

Ans. (a) Meaning. Price elasticity of supply is the degree of responsiveness of supply of a commodity to a change in its price. It measures responsiveness of quantity supplied of a commodity to change in its own price. Thus it measures the extent to which supply responds to change in price of the commodity.

Law of supply explains a quantitative relationship between price and supply because it tells about direction of change in supply caused by change in price but elasticity of supply refers to a quantitative relationship between price and quantity supplied. Thus **elasticity of supply is a measurement of degree of responsiveness of quantity supplied to change in price**. This can be illustrated with the help of a simple example. Suppose at the rate of ₹ 28 per kg, supply of sugar is 100 kg but when the price rises to ₹ 35 per kg, its supply expands to 150 kg. In this case supply of sugar is very elastic because its supply gone up by 50% in response to rise in price by 25%. Price elasticity of supply (e_s) is also defined as percentage change in quantity supplied divided by percentage change in price. Symbolically:

$$e_s = \frac{\% \text{ Change in quantity supplied}}{\% \text{ Change in price}}$$

(b) Factors affecting magnitude of price elasticity of supply.

(i) **Change in cost of production.** Elasticity of supply of a commodity depends on how cost responds to change in output. If with an increase in output, cost of production per unit also goes up, supply will be rather less elastic. It is so because incentive of getting high profit as a result of price rise is choked off by increase in cost of production. As against it, if per unit cost of production rises slowly or negligibly as production increases, the producers will produce more to earn more profit making the supply elastic.

(ii) **Nature of commodity.** The nature of the commodity—agricultural or industrial, durable or perishable—also affects the elasticity of supply. For example, elasticity of supply of industrial goods is more than that of agricultural goods. Similarly elasticity of supply of durable goods is more than that of perishable goods like fresh vegetables which cannot be stored for next day.

(iii) **Behaviour pattern of producers.** Generally producers aim at maximising their profits and if they are rational, they raise the supply with rise in price. But in real life, producers behave differently. For instance, farmers in rich countries respond negatively to rise in price of their agricultural products because then their need for fixed money income is met by disposing of smaller quantity of foodgrains.

(iv) **Time period.** Generally elasticity of supply is more in the long period than in shorter period of time. The reason is that in the long period, all adjustments to the higher prices can be made easily and supply of commodity can be varied accordingly. As against it, supply is inelastic in short period.

(v) **Availability of facilities for expanding output.** How can farmers raise their agricultural output with rise in price of their products if facilities like seeds, fertilisers or irrigation facilities for expansion are not available. Similarly industrialists feel handicapped in expanding their output in response to rise in their industrial products when power, raw material, fuel etc. are not readily available.

Q. 3.46. (a) Describe different types (degrees) of elasticity of supply.

- Draw supply curves of a commodity with price elasticity of supply (i) equal to one, (ii) less than one, (iii) greater than one, (iv) equal to zero, and (v) equal to infinity.

(b) Answer the following questions :

- (i) When is supply of a commodity called elastic?
- (ii) What is meant by perfectly elastic supply of a commodity?
- (iii) What will be price elasticity of supply at a point on a positively sloped straight line curve?

Ans. (a) Generally the following five types of elasticity of supply are taken into consideration depending upon the degree of elasticity. The coefficient of price elasticity of supply varies from zero to infinity as explained below.

(Sample Paper, 2010)

(i) **Perfectly inelastic supply ($e_s = 0$).** When quantity supplied does not change at all in response to change in price of the commodity, its supply is said to be perfectly inelastic as shown below. In such a situation, supply curve becomes vertical and parallel to Y-axis

as shown in Fig. 3.28. Here elasticity of supply (e_s) = 0 because supply has not changed at all as a result of 100% rise in price. This happens in case of perishable goods like fish, milk etc.

Price per kg (₹)	Supply (kg)
10	100
20	100

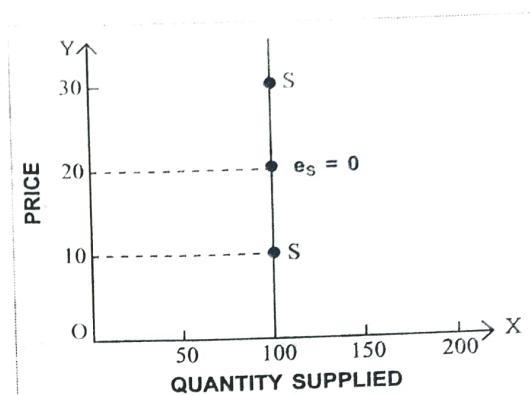


Fig. 3.28

(ii) **Less than unit elastic supply ($e_s < 1$)**. When percentage change in quantity supplied is less than the percentage change in price, supply is said to be less than unit elastic (or less elastic) but greater than zero as shown in the following supply schedule.

Price per kg (₹)	Supply (kg)
10	100
20	150

Here supply has increased by 50% in response to 100% rise in price. Figure 3.29 shows a straight line positively sloped supply curve which meets X-axis when extended to the right of origin (point O). Alternatively it also means that $e_s < 1$ if supply curve starts from X-axis.

(iii) **Unit elastic supply ($e_s = 1$)**. Supply of a commodity is said to be unit elastic (or unitarily elastic) when percentage change in supply is equal to percentage change in price as shown below. Here supply has increased by 50% as a result of 50% increase in price. In such cases, a straight line supply curve passes through the point O as shown in Fig. 3.30.

Price per kg (₹)	Supply (kg)
10	100
15	150

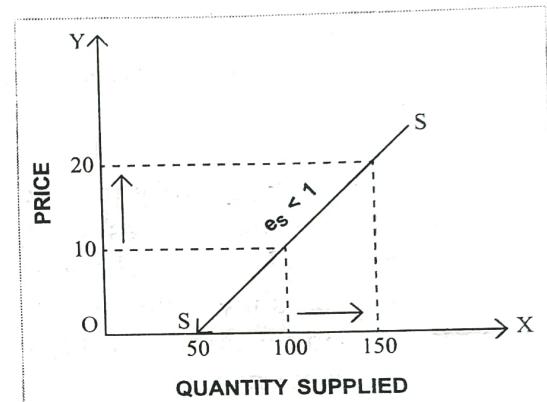


Fig. 3.29

Thus when $e_s = 1$, supply curve should start from the point of origin as shown in this figure. Alternatively it also means that $e_s = 1$, if supply curve starts from the origin (point of axes).

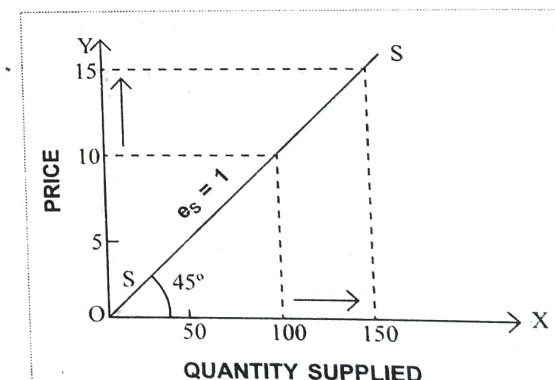


Fig. 3.30

(iv) More than unit elastic ($e_s > 1$). When percentage change in supply is more than percentage change in price, supply is said to be more than unit elastic (or highly elastic) but less than infinity as shown below. Here, supply has increased by 100% in response to 50% rise in price. In such a situation positively sloped straight line meets Y-axis above the point O (point of origin) as illustrated in Fig. 3.31.

Price per kg (₹)	Supply (kg)
10	100
15	200

Alternatively it also means that $e_s > 1$, if supply curve starts from Y-axis.

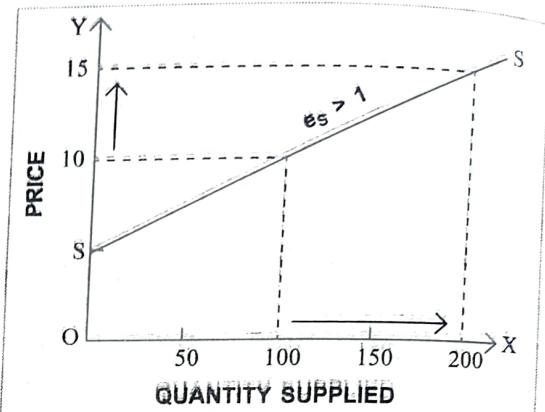


Fig. 3.31

(v) Perfectly elastic supply ($e_s = \infty$). Supply of a commodity is said to be perfectly elastic when its supply expands (rises) or contracts (falls) to any extent without any change or very little change in price as shown below. In the following hypothetical schedule, supply has gone up by 100% without an increase in price.

Price per kg (₹)	Supply (kg)
20	100
20	200

Here $e_s = \infty$ (infinity) and the supply curve becomes horizontal and parallel to X-axis as shown in Fig. 3.32. It is an imaginary concept.

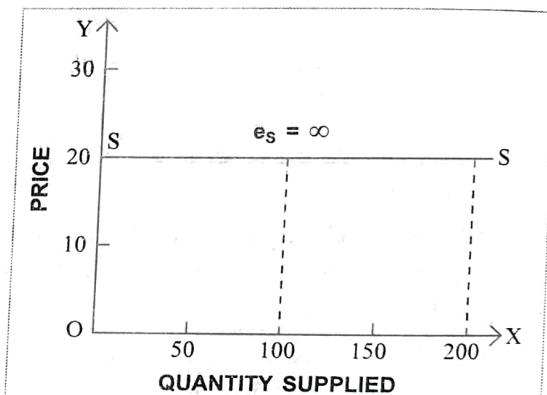


Fig. 3.32

DEGREES OF ELASTICITY OF SUPPLY

Coefficients of e_s	Nature of e_s	Relationship between price and supply
$e_s = 0$	Perfectly inelastic	Quantity supplied does not change with change in price.
$e_s < 1$	Less than unit elastic	% change in supply is less than that in price.
$e_s = 1$	Unit elastic	% change in supply is equal to that in price.
$e_s > 1$	More than unit elastic	% change in supply is more than that in price.
$e_s = \infty$	Perfectly elastic	Supply changes infinitely without change in price.

Simply put, 'Flatter the supply curve, the more responsive (elastic) is the supply.'

Supply curves showing different elasticities

The Fig. 3.33 shows graphically supply curves with different degrees of elasticity ranging from 0 to infinity. Simply put (i) If supply curve is a vertical straight line, e_s is zero, (ii) If supply curve is parallel to X-axis, e_s is infinite. (iii) If supply curve is a straight line passing through the origin (O), $e_s = 1$. (iv) If supply curve is a straight line cutting Y-axis, $e_s > 1$. (v) If supply curve is a straight line intersecting X-axis, $e_s < 1$.

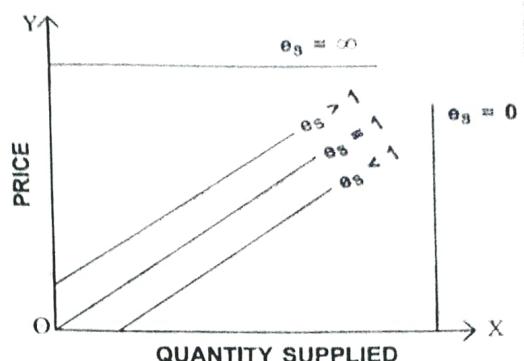


Fig. 3.33

- (b) (i) When percent change in supply is greater than percentage change in price.
- (ii) When supply expands or contracts to any extent without any change or very little change in price.
- (iii) Elasticity at any point on a positively sloped straight line supply curve is 1 i.e., $e_s = 1$ if it touches (or passes through) the origin when extended; $e_s > 1$ if it touches Y-axis when extended and $e_s < 1$ if touches X-axis when extended.

MEASUREMENT OF ELASTICITY OF SUPPLY

Q. 3.47. • Explain percentage method of measuring price elasticity of supply.

(D 2000)

(A 2000)

• State formula of measuring price elasticity of supply.

Ans. Price elasticity of supply (e_s) can be measured by two methods—Percentage Method and Geometric Method—as explained below.

Percentage Method

Price elasticity of supply is measured by percentage method in the same way as the elasticity of demand. We measure elasticity of supply as the ratio of percentage change in quantity supplied of the commodity to percentage change in its price. In other words, e_s is measured by dividing the percentage change in quantity supplied of a commodity by the percentage change in price of the commodity. Expressed in the form of an equation:

$$\text{Elasticity of supply} = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

By simplifying, this can be converted into the following formula:

$$e_s = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

In which e_s stands for Elasticity of supply

Δq stands for change in quantity supplied

Δp stands for change in price

q stands for original quantity

p stands for original price

If the result of the above equation is 1, supply is elastic; if more than 1, supply is more or highly elastic; if less than 1, supply is less elastic. This can be further clarified with the help of following examples.

Note: Since price and quantity supplied move generally in the same direction, elasticity of supply will always be positive. There is no confusion regarding sign of e_s .

Example. If price of sugar rises from ₹ 16 per kg to ₹ 18 per kg, the quantity supplied expands from 100 kg to 150 kg. What is elasticity of supply of sugar?

Solution.

$$\Delta q = 50 \text{ kg} (150 - 100)$$

$$\Delta p = ₹ 2 (18 - 16)$$

$$q = 100 \text{ kg}$$

$$p = ₹ 16$$

$$e_s = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$= \frac{50}{2} \times \frac{16}{100} = 4$$

Here 4 is called coefficient of elasticity of supply. Supply in this case is more than unit elastic or supply of sugar is more elastic.

(Geometric method of measuring price elasticity of supply is explained in Q. 3.26)

Q. 3.48. NUMERICAL SUMS ON ELASTICITY OF SUPPLY

(D 2003, 2004, 06, 06C, 07C, 09, 09C, 10; A 2004, 06, 09, 10)

- Calculate elasticity of supply when price falls from ₹ 6 to ₹ 4 per unit.

Price (per unit)	Supply (units)
6	5000
5	4000
4	3500
3	2000

Ans.

$$\Delta q = 1500 (5000 - 3500)$$

$$\Delta p = 2 (6 - 4)$$

$$q = 5000$$

$$p = 6$$

$$e_s = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$= \frac{1500}{2} \times \frac{6}{5000} = \frac{9}{10} = 0.9$$

2. When price of a commodity increases from ₹ 10 to ₹ 12 per unit, its supply goes up from 100 units to 140 units. Calculate elasticity of supply.

Ans.

$$e_S = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$= \frac{40(140 - 100)}{2(12 - 10)} \times \frac{10}{100}$$

$$= 2$$

3. A seller of potatoes sells 80 qtls. a day when the price of potatoes is ₹ 4 per kg. The price elasticity of supply of potatoes is known to be 2. How much quantity of potatoes will the seller supply when the price rises to ₹ 5 per kg. (D 96)

Ans.

$$e_S = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$2 = \frac{\Delta q}{1(5 - 4)} \times \frac{4}{80}$$

or

$$\Delta q = 40$$

Seller will supply 120 (80 + 40) qtls.

4. From the following table, calculate the price elasticity of supply when price rises from ₹ 2 to ₹ 3. (NCERT)

Price (in ₹ per kg)	1	2	3	4	5
Supply by Firm A	35	37	40	44	48

Ans.

$$e_S = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$= \frac{3(= 40 - 37)}{1(= 3 - 2)} \times \frac{2}{37} = \frac{6}{37} = 0.16$$

5. The coefficient of elasticity of supply of a commodity is 3. A seller supplies 20 units of this commodity at a price of ₹ 8 per unit. How much quantity of this commodity will the seller supply when price rises by ₹ 2 per unit? (A 98)

Ans.

$$e_S = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$3 = \frac{\Delta q}{2} \times \frac{8}{20} = \frac{\Delta q}{5}$$

$$\Delta q = 15$$

Quantity supplied = 35 (20 + 15)

6. Price elasticity of supply of a good is 5. A producer sells 500 units of good at a price of ₹ 5 per unit. How much will he be willing to sell at the price of ₹ 6 per unit? (D 99/II)

Ans.

$$e_S = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$5 = \frac{q - 500}{1(6 - 5)} \times \frac{5}{500}$$

$$or$$

Price	Total Revenue	Quantity
2	400	200 (= 400/2)
3		300 (given)

$$e_S = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$

$$= \frac{100(= 300 - 200)}{1} \times \frac{2}{200} = \frac{200}{200}$$

$$e_S = 1$$

Q. 3.49. • Explain the Geometric (Graphic) Method of measuring price elasticity of supply.

- State geometric method of measuring price elasticity of supply (in case of a straight line supply curve). (D 2005; A 05)

Ans. This method is used to measure e_S at a particular point located on the supply curve. That is why this method is also known as the Point Method. We discuss below point elasticity of supply on linear (straight line) supply curve.

Point Elasticity of Supply on a Linear Supply Curve

Let us consider the following three straight line (linear) supply curves SS where elasticity of supply is to be measured at point R corresponding to quantity OQ and price OP.

(i) In Fig. 3.34, supply curve is extended to meet X-axis at point T. Now elasticity of supply can be obtained by dividing the distance TQ by the distance OQ. Symbolically

$e_S = \frac{TQ}{OQ}$. Since supply curve when extended meets X-axis to the left of origin of OQ, therefore, TQ

is greater than OQ. Hence e_S is greater than unity ($e_S > 1$). Similarly e_S can be calculated at any point on supply curve SS and it would be noted that e_S is greater than unity.

(ii) In Fig. 3.35, since supply curve when extended meets X-axis to the right of origin O, therefore, TQ is smaller than OQ. Hence $e_S = \frac{TQ}{OQ}$ is less than unity ($e_S < 1$).

Likewise e_S at any other point on supply curve with a positive intercept on X-axis would be less than unity.

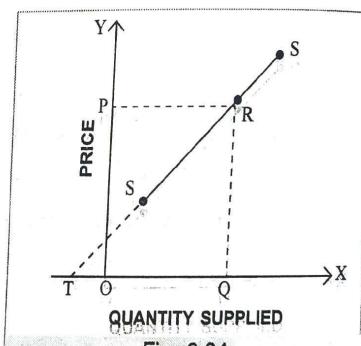


Fig. 3.34

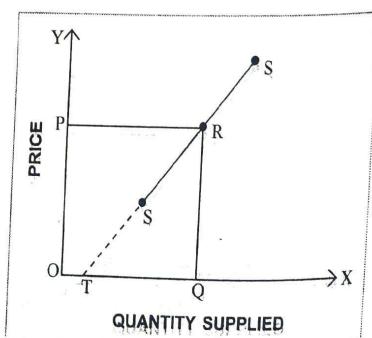


Fig. 3.35

(iii) In Fig. 3.36, since supply curve when extended meets X-axis at the point of origin O, therefore, TQ is equal to OQ. Hence $e_S = \frac{TQ}{OQ}$ is equal to unity ($e_S = 1$). Similarly e_S at any other point on supply curve passing through origin would be equal to unity.

Conclusion. Elasticity of supply at any point on a straight line supply curve is greater than unity ($e_S > 1$) when it intersects X-axis in its negative range; less than unity ($e_S < 1$) when it intersects X-axis in its positive range and equal to unity ($e_S = 1$) when it passes through the origin O.

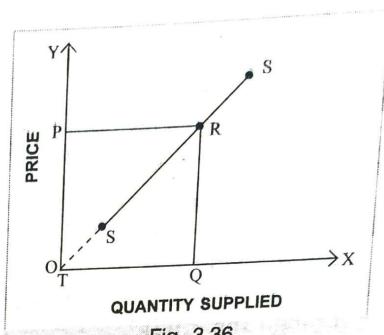


Fig. 3.36