

Importance of Price Elasticity of Demand

← →
(a) To a monopolist :- A monopolist usually fixes the price himself and leaves the supply to be determined by the demand of the consumers. If the demand of his product is very elastic, he will keep the price low to earn maximum monopoly profit. On the other hand, if demand is inelastic, he fixes a higher price and sells a slightly smaller quantity. Thus, the concept of elasticity of demand is of great practical significance to a monopolist.

(b) To a Finance Minister → The concept is equally important in its policy of taxation. While levying taxes, the Finance Minister takes into consideration the elasticity of demand for the commodities on which taxes are being imposed. High rates of ~~taxation~~ taxation on goods with inelastic demand brings higher amount of revenues whereas the same on goods having elastic demand may not fetch the desired revenues of the government.

(c) Useful in Factor Pricing: → The concept helps in explaining relative reward of factors of production in the production process. The factors which have inelastic demand for them are able to get a higher price than factors having elastic demand.

(d) Useful in International Trade: → The knowledge of elasticity of demand has importance in many spheres of international trade. India, for example, can obtain better and higher prices for tea from its exports to U.K. if the latter's demand for Indian tea is inelastic. Thus terms of international trade are determined by elasticity of demand for each other's product.

(e) Explanation of the paradox of poverty of farmers:-

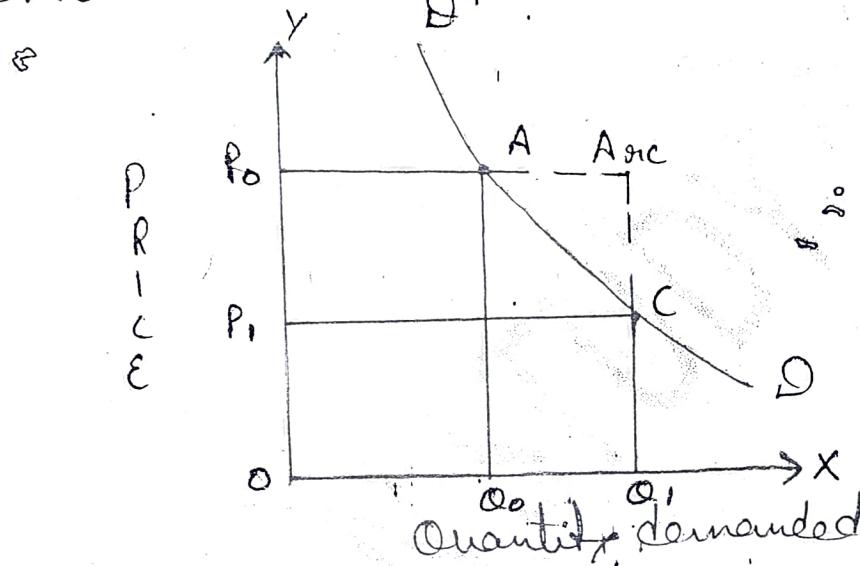
It is generally said that a good harvest, instead of bringing riches, fetches poverty to the farmers.

This is known as paradox of poverty which is explained by the concept of elasticity of demand.

For instance, a rich harvest of an agricultural product, say wheat, whose demand is inelastic, may ultimately fetch less price due to the simple reason that the increased production of wheat has led to fall in market price.

ARC ELASTICITY METHOD

Arc Elasticity is a measure of the average responsiveness to price change shown by the demand curve over some definite portion between two points on a demand curve. An Arc is the portion between two points on a demand curve.



The portion between two points A and C on the demand curve DD is called an Arc. The elasticity obtained when mid point or average price and quantity are used is called the Arc Elasticity.

$$Ed = \frac{\text{Change in Quantity}}{\frac{1}{2}(\text{sum of Quantities})} \div \frac{\text{Change in Price}}{\frac{1}{2}(\text{sum of prices})}$$

$$= \frac{\Delta Q}{\frac{1}{2}(Q_1 + Q_2)} \div \frac{\Delta P}{\frac{1}{2}(P_1 + P_2)}$$

$$= \frac{\Delta Q}{\Delta P} \times \frac{\frac{1}{2}(P_1 + P_2)}{\frac{1}{2}(Q_1 + Q_2)}$$

$$\pm \frac{\Delta Q}{\Delta P} \times \frac{P_i + P}{Q_i + Q}$$

Here Q = Initial Demand, Q_i = New Demand,
 P = Initial Price, P_i = New Price

According to arc elasticity method, if the price of a good rises or falls in the same ratio and consequently demand also contracts and extends in the same ratio, then elasticity of demand will remain the same. But if percentage method is used then elasticity of demand will be different.

Arc elasticity method is, therefore, more realistic and dependable method than percentage elasticity method.

Income Elasticity of Demand

Definition :- According to Watson, "Income elasticity of demand means the ratio of the percentage change in the quantity demanded to the percentage change in income."

According to Lipsey, "The responsiveness of demand to change in income is termed as income elasticity of demand."

$$E_Y = \frac{\text{Proportionate or Percentage Change in Quantity Demanded}}{\text{Proportionate or Percentage Change in Income}}$$

$$E_y = \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta Y}{Y} \times 100}$$

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

Here E_y = Income elasticity of Demand

ΔQ = Change in the quantity demanded,

Q = Initial Demand,

ΔY = Change in Income,

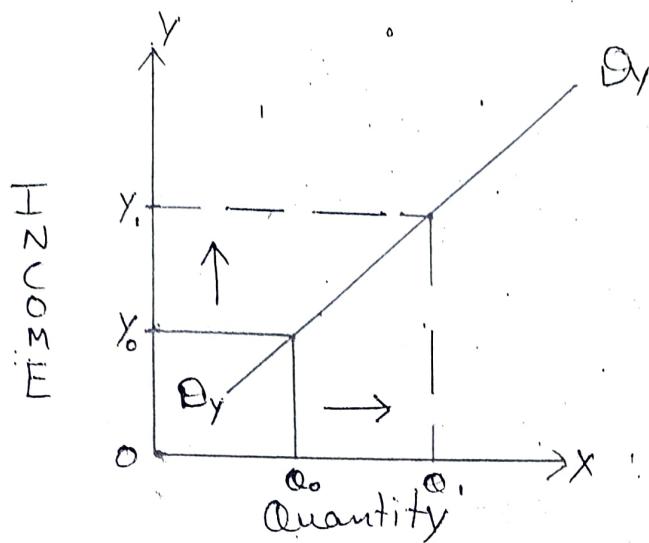
Y = Initial Income

Degrees or Types of Income Elasticity of Demand

Income elasticity of demand is of three types:-

1. Positive Income Elasticity of Demand :-

Income elasticity of demand for a good is positive when with an increase in the income of a consumer his demand for the good increases and with a decrease in income of a consumer his demand for the good decreases. Income elasticity of demand is positive in case of normal goods.



D_Y curve represents positive income elasticity of Demand. Its slope upward from left to right.

Positive income elasticity of demand can be of three types :-

(a) Unitary Income Elasticity of Demand : \rightarrow Positive Income

$\leftarrow \frac{\text{percentage change in demand}}{\text{percentage change in income}}$ elasticity of demand is unitary when a given percentage change in income is followed by equal percentage change in demand.

(b) Less than Unitary Income Elasticity of Demand : \rightarrow

$\leftarrow \frac{\text{percentage change in demand}}{\text{percentage change in income}}$ When percentage change in demand is less than percentage change in income, then the positive income elasticity of demand is less than unitary.

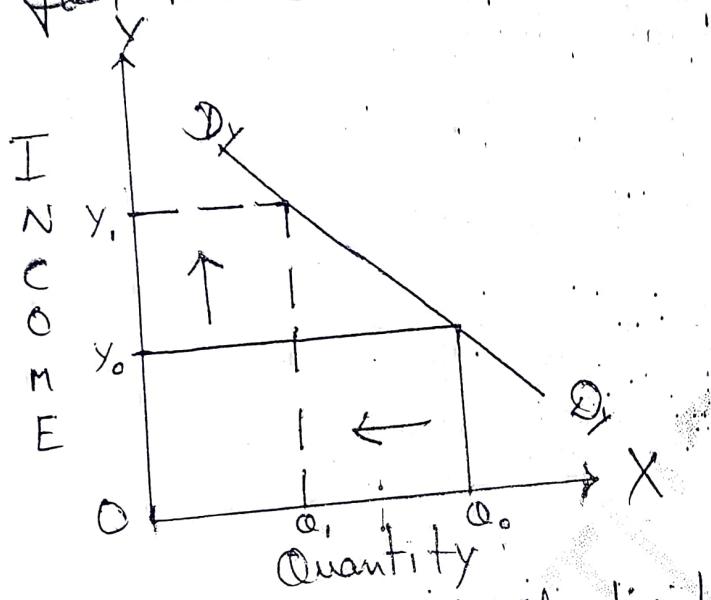
(c) More than Unitary Income Elasticity of Demand \rightarrow

$\leftarrow \frac{\text{percentage change in demand}}{\text{percentage change in income}}$ Positive income elasticity of demand is more than unitary when percentage change in demand is more than percentage change in income.

2. Negative Income Elasticity of Demand : \rightarrow

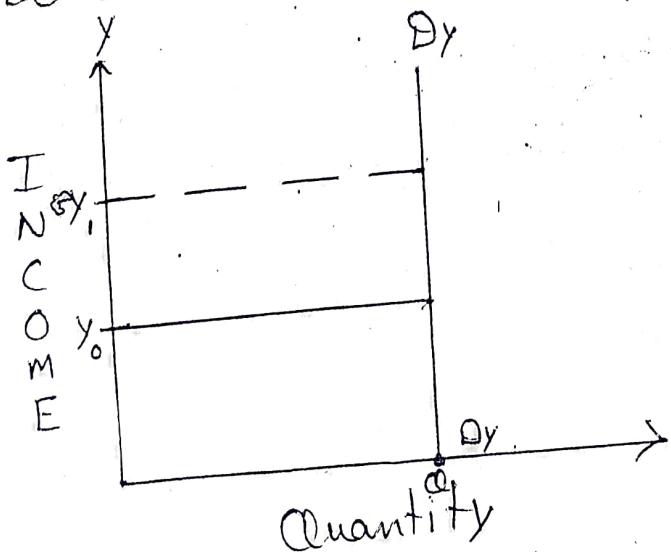
$\leftarrow \frac{\text{percentage change in demand}}{\text{percentage change in income}}$ Income elasticity of Demand is negative when increase in the income of the consumer is accompanied by fall in demand of a good and

decrease in income is followed by rise in demand. Negative income elasticity refers to inferior goods. For example, income elasticity of demand for tonned milk, coarse grains etc. is negative.



$D_X D_Y$ demand curve represents negative income elasticity of demand. Its slope downwards from left to right.

3. Zero Income Elasticity of Demand :- Income elasticity of demand is zero, when change in the income of consumer evokes no change in his demand. Demand for necessities like, kerosene oil, salt, etc. has zero income elasticity of demand.



$D_X D_Y$ demand curve represents zero income elasticity of demand. It is parallel to OY-axis.

CROSS ELASTICITY OF DEMAND

Cross elasticity of demand is a measure of proportionate change in quantity demanded of good X, as a result of proportionate change in the price of good Y.

In the words of Ferguson, "The cross elasticity of demand is the proportional change in the quantity demanded of good X divided by the proportional change in the price of the related good Y."

$$E_C = \frac{\text{Proportionate or Percentage Change in Quantity Demanded of Good } X}{\text{Proportionate or Percentage Change in Price of Good } Y}$$

$$= \frac{\frac{\Delta Q_X}{Q_X} \times 100}{\Delta P_Y \times 100}$$

$$= \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

Here, E_C = Cross Elasticity of Demand,

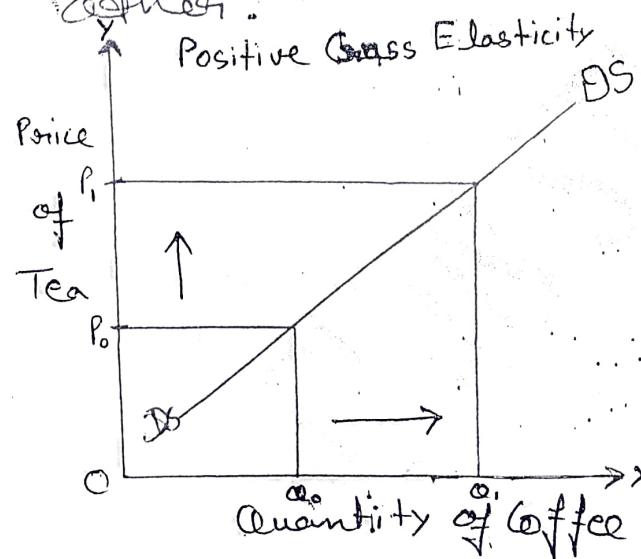
ΔQ_X = Change in the quantity demanded of X
 Q_X = Original quantity demanded of X

ΔP_Y = Change in price of good Y

P_Y = Original Price of good Y..

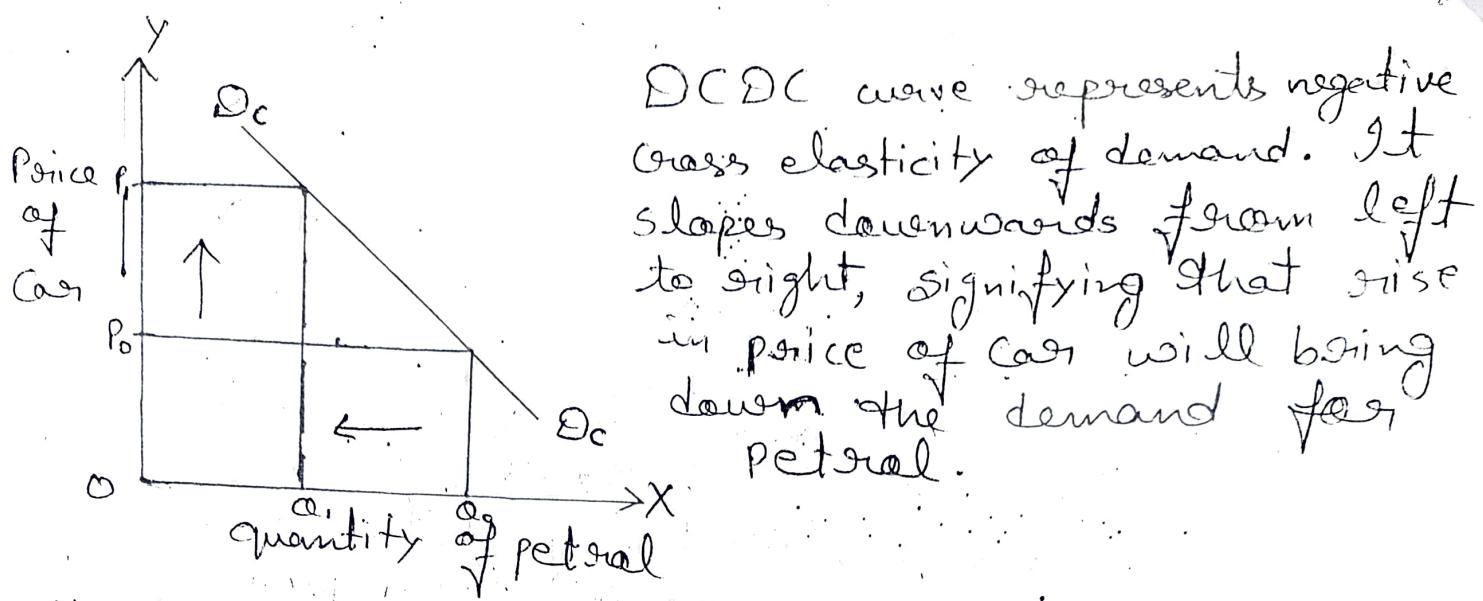
Nature and Degree of Cross Elasticity of Demand:-

(i) Positive :- Gross elasticity of demand is positive in case of substitutes. In other words, when goods are substitutes of each other, then a given percentage rise in the price of a good will lead to a given percentage increase in the demand for the substitute good. For example, rise in price of tea will lead to increase in demand for coffee because the two are close substitutes of each other.



DS Curve represents the positive cross elasticity of demand. This curve slopes upward from left to right.

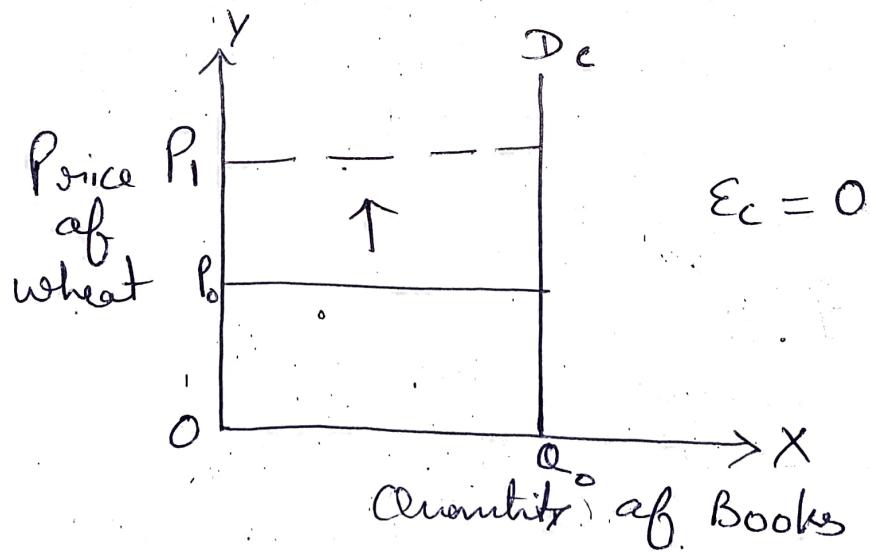
(ii) Negative :- Gross elasticity of demand is negative in case of complementary goods. In case of complementary goods (jointly demanded goods), proportionate rise in the price of one leads to proportionate fall in the demand for the other. Consequently, gross elasticity of demand is negative and the same is indicated by putting minus (-) sign before the number of cross elasticity of demand.



(iii) Zero Cross Elasticity of Demand :-

Cross elasticity of demand is zero when two goods are not related to each other. For example, rise in the price of wheat will have no effect on the demand for books.

Their cross elasticity of demand will be called zero.



Q-1 When income of consumer rises from £ 50000 to £ 70000 p.m. The demand of commodity X falls from 100 Units to 50 Units. Calculate Income elasticity of demand.

Sol

Income

Quantity Demanded
(Units)

(ϵ)

50000

100 ~~80000~~

70000

50

$$\epsilon_y = \frac{\Delta q}{\Delta y} \times \frac{y}{q}$$

$$\Delta q = 50 - 100 = -50$$

$$\Delta y = 70000 - 50000 = 20000$$

$$y = 50000$$

$$q = 100$$

$$= \frac{-50}{20000} \times \frac{50000}{100}$$

$$= \frac{-5}{4}$$

$$= (-)1.25$$

The income elasticity is negative so the commodity X is an inferior good.

Q2 When the price of Commodity X is £80 the quantity demanded of good Y is 100 Units. With the rise in price of good X to £120, demand for good Y falls to 50 Units. Calculate cross elasticity of demand and how goods X and Y are related.

<u>Sol</u>	Price of good X (£)	Quantity Demanded of Good Y (Units)
	80	100
	120	50

$$E_C = \frac{\Delta Q_Y}{\Delta P_X} \times \frac{P_X}{Q_Y}$$

$$\Delta Q_X = 50 - 100 = -50$$

$$\Delta P_X = 120 - 80 = 40$$

$$P_X = 80 \quad Q_X = 100$$

$$E_C = -\frac{50}{40} \times \frac{80}{100}^2$$

$$= -\frac{100}{100}$$

$$= (-) 1$$

The cross elasticity of demand for X and Y is negative. So goods X and Y are complementary.

Q-③ When the price of A falls from £ 20 to £ 15 per unit, as a result the quantity demanded of good B also falls from 100 to 80 units. Calculate cross elasticity of demand and how goods A and B are related?

<u>Sol</u>	Price of A	Quantity demanded of good B
	20	100
	15	80

$$\Delta Q_B = 80 - 100 = -20$$

$$\Delta P_A = 15 - 20 = -5$$

$$Q_B = 100 \quad P_A = 20$$

$$E_C = \frac{\Delta Q_B}{\Delta P_A} \times \frac{P_A}{Q_B}$$

$$= \frac{-20}{-5} \times \frac{20}{100}$$

$$= \frac{4}{5} = 0.8$$

The cross elasticity of demand is positive so goods A and B are Substitute goods.