Elasticity

- **What is Price Elasticity of Demand?**
- **Definition:**

- Price elasticity of demand measures the degree of responsiveness of the quantity demanded of a good to a change in its price. It is also defined as:

- "The ratio of proportionate change in quantity demanded caused by a given proportionate change in price".

Formula for Calculation:

Price elasticity of demand is computed by dividing the percentage change in quantity demanded of a good by the percentage change in its price.

Symbolically price elasticity of demand is expressed as under:

$$E_d = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

Simple formula for calculating the price elasticity of demand:

$$E_d = \frac{\%\Delta Q}{\%\Delta P}$$

- Here:
- E_d stands for price elasticity of demand.
- Q stands for original quantity.
- P stands for original price.
- Δ stands for a small change.
- **Example:**
- The price elasticity of demand tells us the relative amount by which the quantity demanded will change in response to a change in the price of a particular good. For example, if there is a 10% rise in the price of a tea and it leads to reduction in its demanded by 20%, the price elasticity of demand will be:
- $$E_d = \frac{-20}{+10}$$
- $$E_d = -2.0$$

Types of Elasticity of Demand:

- The ***three main types of elasticity of demand*** are discussed in brief.
- **(1) Price Elasticity of Demand:**
- **Definition and Explanation:**
- The concept of price elasticity of demand is commonly used in economic literature. Price elasticity of demand is the degree of responsiveness of quantity demanded of a good to a change in its price. Precisely, it is defined as:
- "The ratio of proportionate change in the quantity demanded of a good caused by a given proportionate change in price".

- **Formula:**
- The formula for measuring price elasticity of demand is:
- **Price Elasticity of Demand =**
- **Percentage Change in Quantity Demand**
- **Percentage Change in Price**

- $E_d = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P}$
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- $E_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$

- **Example:**

- Let us suppose that price of a good falls from Tk 10 per unit to Tk 9 per unit in a day. The decline in price causes the quantity of the good demanded to increase from 125 units to 150 units per day. The price elasticity using the simplified formula will be:

- $\mathbf{E_d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}}$

- $\Delta Q = 125 - 150 = -25$

- $\Delta P = 10 - 9 = 1$

- Original Quantity (Q) = 125

- Original Price (P) = 10

- $\mathbf{E_d = -25 / 1 \times 10 / 125 = -2}$

- The elasticity coefficient is less than one. Therefore the demand for the good is elastic.

Types:

- The concept of price elasticity of demand can be used to divide the goods into three groups.

- **(i) Elastic:** When the percent change in quantity of a good is greater than the percent change in its price, the demand is said to be elastic. When elasticity of demand is greater than one, a fall in price increases the total revenue (expenditure) and a rise in price lowers the total revenue (expenditure).

- **(ii) Unitary Elasticity:** When the percentage change in the quantity of a good demanded equals percentage in its price, the price elasticity of demand is said to have unitary elasticity. When elasticity of demand is equal to one or unitary, a rise or fall in price leaves total revenue unchanged.

- **(iii) Inelastic.** When the percent change in quantity of a good demanded is less than the percentage change in its price, the demand is called inelastic. When elasticity of demand is inelastic or less than one, a fall in price decreases total revenue and a rise in its price increases total revenue.

(2) Income Elasticity of Demand:

- **Definition and Explanation:**

- Income is an important variable affecting the demand for a good. When there is a change in the level of income of a consumer, there is a change in the quantity demanded of a good, other factors remaining the same. The degree of change or responsiveness of quantity demanded of a good to a change in the income of a consumer is called income elasticity of demand. Income elasticity of demand can be defined as:

- "The ratio of percentage change in the quantity of a good purchased, per unit of time to a percentage change in the income of a consumer".

- **Formula:**

- The formula for measuring the income elasticity of demand is the percentage change in demand for a good divided by the percentage change in income. Putting this in symbol gives.

- E_y = **Percentage Change in Demand**
- **Percentage Change in Income**

- Simplified formula:

- $E_y = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$

- **Example:**

- A simple example will show how income elasticity of demand can be calculated. Let us assume that the income of a person is Tk 4000 per month and he purchases six CD's per month. Let us assume that the monthly income of the consumer increase to Tk 6000 and the quantity demanded of CD's per month rises to eight. The income elasticity of demand for CD's will be calculated as under:

- $\Delta Q = 8 - 6 = 2$
- ΔY = Tk 6000 – Tk 4000 = Tk 2000
- Original quantity demand (Q) = 6
- Original income (Y)=Tk 4000
- **$E_y = \Delta Q / \Delta Y \times Y / Q = 2 / 200 \times 4000 / 6 = 0.66$**

- The income elasticity is 0.66 which is less than one.

Types:

- When the income of a person increases, his demand for goods also changes depending upon whether the good is a normal good or an inferior good. For normal goods, the value of elasticity is greater than zero but less than one.
- Goods with an income elasticity of less than 1 are called inferior goods. For example, people buy more food as their income rises but the % increase in its demand is less than the % increase in income.

(3) Cross Elasticity of Demand:

- **Definition and Explanation:**

- The concept of cross elasticity of demand is used for measuring the responsiveness of quantity demanded of a good to changes in the price of related goods. Cross elasticity of demand is defined as:

- "The percentage change in the demand of one good as a result of the percentage change in the price of another good".

- **Formula:**

- The formula for measuring, cross, elasticity of demand is:
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- $\mathbf{E_{xy} = \frac{\%\ Change\ in\ Quantity\ Demanded\ of\ Good\ X}{\%\ Change\ in\ Price\ of\ Good\ Y}}$

- The numerical value of cross elasticity depends on whether the two goods in question are substitutes, complements or unrelated.

Types and Example:

- **(i) Substitute Goods.** When two goods are substitute of each other, such as Coca-Cola and Pepsi, an increase in the price of one good will lead to an increase in demand for the other good. The numerical value of goods is positive.

- **For example** there are two goods. Coca-Cola and Pepsi which are close substitutes. If there is increase in the price of Pepsi called good **y** by 10% and it increases the demand for Coca-Cola called good **x** by 5%, the cross elasticity of demand would be:

- $\mathbf{E_{xy} = \%\Delta Q_x / \%\Delta P_y = 0.2}$

- Since E_{xy} is positive ($E > 0$), therefore, Coca-Cola and Pepsi are close substitutes.

- **(ii) Complementary Goods.** However, in case of complementary goods such as car and petrol, cricket bat and ball, a rise in the price of one good say cricket bat by 7% will bring a fall in the demand for the balls (say by 6%). The cross elasticity of demand which are complementary to each other is, therefore, 6% / -7% = -0.85 (**negative**).
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- **(iii) Unrelated Goods**. The two goods which are unrelated to each other, say apples and pens, if the price of apple rises in the market, it is unlikely to result in a change in quantity demanded of pens. The elasticity is zero of unrelated goods.

Factors Determining Price Elasticity of Demand:

- The price elasticity of demand is not the same for all commodities. It may be or low depending upon number of factor. These factors which influence price elasticity of demand, in brief, are as under:
- **(i) Nature of Commodities.** In developing countries of the world, the per capita income of the people is generally low. They spend a greater amount of their income on the purchase of necessaries of life such as rice, wheat, milk, cloth etc. They have to purchase these commodities whatever be their price. The demand for goods of necessities is, therefore, less elastic or inelastic. The demand for luxury goods, on the other hand is greatly elastic.
- For example, if the price of burger falls, its demand in the cities will go up.

- **(ii) Availability of Substitutes.** If a good has greater number of close substitutes available in the market, the demand for the good will be greatly elastic.

- For examples, if the price of Coca-Cola rises in the market, people will switch over to the consumption of Pepsi Cola, which is its close substitute. So the demand for Coca Cola is elastic.
- **(iii) Proportion of the Income Spent on the Good.** If the proportion of income spent on the purchase of a good is very small, the demand for such a good will be inelastic.

- For example, if the price of a box of matches or salt rises by 50%, it will not affect the consumers demand for these goods. The demand for salt, maker box therefore will be inelastic. On the other hand, if the price of a car rises from Tk 6 lakh to Tk 9 lakh and it takes a greater portion of the income of the consumers, its demand would fall. The demand for car is, therefore, elastic.
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- **(iv) Time.** The period of time plays an important role in shaping the demand curve. In the short run, when the consumption of a good cannot be postponed, its demand will be less elastic. In the long run if the rise price persists, people will find out methods to reduce the consumption of goods. So the demand for a good in the, long run is elastic, other things remaining constant.

- For example if the price of electricity goes up, it is very difficult to cut back its consumption in the short run. However, if the rise in price persists, people will plan substitution gas, heater, fluorescent bulbs etc. so that they use less electricity. So the electricity of demand will be greater (E_d = > 1) in the long run than in the short run.

- **(5) Number of Uses of a Good.** If number of uses of a good more, its demand is greater elastic ($E_d > 1$).
- For example, if the price of coal falls, its quantity demanded will rise considerably because demand will be coming from households, industries, railways etc.

- **(6) Addiction.** If a product is habit forming say for example, cigarette, the rise in its price would not induce much change in demand. The demand for habit forming good is, therefore, less elastic.

- **(7) Joint Demand.** If two goods are jointly demand, then the elasticity of demand depends upon the elasticity of demand of the other jointly demanded good.

- For example, with the rise in price of cars, its demand is slightly affected, then the demand for petrol will also be less elastic.

Importance of Elasticity of Demand:

- **(1) Theoretical Importance:**
- The concept of elasticity of demand is very useful as it has got both theoretical and practical advantages. As regards its importance in the academic interest, the concept is very helpful in the theory of value. In the words of **Keynes:**

- "The concept of elasticity is so important that in the provision of terminology and apparatus to aid thought, I do not think, Marshall did any greater service than by the explicit introduction of the idea of the elasticity".

- **(2) Practical Importance:**
- **(i) Importance in taxation policy.** As regards its practical advantages, the concept has immense importance in the sphere of government finance. When a finance minister levies a tax on a certain commodity, he has to see whether the demand for that commodity is elastic or inelastic.
- If the demand is inelastic, he can increase the tax and thus can collect larger revenue. But if the demand of a commodity is elastic, he is not in a position to increase the rate of a tax. If he does so, the demand for that commodity will be, calculated and the total revenue reduced.

- **(ii) Price discrimination by monopolist.** If the monopolist finds that the demand for his commodities is inelastic, he will at once fix the price at a higher level in order to maximize his net profit. In case of elastic demand, he will lower the price in order to increase, his sale and derive the maximum net profit. Thus we find that the monopolists also get practical advantages from the concept of elasticity.

- **(iii) Price discrimination in cases of joint supply.** The concept of elasticity is of great practical advantage where the separate, costs of joint products cannot be measured. Here again the prices are fixed on the principle. "What the traffic will bear" as is being done in the railway rates and fares.

- **iv)Importance to businessmen.** The concept of elasticity is of great importance to businessmen. When the demand of a good is elastic, they increases sale by towering its price. In case the demand' is inelastic, they are then in a position to charge higher price for a commodity.

- **(v) Help to trade unions.** The trade unions can raise the wages of the labor in an industry where the demand of the product is relatively inelastic. On the other hand, if the demand, for product is relatively elastic, the trade unions cannot press for higher wages.

- **(vi) Use in international trade.** The term of trade between two countries are based on the elasticity of demand of the traded goods.

- **(vii) Determination of rate of foreign exchange.** The rate of foreign exchange is also considered on the elasticity of imports and exports of a country.

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- **(viii) Guideline to the producers.** The concept of elasticity provides a guideline to the producers for the amount to be spent on advertisement. If the demand for a commodity is elastic, the producers shall have to spend large sums of money on advertisements for increasing the sales.

- **(ix) Use in factor pricing.** The factors of production which have inelastic demand can obtain a higher price in the market then those which have elastic demand. This concept explains the reason of variation in factor pricing.

Price Elasticity of Supply:

- **Definition and Explanation:**

- Price elasticity of demand measures the degree of responsiveness of demand for a product due to a change in the price of that product.

- "Price elasticity of supply measures how responsive producers are to a change in the price of good. It is defined as a measure of the responsiveness of quantity supplied to change in price".

- **Measurement and Formula:**

- It is measured by dividing the percentage change in quantity supplied by the percentage change in price. Thus the Percentage Method formula is:

- $E^s = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price}}$

- It can also be written as:
- $E^s = \frac{\Delta Q/Q}{\Delta P/P}$
- $E^s = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$
- Just like demand, supply can also be elastic or inelastic.

- **Elastic Supply:**

- Elasticity of supply represents the extent of change in supply in response to a change in price. If the amount supplied is highly responsive to a change in price, the supply is said to be elastic.

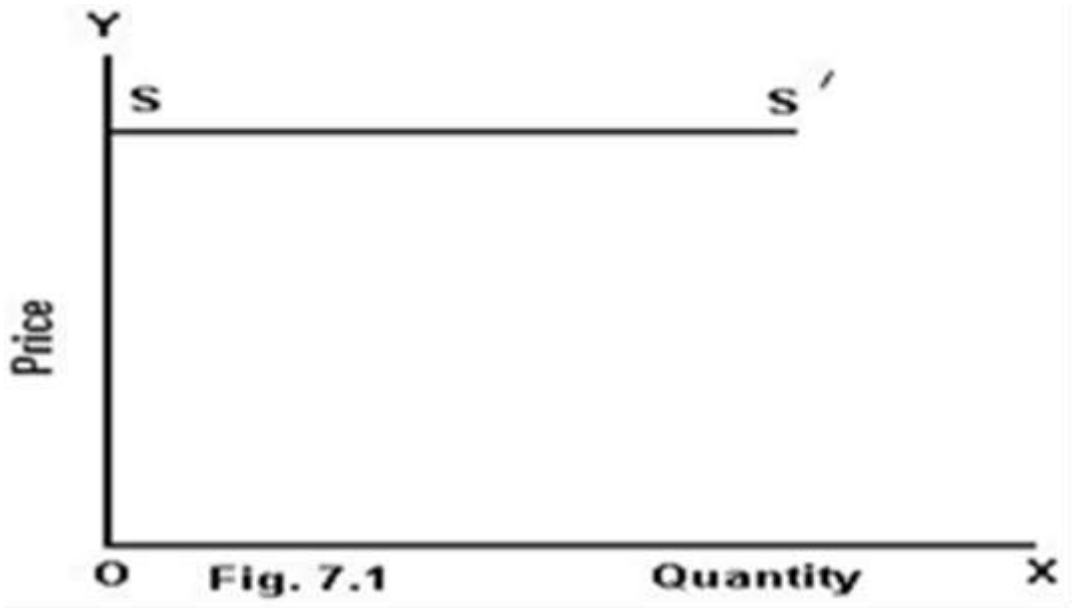
- **Inelastic Supply:**

- If the amount offered for sale is less affected by price change, then the supply is said to be inelastic.

Categories/Types of Price Elasticity of Supply:

- **Definition and Explanation:**
- There are five **degrees of price elasticity of supply:**
- **(1) Infinitely Elastic Supply:**
- When the amount supplied at the ruling price is infinite, we say the supply is infinitely elastic. An infinitely elastic supply curve is a horizontal straight line as is shown in the figure 7.1

Diagram/Figure and Example:



In this diagram 7,1, when the price is OP, the producer supplies an infinite amount of goods if the price falls slightly below OP then nothing will be supplied by him

- **(2) Elastic Supply:**

- When the percentage change in the amount of a good supplied is greater than the percentage change in price that generated it. The supply is then said to be **elastic supply.**

- **For example,** if the price of oranges increases from $5 to $6 and the quantity supplied rises from 150 to 600 oranges, the supply will be elastic.

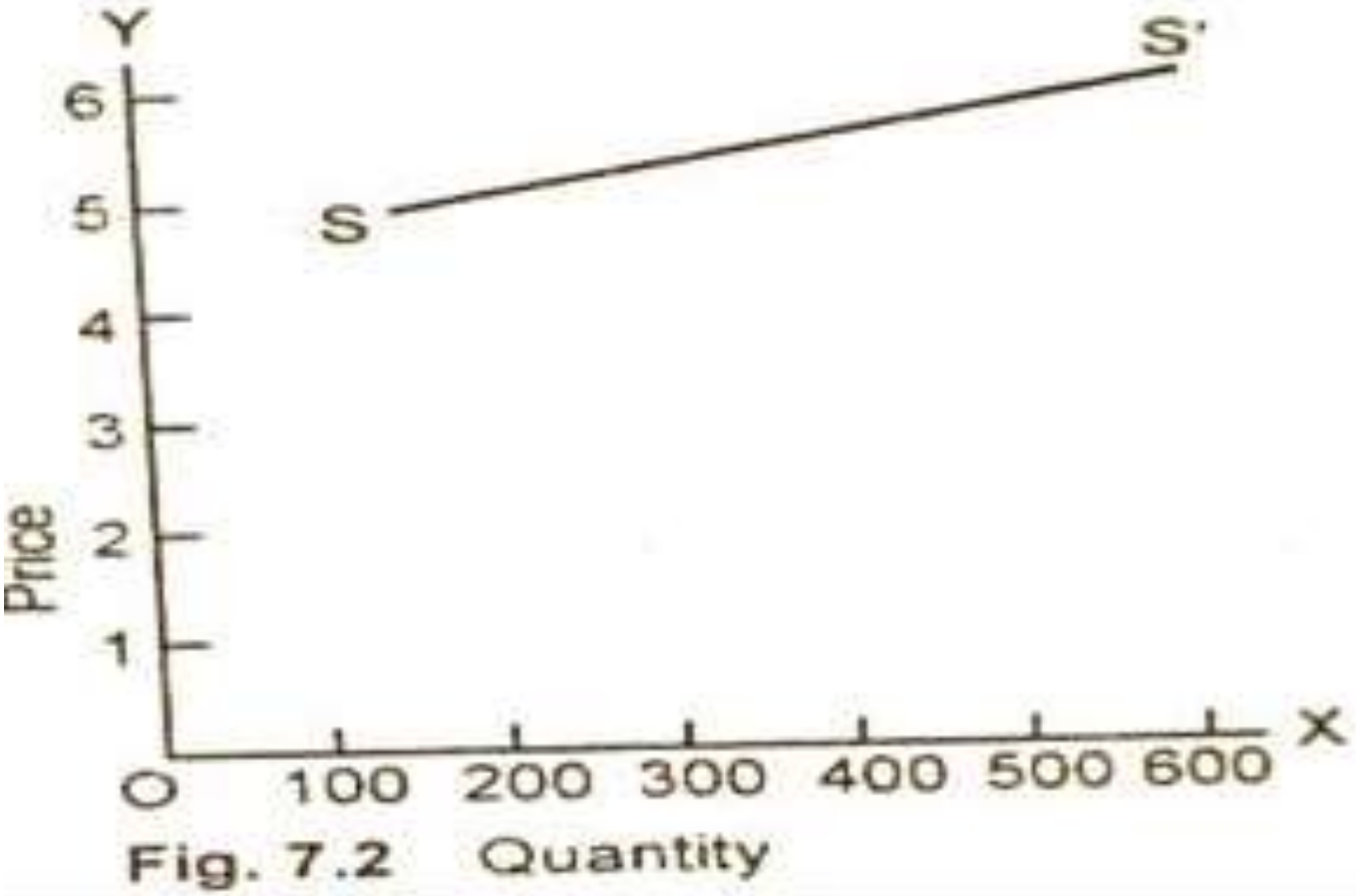


Fig. 7.2

In the diagram 7.2 SS/ supply curve is elastic and the numerical value for elasticity is greater than 1.

- **(3) Unitary Elasticity:**
- When the percentage change in the quantity supplied is exactly equal to percentage change in price that evoked it, the supply is said to have elasticity equal to unity, the elasticity of supply is equal to 1.

Fig. 7.3

- In the diagram 7.3 SS/ supply curve drawn through the origin has unit elasticity of supply.

- **(4) Inelastic Supply:**
- When the percentage change in the quantity supplied is less than the percentage change in the price that generated it, the supply is said to be inelastic**.** The inelasticity of supply is less than 1.

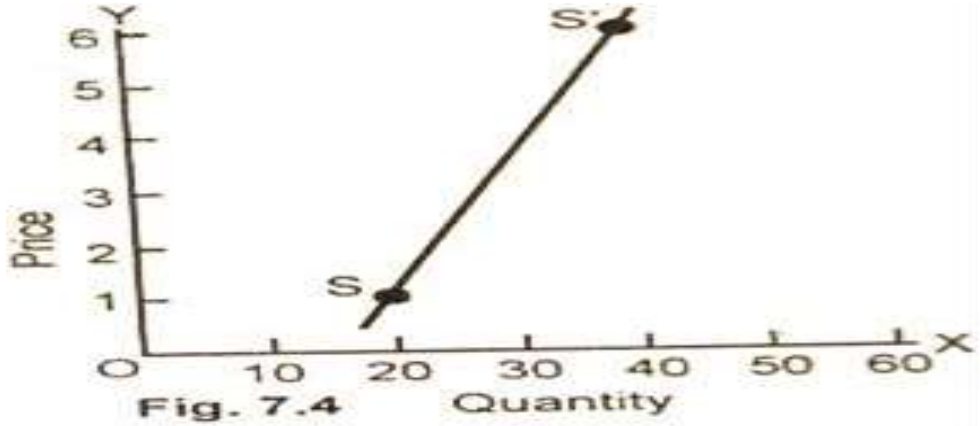


Fig. 7.4

- In this figure 7.4 SS/ supply curve (which is steeper than the elastic supply curve) shows that with *a* significant change in price, the quantity offered for sale is not very much affected.

- **(5) Perfectly Inelastic Supply:**

- In perfectly inelastic-supply, the quantity supplied does not change as price changes. The elasticity of supply in other words is zero.

- **For example,** if the price of a painting by an artist, who has died, rises from $10 thousand to $50 thousand, the supply of the painting cannot be increased. Diagram 7.5 shows the perfectly inelastic supply.

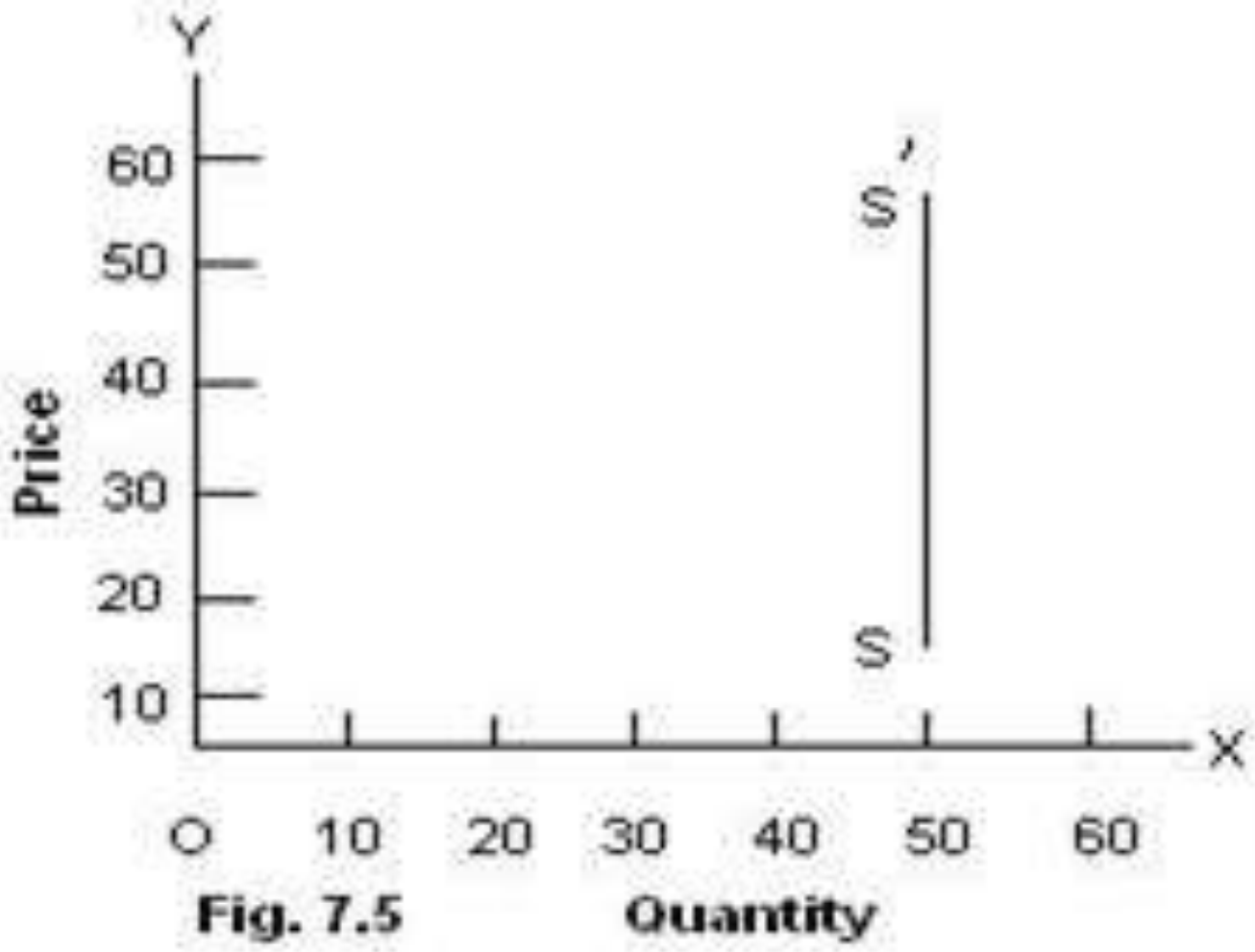


Fig. 7.5

Determinants/Factors of Price Elasticity of Supply:

- The main determinants/factors which determine the degree of price elasticity of supply are as under:
- **(i) Time period.** Time is the most significant factor which affects the elasticity of supply. If the price of a commodity rises and the producers have enough time to make adjustment in the level of output, the elasticity of supply will be more elastic. If the time period is short and the supply cannot be expanded after a price increase, the supply is relatively inelastic.
- **(ii) Ability to store output.** The goods which can be safely stored have relatively elastic supply over the goods which are perishable and do not have storage facilities.

- **(iii) Factor mobility.** If the factors of production can be easily moved from one use to another, it will affect elasticity of supply. The higher the mobility of factors, the greater is the elasticity of supply of the good and vice versa.

- **(iv) Changes in marginal cost of production.** If with the expansion of output, marginal cost increases and marginal return declines, the price elasticity of supply will be less elastic to that extent.

- **(v) Excess supply.** When there is excess capacity and the producer can increase output easily to take advantage of the rising prices, the supply is more elastic. In case the production is already up to the maximum from the existing resources, the rising prices will not affect supply in the short period. The supply will be more inelastic.

- **(vi) Availability of infrastructure facilities.** If infrastructure facilities are available for expanding output of a particular good in response to the rise in prices, the elasticity of supply will be relatively more elastic.

- **(vii) Agricultural or industrial products.** In agriculture, time is required to increase output in response to rise in prices of goods. The supply of agricultural goods is fairly inelastic. As regards the supply of manufactured consumer goods, it is comparatively easy to increase production in a short period.


THANK YOU ALL