**Chapter- 5**

**ELASTICITY OF SUPPLY**

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| **Outline of this Chapter:*** Elasticity of Supply
* Meaning/ Definition of Elasticity of Supply; and
* Determinants of Elasticity of Supply.
* Different Types of Elasticity of Supply
* Measurement of Elasticity of Supply
* Percentage Method (Point Vs Arc Elasticity); and
* Diagrammatic Method.
* Questions for Review.
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**Meaning of Elasticity of Supply:**

* Alfred Marshall developed the concept of elasticity of supply.
* Elasticity of supply is defined as the responsiveness (or percentage change) of quantity supplied of a commodity to one percentage change in its price.
* It is calculated as:

Es or es = $\frac{Percentage change in quantity supplied}{Percentage change in price}$ = (+) $\frac{∆Q}{∆P}$.$ \frac{P}{Q}$

 Where

Es or es = Coefficient of price elasticity of supply;

P = Initial price of the good;

Q = Initial quantity supplied;

∆q = Change in quantity supplied; and

∆p = Change in price

* The positive sign indicates that price and quantity supplied of a good are positively or directly related (follows law of supply), that means, greater units of the good will be placed in the market only at higher prices and vice versa.

**Determinants of Elasticity of Supply:**

* **Time factor:** the longer the time period, the more elastic is the supply curve.
* **Nature of the good:** inelastic supply in case of perishable goods.
* **Production capacity:** if unlimited production capacity exists, then there is elastic supply.
* **Production methods and techniques:** if complicated, then supply of good produced will be relatively inelastic.
* **Stage of laws of return:** if the law of diminishing return is applied on the production of a good, elasticity of supply of good will be inelastic.
* **Future price expectation:** if the producers expect that the price will rise in future then they will supply less quantity in the market presently. Thus, supply will become inelastic.
* **Number of products being produced by an industry:** if an industry is producing many products, supply is elastic as the producers can switch over to the production of other goods and vice versa.

**Different types of Elasticity of Supply:**

* There are five degrees or types of elasticity of supply:
1. Perfectly inelastic supply (es = 0);
2. Inelastic supply (0 < es < 1);
3. Unitary elastic supply (es = 1);
4. Elastic supply (1 < es < ∞); and
5. Perfectly elastic supply (es = ∞).

***Perfectly inelastic supply (es = 0):*** When supply of a commodity does not change irrespective of any change in its price, it is called perfectly inelastic supply.In this case es= 0andsupply curve will be a vertical line, parallel to y- axis.



***Inelastic or less than unit elastic supply (0 < es < 1):*** When percentage change in quantity supplied is less than percentage change in price, it is called inelastic or less than unit elastic supply.In this case coefficient of elasticity of supply will be greater than zero but less than one (0 < es < 1).The inelastic supply curve is upward sloping originating from the x- axis.



***Unit elastic supply (es = 1):*** When percentage change in quantity supplied is equal to percentage change in price, it is called unit elastic supply.In this case es= 0.The unit elastic supply curve is upward sloping originating from the origin.



***Elastic or more than unit elastic supply (1 < es < ∞):*** When percentage change in quantity supplied is greater than percentage change in price, it is called elastic or more than unit elastic supply.In this case coefficient of elasticity of supply will be greater than one but less than infinity (1 < es < ∞).The elastic supply curve is upward sloping originating from the y- axis.



***Perfectly elastic supply (es =*** *∞****):*** Supply of commodity is said to be perfectly elastic when its supply expands (rise) or contracts (falls) to any extent without any change in the price. The coefficient of es = ∞. The perfectly elastic supply curve is a horizontal line, parallel to x- axis.



**Measurement of Elasticity of Supply:**

There are two methods of measuring price elasticity of supply:

1. Proportionate or Percentage Method
2. Geometric Method
3. **Proportionate or Percentage Method**: According to this method, price elasticity of supply is measured as under:

Elasticity of supply can be measured by this formula:

Es or es = $\frac{Percentage change in quantity supplied}{Percentage change in price}$ = (+) $\frac{∆Q}{∆P}$.$ \frac{P}{Q}$

Where

 Es or es = Coefficient of price elasticity of supply;

 P = Initial price of the good;

 Q = Initial quantity supplied;

 ∆q = Change in quantity supplied; and

 ∆p = Change in price

The coefficient/ value of elasticity of supply ranges from zero to infinity.

* If the value of es > 1 => Supply is elastic.
* If the value of es = 1 => Supply is unitary elastic.
* If the value of es < 1 => Supply is inelastic.
* If the value of es = 0 => Supply is perfectly inelastic.
* If the value of es = ∞ => Supply is perfectly elastic.

**Example:** **When price of a commodity increases from Rs 6 to Rs 8, its quantity supplied increases from 20 units to 25 units. The price elasticity of supply is:**

Solution: Since 𝝙P = 8 – 6 = 2; 𝝙Q = 25 – 20 = 5;

 Hence, es =$\frac{∆Q}{∆P}$.$ \frac{P}{Q}$ = $\frac{5}{2}$×$\frac{6}{20}$ = 0.75

**Point Vs Arc Elasticity of Supply:**

* Point elasticity of supply relates to a situation where the two price and quantity situations are very close to each other.
* The formula for calculating es remains the same as es = (+) $\frac{∆Q}{∆P}$.$ \frac{P}{Q}$
* Arc elasticity of supply relates to a situation where the two prices and quantity situations are far from each other, such that they relate to an arc over the supply curve.
* In this case formula for calculating es is modified as follows:

es = $\frac{q1-q2}{q1+q2}$. $\frac{p1+p2}{p1-p2}$

***Question: Find arc elasticity of supply if price of rice rises from SR 5 to SR 10 per kg and supply increases from 10 kg to 15 kg in a month.***

*Solution:* Arc elasticity of supply, es = $\frac{∆Q}{∆P}$.$ \frac{P1+P2}{Q1+Q2} $= = $\frac{5}{5}$. $\frac{15}{25}$ = $\frac{3}{5}$ = 0.6 Ans.

***Question:* Find arc elasticity of supply if price of rice rises from SR 10 to SR 15 per kg and supply increases from 100 kg to 150 kg in a month.**

Solution: Arc elasticity of supply, es = $\frac{∆Q}{∆P}$.$\frac{P1+P2}{Q1+Q2}$ = $\frac{50}{5}.\frac{10+15}{100+150}$ = 1 Ans.

1. ***Geometric or diagrammatic method to calculate elasticity of supply:***

Answer: The diagrammatic method to calculate elasticity of supply is-

 Es (at point C) = es = $\frac{\begin{array}{c}Distance betweenthe point where supply curve meets \\the x-axis and the output corresponding to point C.\end{array}}{\begin{array}{c}Distance between origin and the output corresponding\\to point C.\end{array}}$

* Any straight line supply curve passing through the origin has value of elasticity equal to one.
* If straight line supply curve goes through the quantity axis (x- axis), it is inelastic.
* If a straight line supply curve goes through the price axis (y- axis), it is elastic.
* ***Thus,*** *if the tangent to the supply curve passes through the point of origin, es at that point is equal to unity; if the tangent intercepts the x-axis, es at that point is less than unity; and if tangent intercepts the y-axis, es at that point is greater than unity.*

**Questions for Review**

***Objective type questions:***

1. The concept of elasticity of supply was developed by-

|  |  |
| --- | --- |
| 1. Alfred Marshall,
 | 1. Adam Smith,
 |
| 1. L. Robbins,
 | 1. None of these.
 |

1. The responsiveness (or percentage change) of quantity supplied of a commodity to one percentage change in its price is known as-

|  |  |
| --- | --- |
| 1. Elasticity of demand,
 | 1. Elasticity of supply,
 |
| 1. Law of demand,
 | 1. Law of supply.
 |

1. The formula for calculation of elasticity of supply is-

|  |  |
| --- | --- |
| 1. es = (-) $\frac{∆Q}{∆P}$.$\frac{P}{Q}$
 | 1. es = (+) $\frac{∆Q}{∆P}$.$\frac{P}{Q}$
 |
| 1. es = (-) $\frac{∆P}{∆Q}$.$\frac{Q}{P}$
 | 1. es = (+) $\frac{∆P}{∆Q}$.$\frac{Q}{P}$
 |

1. The coefficient of elasticity of supply ranges from-

|  |  |
| --- | --- |
| 1. Zero to one,
 | 1. Zero to infinity,
 |
| 1. One to infinity,
 | 1. None
 |

1. Any straight line supply curve passing through the origin has value of elasticity -

|  |  |
| --- | --- |
| 1. Equal to one,
 | 1. Equal to infinity,
 |
| 1. Greater than one,
 | 1. Less than one.
 |

1. The elasticity of supply relates to a situation where the two prices and quantity situations are far from each other is known as-

|  |  |
| --- | --- |
| 1. Point elasticity of supply,
 | 1. Arc elasticity of supply,
 |
| 1. Elasticity of supply,
 | 1. None.
 |

1. Which of the following is ***not*** correctly matched-

|  |
| --- |
| 1. If the value of es = 1 => Supply is unitary elastic.
2. If the value of es< 1 => Supply is inelastic.
3. If the value of es = ∞ => Supply is perfectly elastic.
4. If the value of es> 1 => Supply is perfectly inelastic.
5. If the value of es = 0 => Supply is perfectly inelastic.
 |

1. Match the following-

|  |  |
| --- | --- |
| 1. Any straight line supply curve passing through the origin
 | 1. Inelastic supply
 |
| 1. If straight line supply curve goes through the quantity axis (x- axis)
 | 1. Elastic supply
 |
| 1. If a straight line supply curve goes through the price axis (y- axis)

**Ans:** I ↔ c; II ↔ a; III ↔ b | 1. Unitary elastic supply
 |

1. Find arc elasticity of supply if price of sugar rises from SR 2 to SR 4 per kg and supply increases from 10 kg to 15 kg in a month.

|  |  |
| --- | --- |
| 1. 0.6
 | 1. -15
 |
| 1. 0.06
 | 1. 0.17
 |

1. In case of arc elasticity of supply, the formula for calculating es is modified as-

|  |  |
| --- | --- |
| 1. es= $\frac{q1-q2}{q1+q2}$. $\frac{p1+p2}{p1-p2}$
 | 1. es= $\frac{q1+q2}{q1-q2}$. $\frac{p1+p2}{p1-p2}$
 |
| 1. es= $\frac{q1-q2}{q1+q2}$. $\frac{p1-p2}{p1+p2}$
 | 1. es= $\frac{q1+q2}{q1-q2}$. $\frac{p1-p2}{p1+p2}$
 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Ques:** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Ans:** | a | b | b | b | a | b | d |  | a | a |

**Question with answer:**

***Question: What is elasticity of supply?***

Answer: Elasticity of supply is defined as the responsiveness (or percentage change) of quantity supplied of a commodity to one percentage change in its price.It is calculated as:

Es or es = $\frac{Percentagechangeinquantitysupplied}{Percentagechangeinprice}$ = (+) $\frac{∆Q}{∆P}$.$\frac{P}{Q}$

***Question: Who developed the concept of elasticity of supply?***

Answer: Alfred Marshall developed the concept of elasticity of supply.

***Question: What is the formula to calculate elasticity of supply?***

Answer: The formula to calculate elasticity of supply is-

Es or es = $\frac{Percentagechangeinquantitysupplied}{Percentagechangeinprice}$ = (+) $\frac{∆Q}{∆P}$.$\frac{P}{Q}$

***Question: What are the main determinants of elasticity of supply?***

Answer: Time factor, nature of good, production capacity, production methods and techniques, stages of laws of return, future price expectation and number of products being produced by an industry are the main determinants of elasticity of supply.

***Question: How many types (degree) of elasticity of supply are there?***

Answer: There are five degrees or types of elasticity of supply:

1. Perfectly inelastic supply (es = 0);
2. Inelastic supply (0 <es< 1);
3. Unitary elastic supply (es = 1);
4. Elastic supply (1 <es< ∞); and
5. Perfectly elastic supply (es = ∞).

***Question: What is perfectly inelastic supply (es = 0)?***

Answer: When supply of a commodity does not change irrespective of any change in its price, it is called perfectly inelastic supply.In this case es= 0 and supply curve will be a vertical line, parallel to y- axis.



***Question: What is inelastic or less than unit elastic supply (0 <es< 1)?***

Answer: When percentage change in quantity supplied is less than percentage change in price, it is called inelastic or less than unit elastic supply.In this case coefficient of elasticity of supply will be greater than zero but less than one (0 <es< 1).The inelastic supply curve is upward sloping originating from the x- axis.



***Question: What is unit elastic supply (es = 1)?***

Answer: When percentage change in quantity supplied is equal to percentage change in price, it is called unit elastic supply. In this case es= 0.The unit elastic supply curve is upward sloping originating from the origin.



***Question: What is elastic or more than unit elastic supply (1 <es< ∞)?***

Answer: When percentage change in quantity supplied is greater than percentage change in price, it is called elastic or more than unit elastic supply.In this case coefficient of elasticity of supply will be greater than one but less than infinity (1 <es< ∞).The elastic supply curve is upward sloping originating from the y- axis.



***Question: What is perfectly elastic supply (es =*** *∞****)?***

Answer: Supply of commodity is said to be perfectly elastic when its supply expands (rise) or contracts (falls) to any extent without any change in the price. The coefficient of es = ∞.The perfectly elastic supply curve is a horizontal line, parallel to x- axis.



***Question: What is the percentage method to measure elasticity of supply?***

Answer: Elasticity of supply can be measured by this formula:

Es or es = $\frac{Percentagechangeinquantitysupplied}{Percentagechangeinprice}$= (+)$\frac{∆Q}{∆P}$.$\frac{P}{Q}$

Where

 Es or es= Coefficient of price elasticity of supply;

 P = Initial price of the good;

 Q = Initial quantity supplied;

 ∆q = Change in quantity supplied; and

 ∆p = Change in price

***Question: What are the rages of coefficient of elasticity of supply?***

Answer: The coefficient/ value of elasticity of supply ranges from zero to infinity.

* If the value of es> 1 => Supply is elastic.
* If the value of es = 1 => Supply is unitary elastic.
* If the value of es< 1 => Supply is inelastic.

***Question: What are the main differences between point elasticity and the arc elasticity of supply?***

Answer:

|  |  |
| --- | --- |
| **Point elasticity of supply** | **Arc elasticity of supply** |
| 1. Point elasticity of supply relates to a situation where the two price and quantity situations are very close to each other.
 | 1. Arc elasticity of supply relates to a situation where the two prices and quantity situations are far from each other.
 |
| 1. The formula for calculating point es is, es = (+) $\frac{∆Q}{∆P}$.$\frac{P}{Q}$
 | 1. In this case formula for calculating arc esis modified as follows: es=. (+) $\frac{∆Q}{∆P}$.$\frac{P1+P2}{Q1+Q2}$
 |

***Question: Find arc elasticity of supply if price of rice rises from SR 5 to SR 10 per kg and supply increases from 10 kg to 15 kg in a month.***

*Solution:* Arc elasticity of supply, es= $\frac{∆Q}{∆P}$.$\frac{P1+P2}{Q1+Q2}$= = $\frac{5}{5}$. $\frac{15}{25}$ = $\frac{3}{5}$ = 0.6 Ans.

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***Question: What is the diagrammatic method to calculate elasticity of supply?***

Answer: The diagrammatic method to calculate elasticity of supply is-

Es (at point C) = es= $\frac{\begin{array}{c}Distancebetweenthepointwheresupplycurvemeets\\thex-axisandtheoutputcorrespondingtopointC.\end{array}}{\begin{array}{c}Distancebetweenoriginandtheoutputcorresponding\\topointC.\end{array}}$