

Define elasticity of demand. Mention its types.

→ Elasticity of demand measures the responsiveness of the quantity demanded for a good, to change in its price, change in the price of related goods and changes in consumer's income.

Elasticity of demand is of three types —

- (i) Price elasticity of demand,
- (ii) Income elasticity of demand
- (iii) Cross & elasticity of demand.

$$D = f(P, P', I, I')$$

When change in quantity demanded is measured with respect to change in price of the commodity, it is called price elasticity of demand. When change in quantity demanded is measured with respect to change in income of the consumer, it is called income elasticity of demand. And, When change in quantity demanded of one commodity is measured with respect to change in price of the other commodity, it is called cross elasticity of demand.

22. Explain the different methods of measuring price elasticity of demand.

→ Price elasticity of demand can be measured by following any one of the three methods given as under :-

(1) Proportionate / Percentage method : Under this method ~~the~~ elasticity of demand is measured by the ratio of the proportionate ~~the~~ change in quantity demanded, to the proportionate change in price. It is worked out as under. —

$$E_d = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in price}}$$

$$= \frac{\frac{\text{change in demand}}{\text{Initial demand}} \times 100}{\frac{\text{change in price}}{\text{Initial price}} \times 100}$$

$$= \frac{\frac{Q_1 - Q_0}{Q_0}}{\frac{P_1 - P_0}{P_0}}$$

$$= \frac{\frac{\Delta Q}{Q_0}}{\frac{\Delta P}{P_0}}$$

$$= \frac{\Delta Q}{Q_0} \times \frac{P_0}{\Delta P}$$

$$= \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

$Q_0 = 20$
 $Q_1 = 15$
 $\Delta Q = 5$
 $P_0 = 20$
 $P_1 = 10$
 $\Delta P = 10$
 $\frac{5}{20} \times \frac{20}{10} = \frac{1}{4} = 0.25$

where,

E_d = Price elasticity of demand,

Q_0 = Initial demand

ΔQ = Change in demand

P_0 = Initial price

ΔP = Change in Price.

Q_1 = New demand.

P_1 = New Price

It is to be noted here that price elasticity of demand is a negative number since demand for a good is negatively related to the price of a good.

(ii) Total Expenditure/Total Outlay method : According to this method —

(a) If rise or fall in price of commodity makes no change in its total expenditure, then elasticity of demand is unitary.

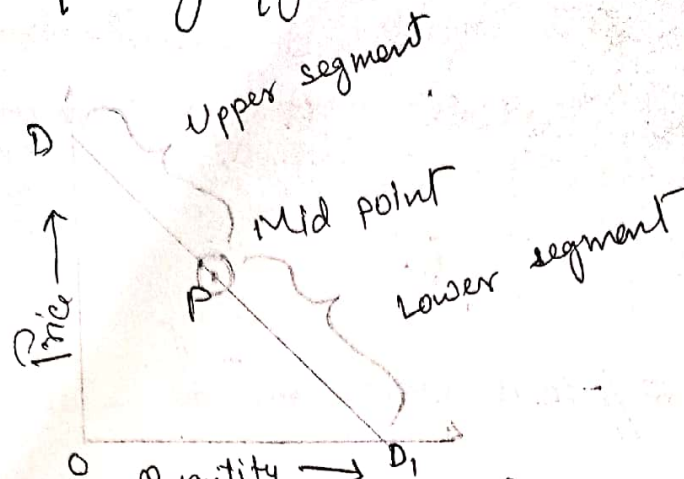
Or

(b) If with a fall in price of a commodity total expenditure increases and with a rise in its price total expenditure decreases, then demand for the commodity is elastic in nature.

(c) If with a fall in price of a commodity, total expenditure decreases and with rise in its price total expenditure increases then demand for the commodity is ~~too~~ inelastic in nature.

(iii) Geometric method : Geometric method measures ~~elasticity~~ elasticity of demand at different points in a linear demand curve. It is also called point method of measuring elasticity of demand. This method may be explained with the help of

of the following figure.

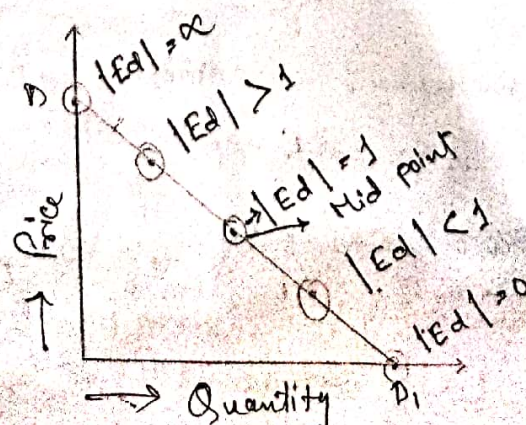


In the above diagram $P; D_1$ is a straight line demand curve. The point P divides the straight line demand curve in two segments, viz. lower segment (PD_1) and upper segment (PD). Elasticity of demand at point P can be measured by taking the difference between lower segment and upper segment i.e.

$$Ed \text{ at point } P = Ed \text{ (at point } P) = \frac{\text{Lower segment (PD}_1\text{)}}{\text{Upper segment (PD)}}$$

23. How will you derive elasticity at different point on a linear demand curve using geometric method?

→ The following figure offers details of elasticity of demand on different points of a straight line demand curve using geometric method.



$d = 1$ (unity) : If point A is at the middle of demand curve then lower segment = upper segment.
Accordingly $E_d = \frac{AD_1}{AD} = 1$.

(ii) $E_d > 1$ (greater than unity) : At point M, E_d .

$$E_d = \frac{MD_1}{MD} > 1, \text{ because } MD_1 > MD.$$

(iii) $E_d < 1$ (less than unity) : At point N,

$$E_d = \frac{ND_1}{ND} < 1, \text{ because } ND_1 < ND.$$

(iv) $E_d = 0$ (Perfectly inelastic) : At point P, (where the demand curve touches the x-axis),

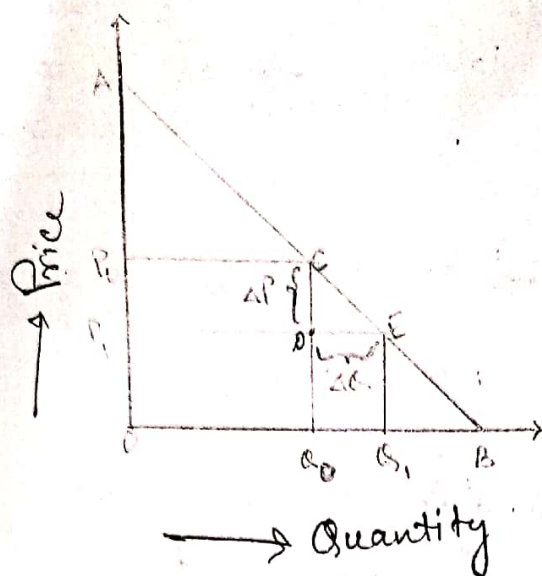
$$E_d = \frac{0}{PD} = 0$$

(v) $E_d = \infty$ (Perfectly elastic) : At point D (where the demand curve touches the y-axis, $E_d = \frac{DD_1}{0} = \infty$)

Q. Derive the process of measuring price elasticity at a particular point on a linear curve using geometric method.

OR.
Prove that under geometric method price elasticity at a particular point = $\frac{\text{lower segment of the demand curve}}{\text{upper segment of the demand curve}}$

→ Elasticity of demand at any point on a straight line demand curve is given by the ratio of the lower segment and the upper segment of the demand curve at that point.
To explain the method let us refer to the following diagram



Let us suppose the initial price is P_0 at which demand for the commodity is Q_0 . Now if price changes from P_0 to P_1 , quantity demand changes from Q_0 to Q_1 . Here,

$$\Delta Q = Q_0 Q_1 \text{ or } DE$$

$$\Delta P = P_0 P_1 \text{ or } CD$$

We know, that $E_p = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$ [By proportionate method]

$$\text{OR, } E_p = \frac{Q_0 Q_1}{CD} \cdot \frac{CO_0}{OQ_0} = \frac{DE}{CD} \cdot \frac{CO_0}{P_0 C} \left[\begin{array}{l} Q_0 Q_1 = DE \text{ and} \\ OQ_0 = P_0 C \end{array} \right]$$

Now, $\triangle CDE$ and $\triangle CO_0B$ are similar triangles, implying the proportion of their sides will be equal as,

$$\frac{DE}{CD} = \frac{O_0 B}{CO_0}$$

Now, the eqⁿ ① can be rewritten as,

$$\begin{aligned} E_p &= \frac{O_0 B}{CO_0} \times \frac{CO_0}{P_0 C} \\ &= \frac{O_0 B}{P_0 C} \longrightarrow \textcircled{2} \end{aligned}$$

24. $\triangle AP_0C$ and $\triangle CQ_0B$ are also similar triangles and hence we may write,

$$\frac{Q_0B}{P_0C} = \frac{CB}{CA}$$

As a result eqⁿ (1) becomes,

$$E_p = \frac{CB}{CA} = \frac{\text{Lower segment of the demand curve}}{\text{Upper segment of the demand curve}}$$

25.

Again,

$\triangle AP_0C$ and $\triangle CQ_0B$ are also similar triangles and hence we may write,

$$\frac{Q_0B}{P_0C} = \frac{CB}{CA}$$

As a result eqⁿ (2) becomes,

$$E_p = \frac{CB}{CA} = \frac{\text{Lower segment of the demand curve}}{\text{Upper segment of the demand curve}}$$

25. Find out elasticity of demand along a linear demand curve $q = a - bp$ using proportionate method.

→ Let us consider a linear demand curve.

$q = a - bp$. It is to be noted that at any point on the demand curve, the change in demand

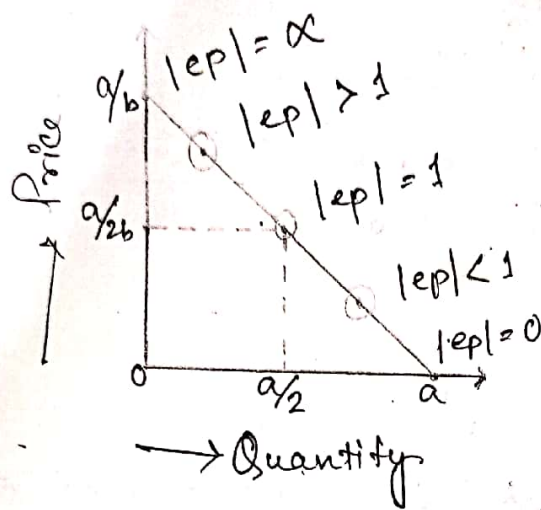
per unit of change in price $\frac{\Delta q}{\Delta p} = -b$. Substituting

the value of $\frac{\Delta q}{\Delta p}$ in the elasticity formula we

will obtain,

$$e_p = -b \cdot \frac{p}{q}$$

$$= -\frac{bp}{a-bp} \quad \text{--- (1)}$$



From the above eqⁿ (1) it is clear that elasticity of demand is different at different point of the linear demand curve.

At $P = 0$ the elasticity is 0

At $Q = 0$ the elasticity is ∞

At $P = \frac{b}{2}$, the elasticity is 1,

Again, at any price greater than 0 but less than $\frac{a}{2b}$, elasticity is less than 1 and at any price greater than $\frac{a}{2b}$ elasticity is greater than 1.

The different price elasticity of demand along the linear demand curve is shown in the above figure.

29. Explain the different determinants of price elasticity of demand.

OR

Describe the factors that determine price elasticity.

→ Following ^{factors} ~~factors~~ determine price elasticity of demand :

(i) Nature of the commodity : Generally, necessities like salt, rice, wheat, ~~etc~~ vegetables etc have inelastic demand but luxuries like costly furnitures, ACs, fashionable garments etc have elastic demand.

(ii) Availability of substitutes : Demand for those commodities which have substitutes are relatively more elastic. On the other hand, commodities having no substitutes like ^{cigarettes} ~~cigarettes~~, wine, etc have inelastic demand.

(iii) Different uses of the commodity : Commodities that can be put to a variety of uses have elastic demand. For instance, electricity has multiple uses and therefore having elastic demand. On the other hand, if a commodity (such as paper) has only a few uses, its demand is likely to be inelastic.

Income of the consumer : People whose incomes are very high or very low, their demand will ordinarily be ~~inelastic~~ ^{elastic}. Conversely, middle income groups - will have ~~elastic~~ ^{inelastic} demand.

(v) Habit of the consumer : Goods to which a person becomes habitual, will have inelastic demand; like ^{cigarettes} ~~cigarette~~, coffee etc.

(vi) Proportion of income spent on a commodity : Goods on which a consumer spends very small proportion of his income, viz. newspaper, toothpaste, shoe polish etc will have an inelastic demand. On the other hand, goods on which the consumer spends a large proportion of his income, eg^s clothes, motor cycles etc their demand will be elastic.

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