

demanders
 ↓
 Consumers
 ↓
 household
 ↓
 customer

Producers
 ↓
 Supplier
 ↓
 Seller

Chapter 5

SUPPLY

Meaning

Supply means the quantities of a commodity offered for sale at different prices during a given period of time.

Prof. Meyers defines supply in the following words:

"Supply is a schedule of the amount of a good that would be offered for sale at all possible prices, at any one instant of time or during any period of time, e.g. a day, a week, and so on".

Just as demand for a commodity is always associated with a price, supply of a product is always shown against some price. It is also influenced by the period of time under consideration. Unlike demand, supply is directly related to price i.e. more quantity is offered for sale at higher prices.

Supply Vs Stock

For a common man, the words supply and stock of a commodity may have the same meaning but a student of economics needs to distinguish the two terms.

Stock is the total quantity of a commodity available in or near the market which can be brought for sale at a short notice. The stock is a fixed amount, which is not affected by the changes in price.

Supply is the quantity which is actually offered for sale out of the existing stock at different prices. The supply increases with a rise in price and vice versa.

If the commodity is ~~worn out~~ durable and the price offered is not acceptable, a part of the stock will be withheld. See table 5.1. Initially when price is Rs. 200, no body is willing to sell wheat. Even at price Rs. 400 no quantity is being offered for sale although 200 thousand tons of wheat are lying with the stockists. It is only when price has risen to Rs. 600 that a small amount of 50 thousand tons is offered. As price rises, more quantity of wheat out of the stock is put on sale. i.e. with increase in price, supply has expanded.

Table 5.1

Price (Rs./maund)	Stock of wheat (Thousand tons)	Supply of wheat (Thousand tons)
200	200	0
400	200	0
600	200	50
800	200	100
1000	200	200
1200	200	200

Stock is equal to Supply

In case of perishable commodities like fresh milk, fish and fruit, we cannot distinguish between stock and supply. The whole stock must be sold immediately; otherwise the commodity will be wasted.

Price of ice (Rs)	Stock of ice blocks	Supply of ice blocks
40	100	100
30	100	100
20	100	100

Important S/O RESERVE PRICE G.T

This is the minimum price below which a seller does not want to sell any quantity. For example a person selling chairs may consider Rs. 500 as the minimum acceptable price. Then Rs. 500 is the reserve price. This price depends upon nature of the commodity and circumstances of the seller.)

RELATION OF TIME PERIOD TO SUPPLY

Supply depends upon period of time under consideration. As the period gets longer, supply becomes elastic and sellers find more time to easily adjust to new price.

Daily Market

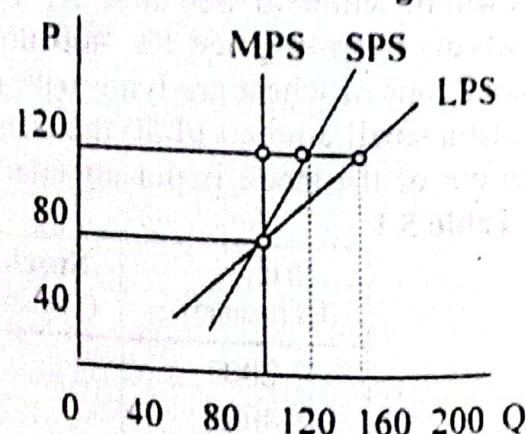
(i) **Market Period Supply** refers to very short period e.g. the day to day market. This supply is fixed for perishable goods. In case of durable goods, the market period supply can be increased or decreased only out of existing stock available. Suppose on a particular day, 50 trucks of banana have arrived in Lahore Fruit Market. This is the market period supply. All the truck-loads of banana must be sold as soon as possible they get rotten.

(ii) **Short Period Supply** refers to such period of time which is enough to make adjustments by sellers in response to changes in price. However, the time available is not very long. So, the adjustments are possible only within the existing productive capacity of firms.

(iii) **Long Period Supply** refers to such time period during which all necessary changes can be brought in the industry to meet permanent shift of demand for products. New firms can be established and old ones can be closed. Existing firms can also expand or contract their productive capacity. The relationship between various kinds of supply is illustrated in table 5.3 and fig. 5.1.

Table 5.3.

Price of fish (Rs./Kg)	Market period supply (tons)	Short period supply	Long period supply
40	100	80	60
60	100	90	80
80	100	100	100
100	100	110	120
120	100	120	140



If price rises from Rs. 80 to Rs. 100, supply is not affected immediately. But, in time considered is quite long.

Important S/Q + L/Q

LAW OF SUPPLY

Law of supply expresses the relationship between the price of a commodity and the quantity supplied. Normally supply has positive or direct relation with price i.e. quantity supplied moves in the same direction as price, more quantity is supplied at higher price and vice versa.

Law of supply

"Other things remaining the same, quantity supplied of a commodity increases with rise in price and decreases with fall in price."

Positive relationship between price and supply is due to the reason that, higher the price, the greater will be profit of sellers and the greater inducement for firms to produce more. New firms are also attracted by higher profits.

Law of supply can be explained with the help of a schedule and a diagram. Supply schedule is a statement of the various quantities of a commodity offered for sale at different prices during given period of time.

Price of eggs (Rs./per dozen)	Quantity supplied (dozens per day)
40	400
60	600
80	800
100	1000
120	1200

The above schedule indicates that when price of eggs increases from Rs.40 per dozen to Rs.120 per dozen, the supply of eggs expands from 400 dozens to 1200 dozens. As price moves upward, the poultry farmers try to raise more chicken and so increase the supply of eggs.

SUPPLY CURVE

When supply schedule is plotted in a graph we get a supply curve as shown in the fig. 5.2. Supply curve for a good shows relationship between prices of a good and the quantities which firms offer for sale are at different prices.

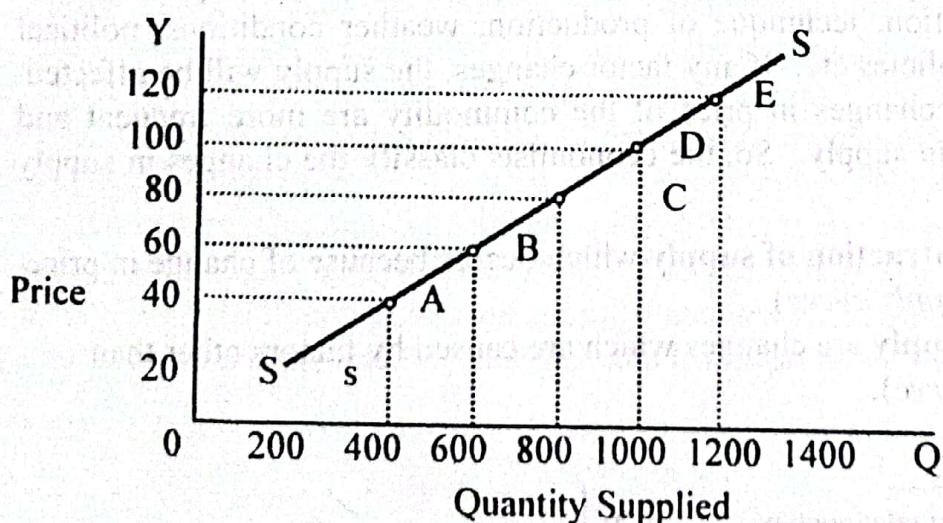


Fig. 5.2

In the diagram, at price¹ Rs.40 the quantity supplied is 400 dozen. This gives us point A. Similarly, for other prices and corresponding quantities we get points B, C, D and E. By joining these points we obtain SS supply curve.

The supply curve is upward sloping from left to right showing a positive relation between price and quantity supplied.

Assumptions

Law of supply is based on certain assumptions:

1. Cost of inputs used to produce the product does not change. A change in cost of production affects profits of the sellers so they may change the quantity offered for sale at the same price. e.g. a government tax can reduce supply.
 - (i) **Prices of raw materials**
 - (ii) **Cost of transport** Rise in price of petrol raises transport cost affects supply of many commodities.
 - (iii) **Tax rate** If tax is increased, supply is reduced because of lower profits.
 - (iv) **Wage bill** (Rise in wage bill causes fall in supply)
2. Production technology remains the same. Improvement in technology may lower cost of production and affect supply. If new technology reduces cost of production of TVs, their supply will increase without change in price.
3. Floods, wars etc. may affect supply. Change of season affects supply of agricultural goods. More quantity is offered for sale in harvest.
4. Number of sellers If more firms enter a market, more quantity comes for sale at existing prices i.e. supply increases.
5. Law and order situation Change in law and order situation affects supply.
6. Expectations about future prices affect quantity supplied without change in price.

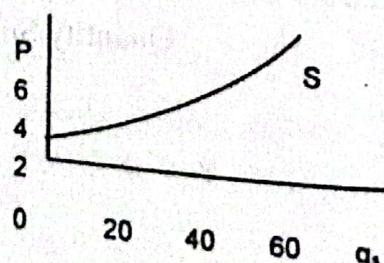
CHANGES IN SUPPLY

Supply of a commodity is influenced by a lot of factors such as price of the commodity, cost of production, technique of production, weather conditions, political situation and government policies etc. If any factor changes, the supply will be affected. Compared to other factors, changes in price of the commodity are more frequent and immediate cause of change in supply. So, the economists classify the changes in supply into two types.

- (a) Extension and contraction of supply which occurs because of change in price (*movement along the supply curve*)
- (b) Rise and fall of supply are changes which are caused by factors other than price (*shift of supply curve*).

¹ A more appropriate (i.e. non linear) relationship between price and q_s can be as given below.

P	0	1	2	3	4	5
q_s	0	0	20	35	45	50



Extension and Contraction of supply

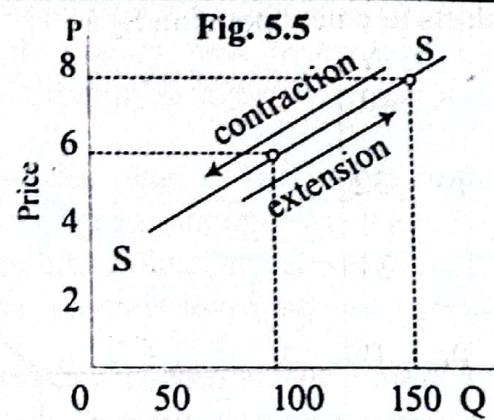
The effect of change in market price on supply is known as extension or contraction of supply. When price of a commodity rises, more quantity is offered for sale. This is termed as extension of supply. On the other hand if price falls its supply will be less. This is known as contraction of supply.

In extension and contraction, the supply schedule and curve remain the same. Upward movement along supply curve indicates extension in supply while the downward movement shows contraction of supply. This is shown in the table and figure below:

Table 5.5

Price (Rs/kg)	Quantity
6	100
8	150

↓ extension ↑ contraction



Both the table and figure show that when price is Rs. 6/- per kg. the quantity supplied is 100 kg. When P increases to Rs. 8/- supply extends to 150 kg. It is extension of supply. Conversely if P falls from Rs. 8/- to Rs. 6/-, the supply reduces from 150 kg. to 100 kg. This is contraction of supply.

Rise and Fall of Supply (or Shift of Supply Curve)

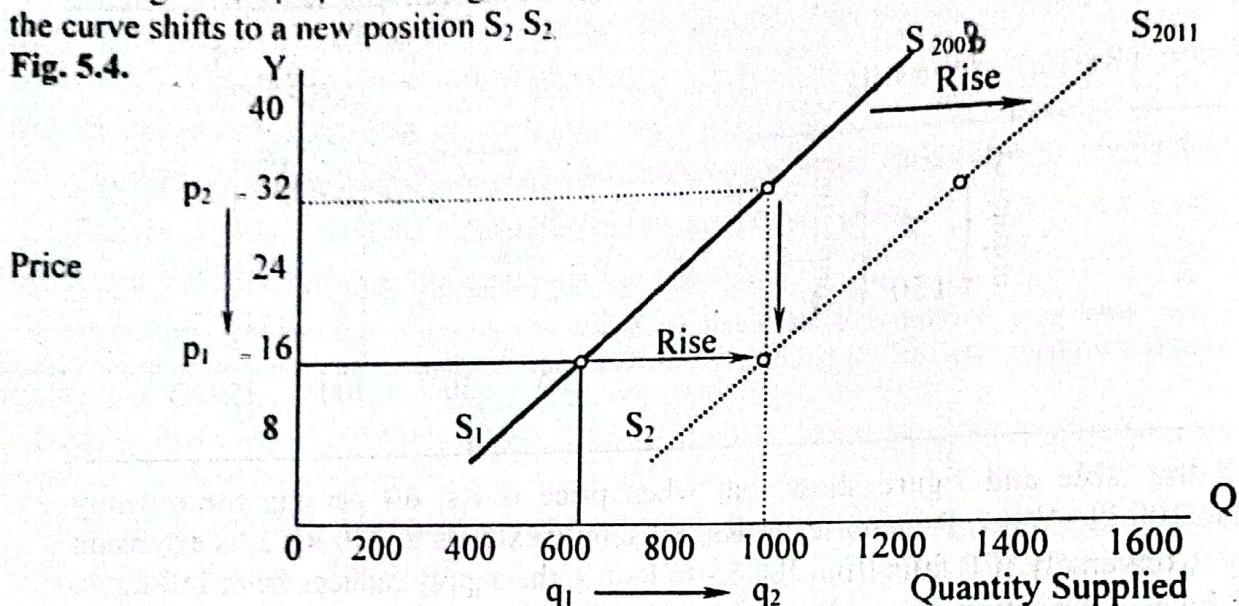
When the supply of a commodity changes, not due to change in its price but due to some other factors, such as cost of production or taxes, the change is called rise or fall of supply. In such a case the whole supply schedule changes and supply curve shifts. In table 5.6, column 2 indicates supply of computers in year 2008 at various prices. By the year 2012, number of computer firms increased. Column 3 represents this change. At each price, the quantity of computers offered for sale has increased. For instance, in 2008 at price Rs. 32000, the quantity supplied is 1000 computers. However, in 2012, at the same price the quantity supplied is 1400 computers. This is rise in supply. We can look at rise in supply in another way. In year 2008, 1000 computers are supplied at price Rs. 32000. But in 2012, 1000 computers are supplied at a lower price Rs. 16000. Thus, rise in supply also means the same quantity supplied at a lower price.

Table 5.6.

Price of computer (thousand rupees)	Quantity supplied 2008	Quantity supplied 2012
16	600	1000
24	800	1200
32	1000	1400
40	1200	1600

In Fig. 5.4, $S_1 S_1$ is the original supply in year 2008. In 2012, the supply rises and the curve shifts to a new position $S_2 S_2$.

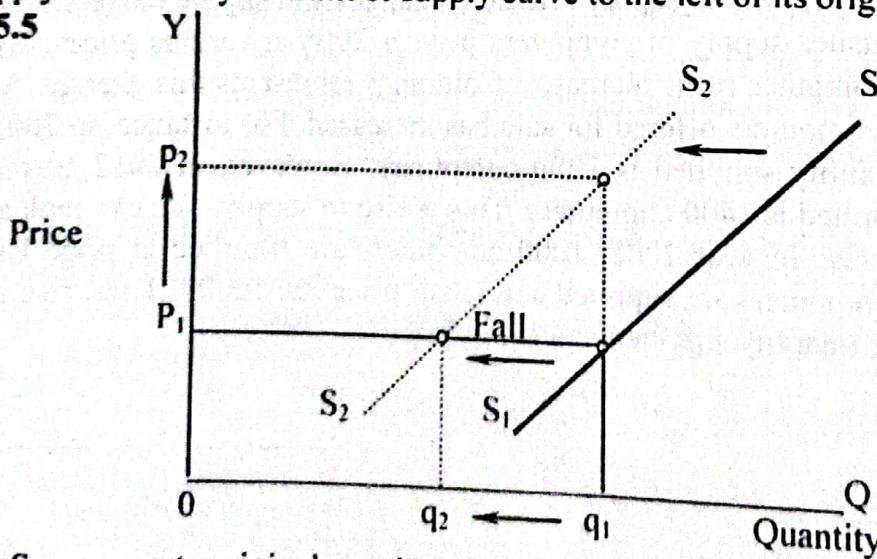
Fig. 5.4.



When price is $O p_1$ the quantity supplied in 2008 is $O q_1$ while it is $O q_2$ in 2012 at the same price. In other words, we can see that in 2008, $O q_2$ quantity is supplied at price $O p_2$, when in 2012 supply rises, the same quantity is being offered for sale at lower price $O p_1$.

In the opposite case it will be called fall in supply. At the same price, less quantity of a commodity is offered for sale or the same quantity is supplied at a higher price. The fall in supply is shown by the shift of supply curve to the left of its original position.

Fig. 5.5



$S_1 S_1$ represents original supply and $S_2 S_2$ is the new supply showing a fall. Initially at price $O p_1$ the quantity offered for sale is $O q_1$. But after the fall in supply, only $O q_2$ is

supplied at the same price. Shift of supply curve from S_1S_1 position to S_2S_2 also indicates that the producers are willing to sell the previous quantity Q_1 only at a higher price P_2 . 40

Factors Affecting Supply (or Supply Shifters)

Besides price, there are many factors which affect supply position. These factors (other things) can change with time, causing the supply curve to shift. Important supply shifters are the following.

1. Cost of inputs like raw materials and wages: Increase in cost of inputs causes fall in supply e.g. rise in prices of fertilizer may compel farmers to reduce supply of wheat.

2. Technology Supply may rise due to use of new technology e.g. use of computer may increase productivity. The use of tractor in agriculture has increased the supply of many agricultural goods.

3. Means of Transport Supply may rise due to improved transport and communication facilities e.g. introduction of air cargo and internet services.

4. Taxation Increase in taxes on commodities (such as sales tax) may cause fall in supply² e.g. if the government increases tax on cement, quantity of cement supplied at previous prices will fall. Sales tax and excise duty shift supply curve leftward.

5. Weather Conditions Favourable weather conditions or timely rains cause increase in supply of many goods. Weather is particularly important for agricultural products.

6. War can reduce supply. Factories may close down and trade routes become unsafe.

7. Industrial Policy A favourable industrial policy which increases concessions and facilities for some industry may cause rise in supply of its products.

8. Prices of substitute products affect supply of a good. For example, supply of wooden chairs is affected by the prices of substitutes such as steel or plastic chairs.

9. Number of Producers Increase in number of producers of a commodity can cause rise in supply. e.g. increase in number of mobile-phone firms resulted in more connections available at current rate of calls.

10. Expectation about Future Prices If producers expect lower or higher price of their product in the future, they adjust their production plans accordingly. If farmers expect the prices of potatoes to fall in the coming season, they will produce and sell less potatoes.

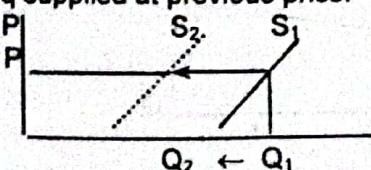
G.7 ELASTICITY OF SUPPLY

Like elasticity of demand, economists have developed the concept of elasticity of supply. We may define elasticity of supply as:

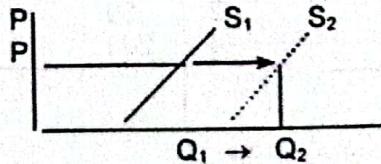
"The degree of responsiveness of supply of a commodity to change in its price."

²(a) Effect of Sales Tax

Less q supplied at previous price.



(b) Supply shifts with improvement in technology



When a small rise in price causes a large expansion in supply (or when a small decrease in price leads to a large contraction in supply), the supply of the commodity is said to be elastic. On the other hand if supply shows little variation in response to a given change in price, the supply is known as inelastic.³

MEASUREMENT The general rule for measuring elasticity of supply is

$$e = \frac{\% \text{ change in quantity supplied}}{\% \text{ change in price}} \quad (= \frac{\% \Delta Q_s}{\% \Delta P})$$

Percentage changes are calculated by dividing the change in price by original price and the change in quantity supplied by the original quantity supplied. So we write⁴

$$e = \frac{\Delta q}{q} \div \frac{\Delta p}{p}$$

Numerical value of elasticity of supply can be calculated by the following two methods. It will always be positive.

A. Mathematically

For this purpose the following formula is used:

$$e = \frac{\Delta q}{q} \div \frac{\Delta p}{p}$$

Δq = change in quantity Δp = change in price
 q = original quantity p = original price

When elasticity of supply of a commodity is measured, five possibilities arise.

(i) Zero elasticity ($e_s = 0$)

When no change in price
When the supply of commodity remains fixed and is not affected by variations in price, the elasticity of supply is said to be equal to zero.

Example:

P Rs.	qs Kg.
3	100
4	100

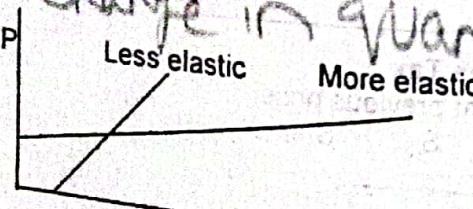
$$\begin{aligned} q &= 100 \\ \Delta q &= 0 \\ p &= 3 \\ \Delta p &= 1 \end{aligned}$$

$$e_s = \frac{\Delta q}{q} \div \frac{\Delta p}{p} = \frac{0}{100} \div \frac{1}{3} = \frac{0}{100} \times \frac{3}{1} = 0$$

(ii) Elasticity less than unity ($e_s < 1$)

If % change in supply is less than the % change in price, the elasticity of supply will be less than unity.

Less elastic supply		More elastic	
P	Q	P	Q
2	50	2	50
4	55	4	200



4

$$\% \text{ change in } q = \frac{\Delta q}{q} \times 100$$

$$e = \left\{ \frac{\Delta q}{q} \times 100 \right\} \div \left\{ \frac{\Delta p}{p} \times 100 \right\} = \frac{\Delta q}{q} \div \frac{\Delta p}{p}$$

$$\% \text{ change in } p = \frac{\Delta p}{p} \times 100$$

Example:

p (Rs)	qs (kg)
3	100
4	110

$$q = 100 \quad \Delta q = 10$$

$$p = 3 \quad \Delta p = 1$$

$$e_s = \frac{\Delta q}{q} \div \frac{\Delta p}{p} = \frac{10}{100} \div \frac{1}{3} = \frac{10}{100} \times \frac{3}{1} = \frac{30}{100} = \frac{3}{10} < 1$$

(iii) Elasticity equal to unity ($e_s = 1$)

If % change in supply equals the % change in price, the elasticity of supply will be equal to one.

Example

p Rs.	qs Kg.
2	100
3	150

$$q = 100 \quad \Delta q = 50$$

$$p = 2 \quad \Delta p = 1$$

$$e_s = \frac{\Delta q}{q} \div \frac{\Delta p}{p} = \frac{50}{100} \div \frac{1}{2} = \frac{50}{100} \times \frac{2}{1} = \frac{100}{100} = 1$$

(iv) Elasticity more than unity ($e_s > 1$)

If % change in supply is greater than the % change in price, the elasticity of supply of a commodity will be more than one.

Example

p (Rs)	qs (kg)
2	100
3	200

$$e_s = \frac{\Delta q}{q} \div \frac{\Delta p}{p} = \frac{100}{100} \div \frac{1}{2}$$

$$= \frac{100}{100} \times \frac{2}{1} = \frac{200}{100} = 2 > 1$$

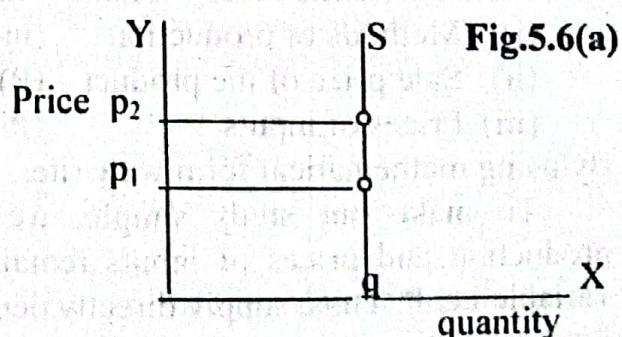
(v) Infinite elasticity ($e_s = \infty$)

When an extremely small rise in price leads to infinite extension in supply, the elasticity of supply is said to be infinity.

B. Geometrically By this method elasticity of supply can be estimated as illustrated in the following diagrams.

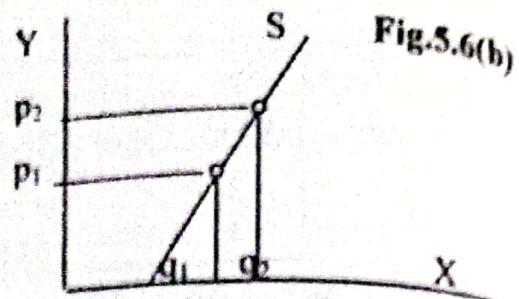
(i) $e_s = 0$

In this case the supply curve will be vertical straight line parallel to y-axis as shown in figure 5.6. (a).



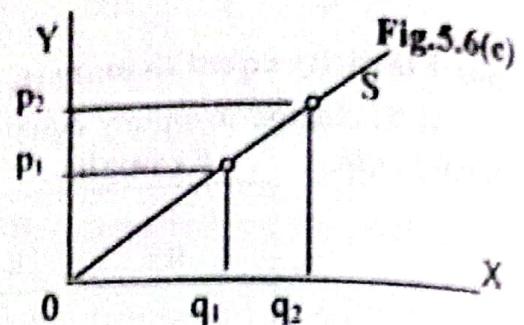
(ii) $e_s < 1$

In this case, if the supply curve is extended, will touch x-axis. It is shown in figure 5.6. (b)



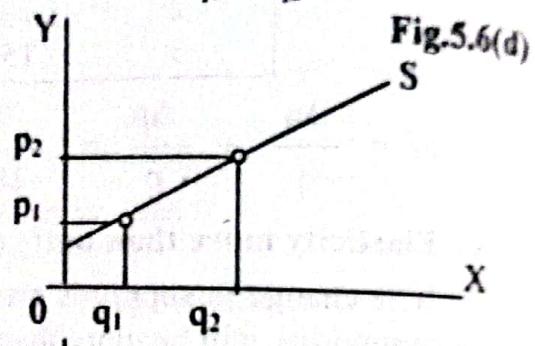
(iii) $e_s = 1$

Here the supply curve (actual or extended) will pass through the origin (0). See figure 5.6. (c).



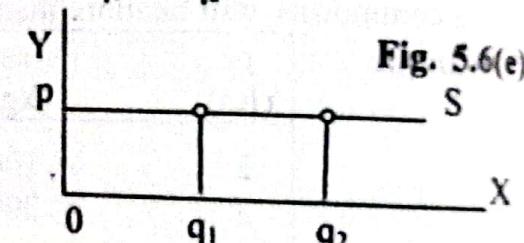
(iv) $e_s > 1$

The elasticity of supply will be greater than unity if the supply curve (actual or extended) meets y-axis as shown in fig. 5.6. (d).



(v) $e_s = \infty$

In this situation supply curve will be horizontal straight line parallel to x-axis as shown in figure 5.6. (e).



EQUATION OF SUPPLY

Functional Equation of Supply

Functional equation of supply shows the relationship between market price of a commodity and quantity offered for sale.

From economic theory we know that supply of a commodity (Q_s) depends on:

- (i) Methods of production (m)
- (ii) Sale price of the product (P)
- (iii) Prices of inputs (Pi)

By using mathematical form we write, $Q_s = f(m, P, P_i)$

To make our study simple, we assume that in short period, the methods of production and prices of inputs remain constant. Then there is only one independent variable i.e. P. Thus, supply directly depends upon price and we can write $Q_s = f(P)$. This function to be linear, then $Q_s = a + bP$ where a and b are parameters. Economic theory

also tells us that when price rises, quantity supplied increases and vice versa. Therefore the co-efficient of P (i.e. b) will always have a positive sign. When a and b are given different values, different supply equations are obtained e.g. if $a = 10$ and $b = 2$, then $Q_s = 10 + 2P$.

SUPPLY SCHEDULE AND SUPPLY CURVE

From a functional equation of supply we can get supply schedule. This is done by putting various assumed values of P and finding the corresponding values of Q. When the values of P and Q_s in a supply schedule are plotted in the graph we get supply curve.

HOW TO GET FUNCTIONAL EQUATION OF SUPPLY

The following formula is used to get functional equation of supply from a supply schedule

$$Q - Q_1 = \frac{Q_2 - Q_1}{P_2 - P_1} (P - P_1)$$

Where Q_1 and P_1 are original quantity and price and Q_2 and P_2 are new quantity and price.

Example Find functional equation of supply from the schedule. Make a graph.

P	1	2	3
Q	15	20	25

If we take

$$\begin{aligned} P_1 &= 1 & Q_1 &= 15 \\ P_2 &= 2 & Q_2 &= 20 \end{aligned}$$

Then putting these values in the formula, we get

$$Q - 15 = \frac{20 - 15}{2 - 1} (P - 1)$$

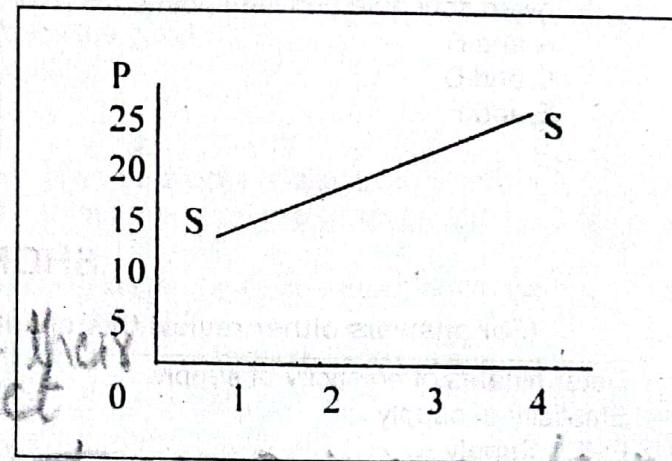
$$Q - 15 = \frac{5}{1} (P - 1)$$

$$Q - 15 = 5P - 5$$

$$Q = 10 + 5P$$

because there is direct

Then is linear equation of supply.

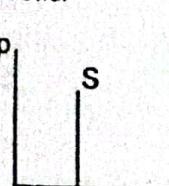


SUPPLEMENTARY NOTES

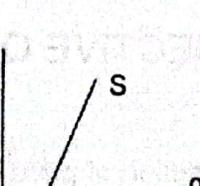
➤ Time and Elasticity of Supply.

Time has great influence on elasticity of supply. If the time is very short the elasticity may be zero. But when time is long enough the firms can make adjustments in their production and size, so supply become elastic.

Market period	
p	q
2	100
4	100



Short period	
p	q
2	100
4	120



Long period	
p	q
2	100
4	300

