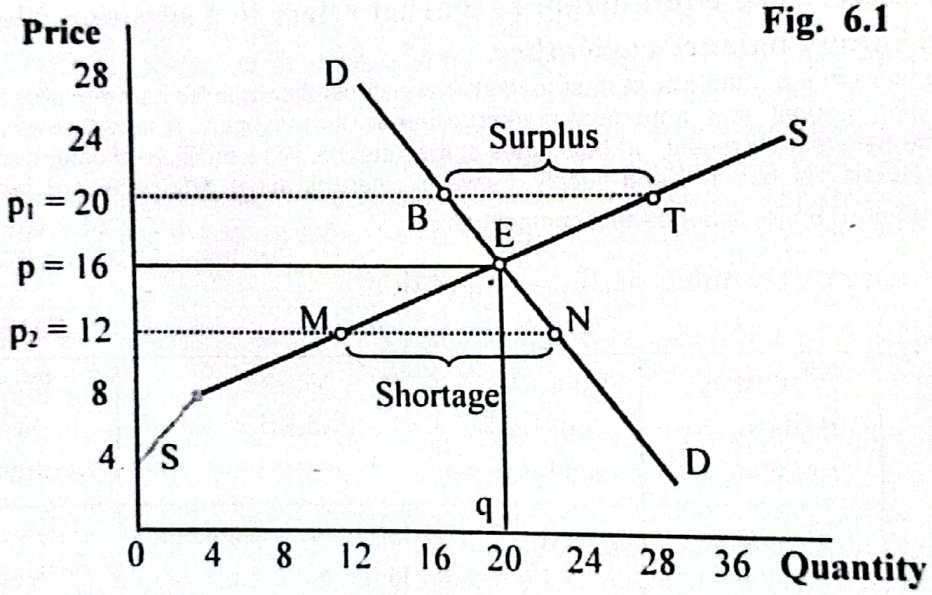
3 In general, we may say that **"An equilibrium is a situation in which there is no tendency to change".**

4 **Perfect competition** is said to prevail in a market if (a) there are very large number of small buyers and sellers, (b) the commodity is homogeneous i.e. all units are identical, (c) there is free entry and exit of firms in the market, (d) both buyers and sellers have perfect knowledge of facts of market and (e) there is perfect mobility of factors of production. **These conditions deny individual buyers or sellers any power over price.** Each buyer or seller has to accept the market price i.e. he is **price taker and not price maker.** (For detailed discussion of perfect competition see chapter 12.

They compete with each other to get the required quantity and offer a higher price. So, competition among buyers pushes up price. It affects demand and supply differently. Demand contracts, while supply expands. When price rises to Rs. 16 per kg., the quantity demanded is just equal to quantity supplied. Because now there is no force to change this price, it will stay. If due to some external cause, the price happens to rise above Rs. 16, forces set in which bring down price back to equilibrium point. Suppose price rises to Rs.20. At this price, supply outstrips demand. There is excess of supply i.e. **there is surplus.** The sellers find it difficult to sell the desired quantity at current price. To induce more sales, the sellers compete with each other and offer a lower price. This process continues till the price is back at equilibrium level.

The market equilibrium is explained by a simple graph. In fig. 6.1, quantity demanded and supplied are indicated on x-axis and price on y-axis.

Fig. 6.1



DD is the downward sloping market demand curve. Its negative slope indicates that more quantity will be demanded at lower prices. SS is the upward sloping supply curve showing that a rise in price will bring in more quantity for sale. When price is Op both quantity demanded and quantity supplied are equal at Oq. This price is the equilibrium price and Oq is equilibrium quantity. Under the given conditions of demand and supply, no other price can ensure equality of demand and supply. For example, let us suppose the price is Op_1. At this price demand is Bp_1 while supply is Tp_1. So there is excess supply equal to BT quantity. This surplus supply pushes down the price. On the other hand if price is Op_2, there is excess demand equal to MN. This will result in rise of price. Thus only Op price can stay.[5]

Inefficiency of free market pricing
Market outcomes of free working of demand and supply are not always efficient, and governments has to take action to remedy market failure

[5] Every market shows one of the three situations
(1) Shortage i.e. D > S and P tends ↑
(2) Surplus i.e. D < S and P tends ↓
(3) Balance i.e. D = S and P tends →

MCQs

Effect of changes in Demand or Supply on Price

It is the interaction of forces of demand and supply that determines market price. However, once a particular price is settled, it does not mean that it will continue to stay permanently. Both supply and demand are governed by such factors which do not remain constant, so either demand or supply or both may change any time. Changes of demand and supply affect the equilibrium market price and quantity. In this regard, the **general rule** is that:

(i) **Rise of demand pushes up the price while fall of demand depresses it.**
(ii) **Rise of supply lowers the price and fall of supply raises it.**

Effect of change in Demand

Table 6.2 shows how a rise and fall of demand influences price. Columns 2 and 3 indicate original demand and supply position. The two forces are equal at price Rs. 5.

Table 6.2

P	S_1	D_1	D_2 (Rise)	D_3 (Fall)
3	60	120	150	90
4	**80**	110	140	**80**
5	**100**	**100**	130	70
6	**120**	90	**120**	60
7	140	80	110	50

Initially, the price settled in the market is Rs. 5. Later, due to some reason, demand rises. New demand is shown in column 4. Now if the previous equilibrium price of Rs. 5 continues, the buyers are willing to buy more than the sellers want to sell. So a competition among buyers starts and raises the price from Rs. 5 to a new equilibrium position i.e. Rs.6. If demand falls as given in column 5, the price falls to Rs. 4, to establish equality of demand and supply at 80.

A similar table can be constructed to show the effect of changes in supply on market equilibrium. The position of market equilibrium under different demand and supply conditions becomes very clear with the help of the following diagrams:

G.T

CHANGES IN MARKET CONDITIONS — Graphic Method

Effect of change in Demand. (Shift of Demand Curve) Fig. 6.2 illustrates DD and SS as original demand and supply curves. The equilibrium is at point E. Op and Oq are equilibrium price and quantity respectively. Now, there is a rise in demand and its new position is D_1, while supply remains unchanged. New equilibrium is at E_1. We see that rise in demand has resulted in higher price Op_1 and larger quantity Oq_1, than before.

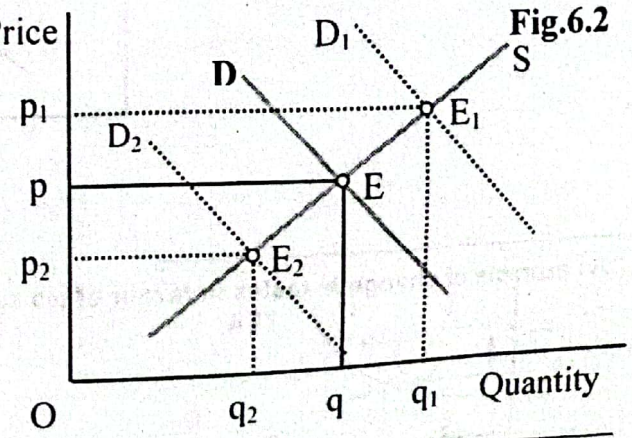


Fig.6.2

Equilibrium price is the only price when both households (buyers) and firms (sellers) are satisfied with their plans about buying and selling.

On the other hand, when demand falls to D_2 position, both price and quantity decrease to become Op_2 and Oq_2 respectively.[6]

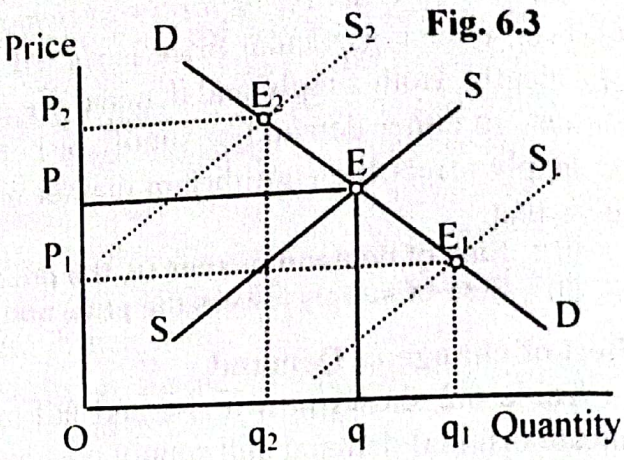
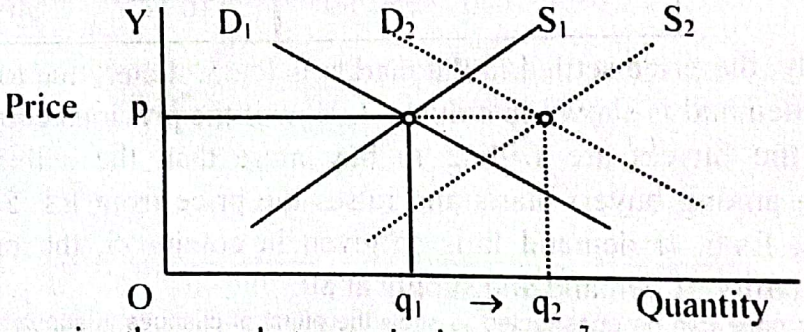


Fig. 6.3

Effect of Change in Supply In Fig. 6.3 DD and SS are original demand and curves. The equilibrium price and quantity are Op and Oq. When supply rises and the curve shifts to S_1 position, price decreases to Op_1 level and quantity exchanged increases to Oq_1. If due to some reason, supply decreases to S_2 position, opposite effects are produced. Price has risen to Op_2 while quantity has shrunk to Oq_2

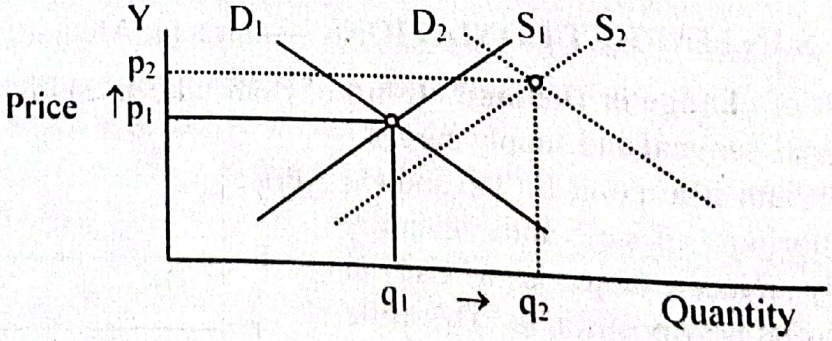
Effect of Simultaneous Change in Demand and Supply In this case many possibilities arise e.g. demand and supply increase in the same proportion or one changes more than the other. We can represent all these possibilities by making different diagrams on the pattern discussed above.

Fig. 6.4 (a) Demand and Supply increase equally.

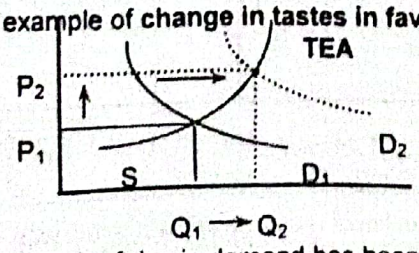


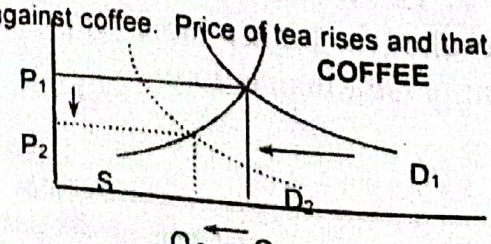
In this case, price remains the same but quantity increases.[7]

(b) Demand increases more than supply.



[6] An example of change in tastes in favour of tea against coffee. Price of tea rises and that of coffee falls.

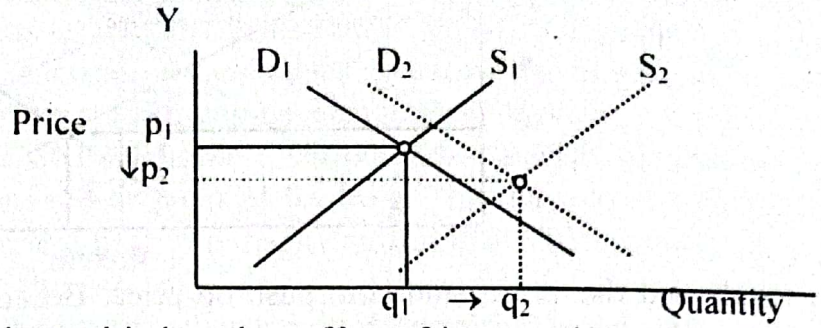




[7] The effect of rise in demand has been fully neutralised by the effect of rise in supply.

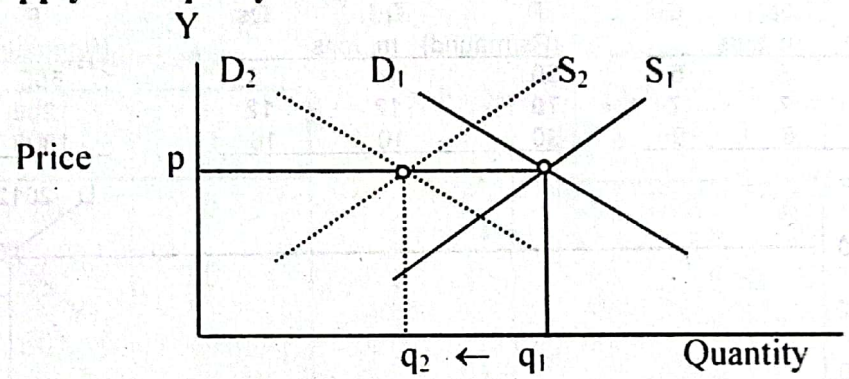
The effect of rise in demand is greater than the effect of rise in supply. Therefore, price and quantity both rise. (The effect of rise in demand is not fully neutralised by rise in supply).

(c) Demand rises less than rise in supply.



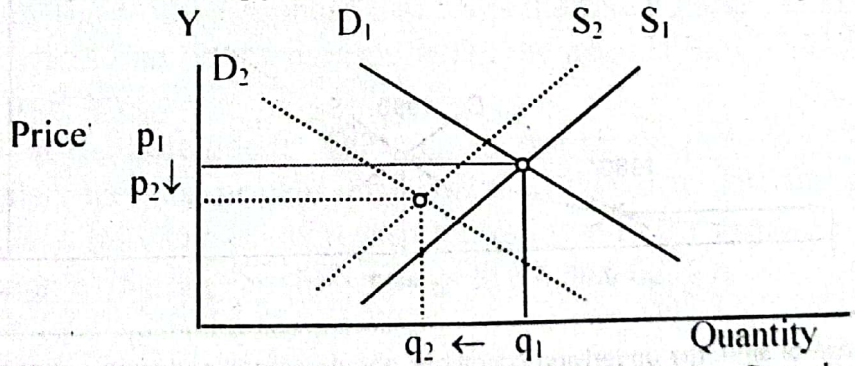
Effect of increase in demand is less than effect of increase in supply, so price falls and quantity exchanged increases.

(d) Demand and Supply fall equally



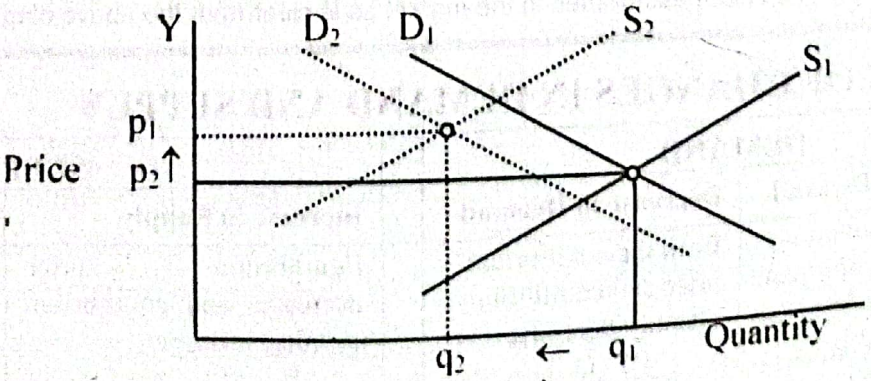
There is no change in price but quantity traded falls.

(e) Demand falls more than the supply.



Influence of fall of demand is greater than effect of fall of supply. So price falls.

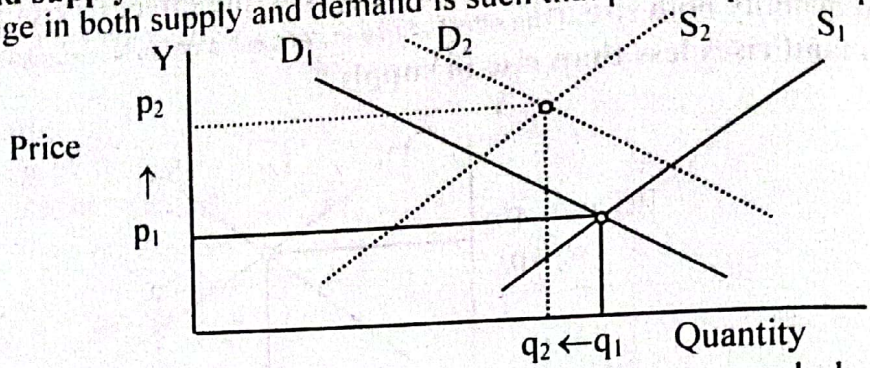
(f) Supply falls more than fall of demand.



Since the relative fall in supply is greater, price has risen.

(g) Demand rises and supply falls

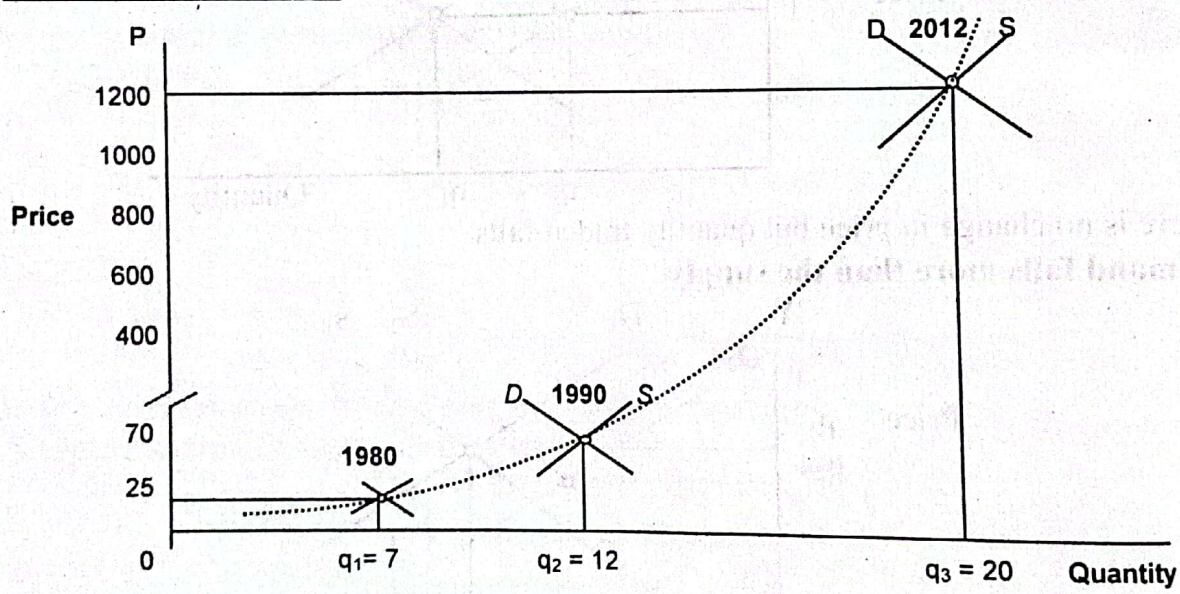
Direction of change in both supply and demand is such that price is pushed up.



Fall in supply and rise in demand both push up price. Because supply has fallen relatively more, quantity decreases.

INFLATION – HOW PRICES RISE IN THE LONG RUN e.g. Wheat market in Pakistan 1980,1990, 2012

1980			1990			2012		
P (Rs/maund)	Qd m. tons	Qs	P (Rs/maund)	Qd m. tons	Qs	P (Rs/maund.)	Qd m. tons	Qs
20	8	5	50	14	8	600	24	12
25	**7**	**7**	**70**	**12**	**12**	1200	**20**	**20**
30	6	9	90	10	16	1800	16	28



With the passage of time, the underlying conditions about demand and supply change; so they may rise or fall. Consequently, new equilibrium values are determined. This is the reason we see that both price and quantity demanded increase. This does not mean that law of demand is violated. It simply means new equilibrium of price and quantity has been established in the market as is clear from the above diagram.

EFFECT OF CHANGES IN DEMAND AND SUPPLY

DEMAND		SUPPLY	
Increase in Demand	**Decrease in Demand**	**Increase in Supply**	**Decrease in Supply**
Both the equilibrium price and equilibrium quantity **increase** P↑ Q↑	**Both** the equilibrium price and equilibrium quantity **decrease** P↓ Q↓	Equilibrium price decreases and equilibrium quantity increases P↓ Q↑	Equilibrium price increases and equilibrium quantity decreases P↑ Q↓

MARKET PRICE AND NORMAL PRICE

Market Price

Market price is the price settled by equality of demand and supply. When the period is very short, say, a day or two, the firms cannot adjust their production plans according to change in market demand. So, whatever quantity has already been produced and is available in or near the market, will decide the level of price.

Market Price of Perishable Commodities. Perishable commodities are those which cannot be stored or stocked for long. They have to be sold as early as possible. Since the sellers cannot wait, if enough demand is not forthcoming, the price may fall to extreme low. Take the case of tomatoes as given below. On a particular day, 40 trucks with one ton each have arrived at Lahore Vegetable Market. *Since the supply is fixed, the price will be decided by demand.* At price Rs.30 per kg, all the supply is sold. If we suppose that demand falls from D_1 to D_2 position. As a result price settles at lower level of Rs.20.

Table 6.3 Market Equilibrium

P	S	D_1	D_2
40	40	20	0
30	40 =	40	20
20	40	60	40
10	40	80	60

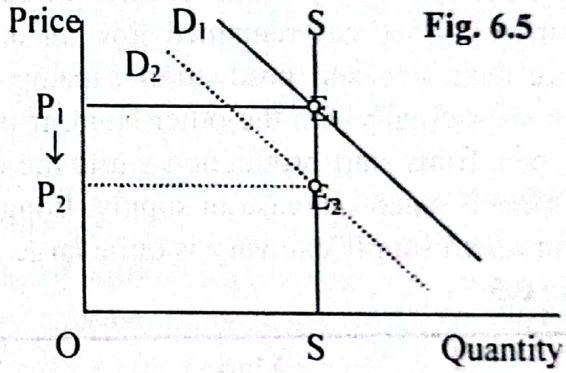


Fig. 6.5

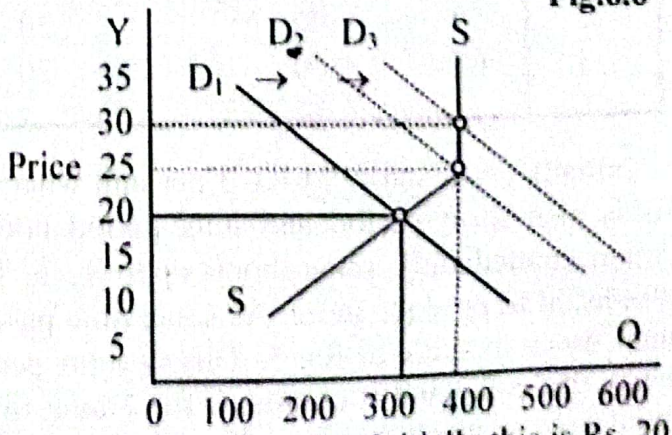
In terms of fig. 6.5, we suppose that SS is the fixed market supply. It has zero elasticity so it is vertical line. When demand is D_1, the price is P_1. If demand falls to D_2, price comes down to P_2 level.

Market price of durable goods These goods can be stocked for some time. So if at sometime the sellers feel that price is unsatisfactory, they offer less for sale. However, if price is rising, the supply can be increased but only up to the available stock and not more. Take the example of wheat as shown in table 6.4 and fig. 6.6.

Table 6.4

P	S	D_1	D_2
5	0	450	600
10	100	400	550
15	200	350	500
20	**300**	**300**	450
25	**400**	250	**400**
30	400	200	350

Fig.6.6



Equilibrium price is determined at the point where Qd = Qs. Initially this is Rs. 20 per kg. Now if demand rises to D_2 position, price rises to Rs.25. If demand further rises, only price will rise. Quantity available for sale cannot be increased above 400. This is

shown in fig. 6.6. If demand falls, price will fall and the commodity will be stocked. When price comes to Rs.5, no quantity is offered for sale.

NORMAL PRICE

It is the price which is settled when producers have enough time to adjust production to meet demand. This can be, (a) short period normal price and (b) long period normal price.

Short Period Normal Price It is the average price over a period during which firms can make adjustments in their output level. However, productive capacity does not change. Only the plants are used more or less. If price rises, firms try to sell more while in case of fall in price, they try to produce less. But the range of changes in supply is limited to the total existing capacity of firms. Short period supply has some elasticity as shown in table 6.5.

Long Period Normal Price It is the average price over a long period during which the industry has full chance to expand or contract. All kinds of changes are possible. If price has remained low for a longer enough period in the past, the firms reduce their size and production capacity. Some weak firms leave. So supply comes down substantially. On the other hand, if price has remained high for long period in the past, new firms start production while the old firms also expand their size. The result is that there is much increase in supply. Long period supply is highly elastic and the range within which supply can vary is quite large as shown in table 6.5 and fig. 6.7.

Table 6.5

P	D1	Market period supply MPS	Short period supply SPS		Long period supply LPS	New demand D2
6	10	**40**	70		160	**40**
5	20	40	60		120	**60**
4	30	40	50		**80**	**80**
3	**40**	**40**	**40**	Current Price	**40**	100
2	50	40	30		0	120
1	60	40	20		0	140

Initially price settles at Rs. 3 per unit where market period supply and D_1 are equal. This is also short period and long period normal price. Now let demand rise to D_2 position. Immediately, price shoots up to Rs. 6. The profits of the firms increase and they are induced to produce more. As some time passes, more quantity is produced and price comes down to settle at Rs. 5. This is short period normal price. If nothing happens to change this price and it continues for a long time, then new firms come and industry's output rises so much that price level falls to Rs. 4. This is long period normal price. See fig. 6.7.

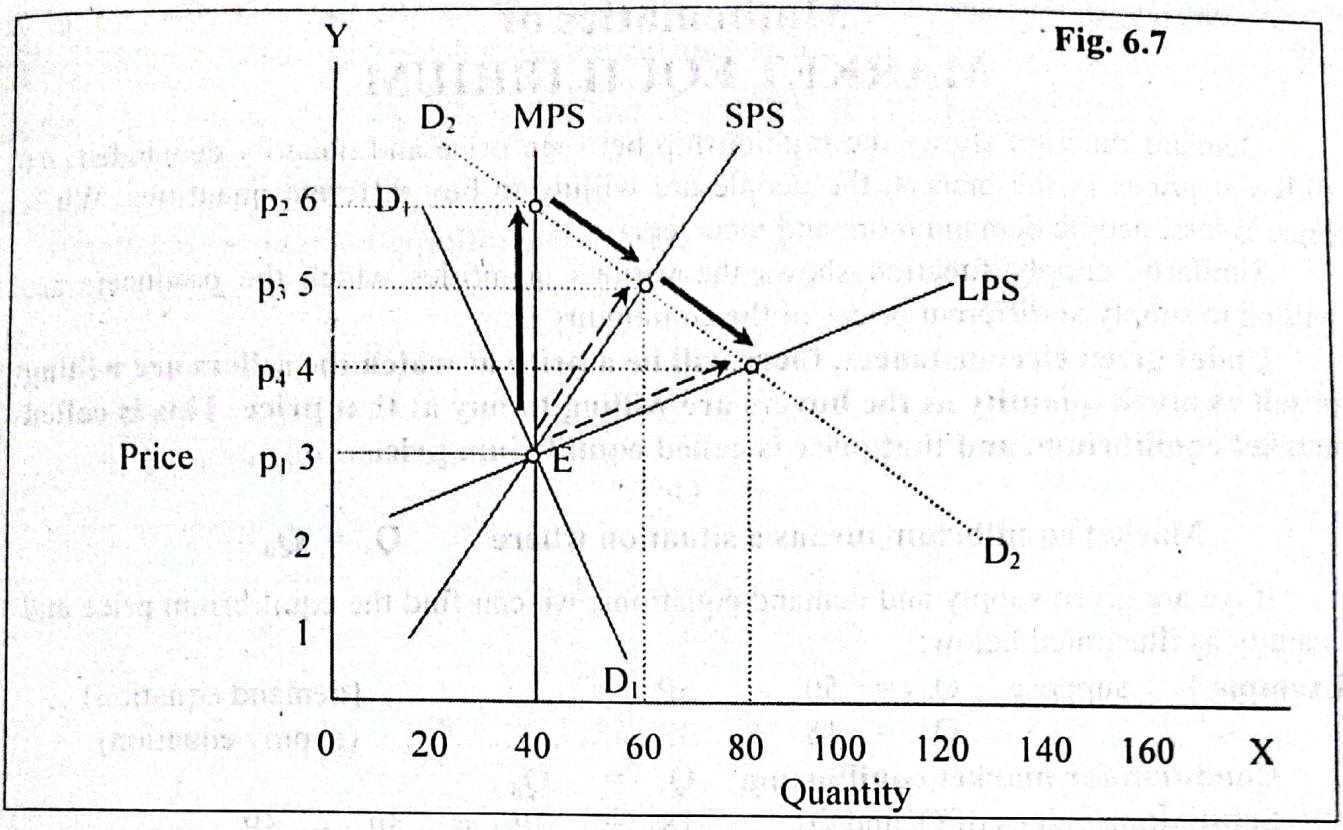
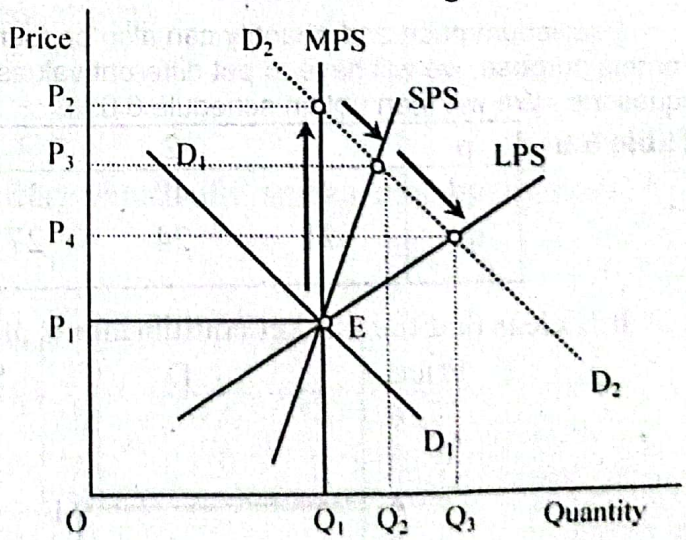


Fig. 6.7

Initially price is p_1. When demand shifts to D_2 position, market price goes to p_2. But this price does not stay in short period. Because of shift of supply curve, it comes to p_3. In the long period, due to expansion of industry and increased supply, price comes to p_4 which is long period normal price.

Fig. 6.8



Explanation without table

Initially price is P_1. When demand shifts to D_2 position, market price goes to P_2. But this price does not stay in short period. Because of shift of supply curve, it comes to P_3. In the long period, due to expansion of industry and increased supply, price comes to P_4 which is long period normal price.

equilibrium price those p and qd and supply is equal.

Mathematics of MARKET EQUILIBRIUM

Demand function shows the relationship between price and quantity demanded. At different prices in the market, the people are willing to buy different quantities. When price is less, people demand more and vice versa.

Similarly, supply function shows the various quantities which the producers are willing to supply at different prices of the commodity.

Under given circumstances, there will be a price at which the sellers are willing to sell as much quantity as the buyers are willing to buy at that price. This is called market equilibrium, and that price is called equilibrium price.

Or

Market equilibrium means a situation where $Q_s = Q_d$

important

If we are given supply and demand equations, we can find the equilibrium price and quantity as illustrated below:

Example 1 Suppose $Q_d = 50 - 5P$ ..... (demand equation)

$Q_s = 18 + 3P$ ..... (supply equation)

Condition for market equilibrium $Q_s = Q_d$

Substituting values of Q_s and Q_d $18 + 3P = 50 - 5P$

$3P + 5P = 50 - 18$

$8P = 32$

$P = 4$

This is *market price or equilibrium price*. If we put this value of p in either demand or supply equation we get equilibrium quantity. Thus, $Q_d = 50 - 5(4) = 50 - 20 = 30$

because $Q_s = Q_d = 30$, the solution is $P = 4$ and $Q = 30$

Equilibrium price and quantity can also be found out by constructing a schedule or a graph. For this purpose, we will have to put different values of p in the above given demand and supply equations. We will then obtain schedule 6.6.

Table 6.6

p	1	2	3	4	5	6
qd	45	40	35	30	25	20
qs	21	24	27	30	33	36

It is clear that the market equilibrium is at $P = 4$ and $Q = 30$. If we plot different values of price and quantity to get graphs of demand and supply, same result is obtained.

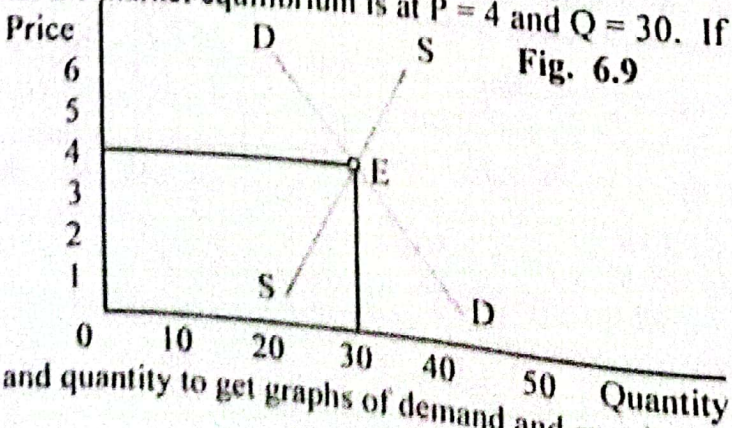


Fig. 6.9

In fig. 6.9, DD and SS are demand and supply curves intersecting at pint E. Corresponding to E, the price is 4 while the quantity is 30.

Example 2. Given $Q_d = 40 - 2P - P^2$ and $Qs = 13 + 4P$. Find equilibrium price and quantity. Also make graph.

Solution

Condition for market equilibrium $Q_s = Q_d$

Putting values $13 + 4p = 40 - 2P - P^2$

$$P^2 + 6p - 27 = 0$$

Using quadratic formula i.e. $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

In our equation $a = 1, \quad b = 6, \quad c = -27$

$$P = \frac{-6 \pm \sqrt{(6)^2 - 4(1)(-27)}}{2(1)}$$

$$= \frac{-6 \pm \sqrt{(144)}}{2} = \frac{-6 \pm 12}{2}$$

$$P = \frac{-6 + 12}{2} = \frac{6}{2} = 3$$

or $$P = \frac{-6 - 12}{2} = \frac{-18}{2} = -9$$

We accept only positive value of P.

Putting this value in demand and supply equations.

$$Q_d = 40 - 2(3) - (3)^2 = 25$$

$$Q_s = 13 + 4(3) = 25$$

So $P = 3$ $Q = 25$

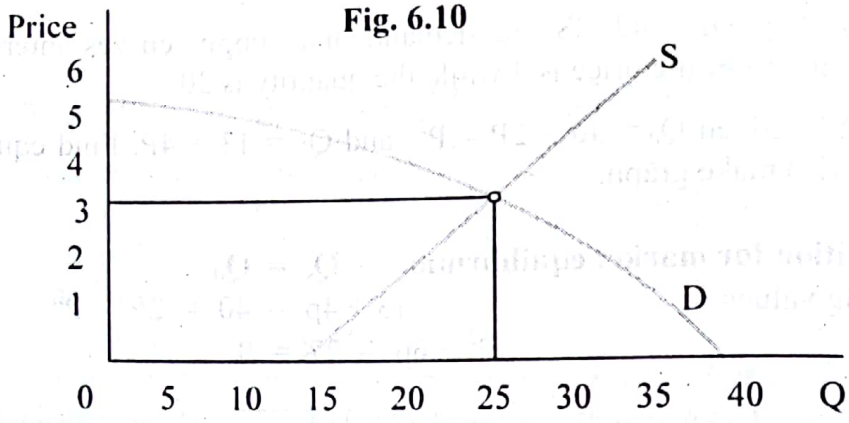
To make graph, we assume different arbitrary values of P and calculate values of Qd and Qs.

Table 6.7

P	0	1	2	**3**	4	5
Q_d	40	37	32	**25**	16	5
Q_s	13	17	21	**25**	29	33

We plot these values in graph to get equilibrium point.

Fig. 6.10

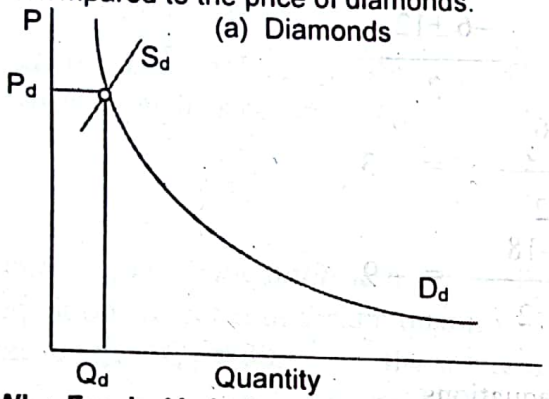


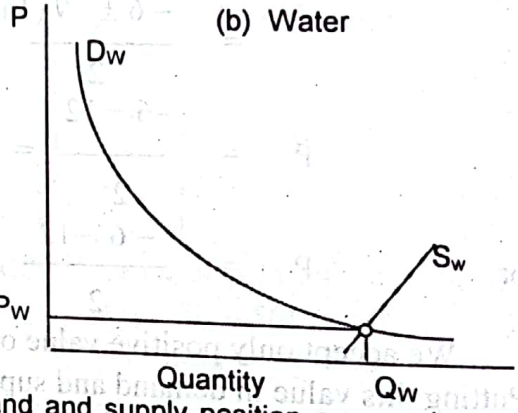
E is equilibrium point and P and Q are equilibrium price and quantity.

SUPPLEMENTARY NOTES

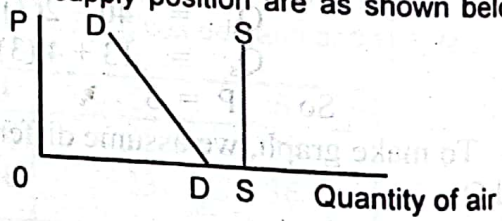
Working of Demand and Supply Forces in different situations

➢ **Price of Water and Diamonds: (Paradox of Value)** At any given price, demand for water is much greater than for diamonds'. But because supply of water is larger, the price settled is very low as compared to the price of diamonds.

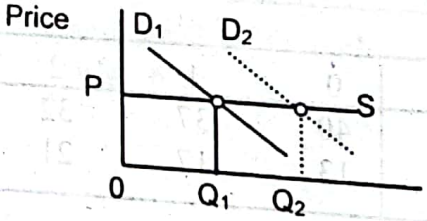




➢ **Why Fresh Air is free good.** Fresh air demand and supply position are as shown below. Supply is greater than demand even at zero price.



➢ **Price with perfectly elastic supply.** Increase in demand has no effect on price



➢ **Price with perfectly inelastic supply.** Increase in demand has only affected price and not quantity