

Income Elasticity of Demand

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Income Elasticity of Demand

- Income Elasticity of Demand (YED) is defined as the responsiveness of demand when a consumer's income changes.
- It is defined as the ratio of the change in quantity demanded over the change in income.
- The higher the income elasticity, the more sensitive demand for a good is to changes in income.
- This means that a very high-income elasticity of demand suggests that when a consumer's income goes up, consumers will buy a lot more of that good and, reciprocally, when income goes down consumers will cut back their purchases of that good to an even higher degree.
- A very low price elasticity implies that changes in a consumer's income will have little effect on demand.

Income Elasticity of Demand

- YED is useful for governments and firms to help them decide what goods to produce and how a change in overall income in the economy affects the demand for their products, i.e., whether it's inelastic or elastic.
- YED can be positive or negative. This depends on the type of good. A normal good has a positive sign, while an inferior good has a negative sign.

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- YED can be positive or negative. This depends on the type of good. A normal good has a positive sign, while an inferior good has a negative sign.
- For example, if a person experiences a 20% increase in income, the quantity demanded for a good increased by 20%, then the income elasticity of demand would be $20\%/20\% = 1$. This would make it a normal good.

Income Elasticity of Demand – formula

Mathematically, it is expressed as:

$$\text{Income elasticity of demand} = \frac{\% \text{change in quantity demanded}}{\% \text{change in income}}$$

Symbolically, it is expressed as:

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

EY = Elasticity of demand

q = Original quantity demanded

Δq = Change in quantity demanded

y = Original consumer's income

Δy = Change in consumer's income

Income Elasticity of Demand – Example

- Suppose that the initial income of a person is Rs.2000 and quantity demanded for the commodity by him is 20 units. When his income increases to Rs.3000, quantity demanded by him also increases to 40 units. Find out the income elasticity of demand.

- **Solution:**

Here, $q = 20$ units

$\Delta q = (40-20)$ units = 20 units

$y = \text{Rs.}2000$

$\Delta y = \text{Rs.} (3000-2000) = \text{Rs.}1000$

- Hence, an increase of Rs.1000 in income i.e. 1% in leads to a rise of 2% in quantity demanded

$$\begin{aligned}\therefore E_y &= \frac{\Delta q}{\Delta y} \times \frac{y}{q} \\ &= \frac{20}{1000} \times \frac{2000}{20} \\ &= 2\%\end{aligned}$$

Methods of Measuring Income Elasticity of Demand

Basically, there are three methods by which we can measure income elasticity of demand.

These methods are

- i. Percentage method**
- ii. Point method**
- iii. Arc method**

Methods of Measuring Income Elasticity of Demand

i. Percentage method –

Percentage method is one of the commonly used approaches of measuring income elasticity of demand, under which income elasticity is measured in terms of rate of percentage change in quantity demanded of the commodity to percentage change in income of the consumers who demand that commodity.

Methods of Measuring Income Elasticity of Demand

i. Percentage method –

$$\begin{aligned} E_y &= \frac{\% \text{ change in quantity demanded}}{\% \text{ change in income}} \\ &= \frac{\frac{\text{change in quantity demanded}}{\text{initial quantity demanded}} \times 100\%}{\frac{\text{change in income}}{\text{initial income}} \times 100\%} \\ &= \frac{\frac{Q_2 - Q_1}{Q_1}}{\frac{Y_2 - Y_1}{Y_1}} \\ &= \frac{\Delta Q}{\Delta Y} \times \frac{Y_1}{Q_1} \end{aligned}$$

ΔQ = change in quantity demanded = $Q_2 - Q_1$

Q_1 = initial quantity demanded

Q_2 = new quantity demanded

ΔY = change in income of the consumers = $Y_2 - Y_1$

Y_1 = initial income of the consumers

Y_2 = new income of the consumers

- **example:**

- The demand of quantity when the income of the consumer was Rs 3000 was 30 units. When his income increased by Rs 2000, the quantity of commodity demanded by him became 50 units. Here, income elasticity of demand can be calculated as

$$\begin{aligned} E_y &= \frac{\% \text{ change in quantity demanded}}{\% \text{ change in income}} \\ &= \frac{\frac{\text{change in quantity demanded}}{\text{initial quantity demanded}} \times 100\%}{\frac{\text{change in income}}{\text{initial income}} \times 100\%} \\ &= \frac{\frac{5000 - 3000}{3000}}{\frac{50 - 30}{30}} \\ &= \frac{\frac{2}{3}}{\frac{2}{3}} \\ &= 1 \end{aligned}$$

Since $E_y = 1$, this is an example of unitary income elasticity of demand where percentage change in income of consumer is equal to percentage change in demand of the commodity.

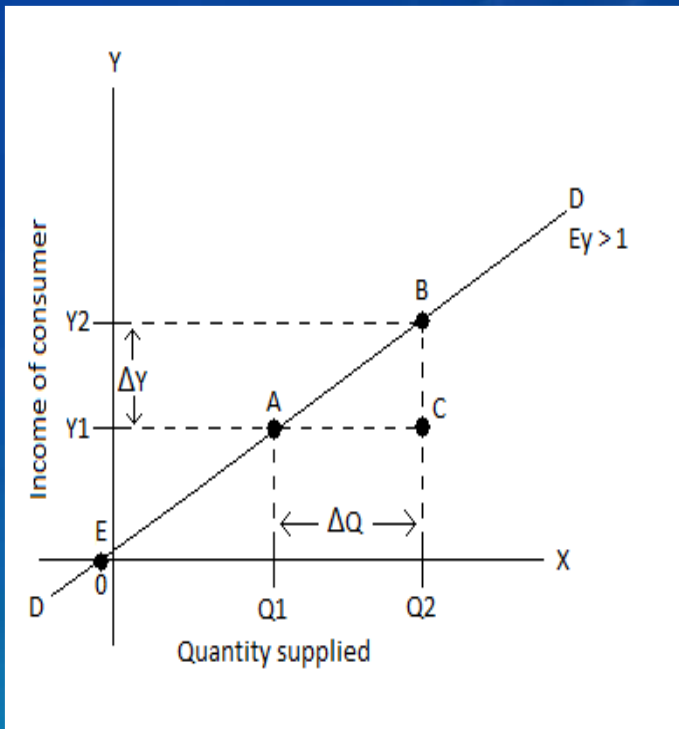
ii. Point Method

Point method is one of the geometric methods of measuring income elasticity of demand at any given point on the income demand curve.

Income demand curve is an upward sloping curve in case of normal goods and a downward sloping curve in case of inferior goods.

However, the method of calculating income elasticity depends upon the nature of the income demand curve.

These methods are described below.



$$E_y = \frac{\Delta Q}{\Delta Y} \times \frac{Y_1}{Q_1} \dots\dots (i)$$

$$= \frac{Q_1 Q_2}{Y_1 Y_2} \times \frac{OY_1}{OQ_1}$$

$$= \frac{AC}{BC} \times \frac{AQ_1}{OQ_1} \dots\dots (ii)$$

[Since, $Q_1 Q_2 = AC$, $Y_1 Y_2 = BC$ & $OY_1 = AQ_1$]

$$\frac{AC}{BC} = \frac{EQ_1}{AQ_1} \dots\dots (iii)$$

$$\frac{EQ_1}{AQ_1} \times \frac{AQ_1}{OQ_1}$$

$$= \frac{EQ_1}{OQ_1}$$

$$= \frac{\text{intercept on X-axis}}{\text{initial quantity}} \dots\dots (iv)$$

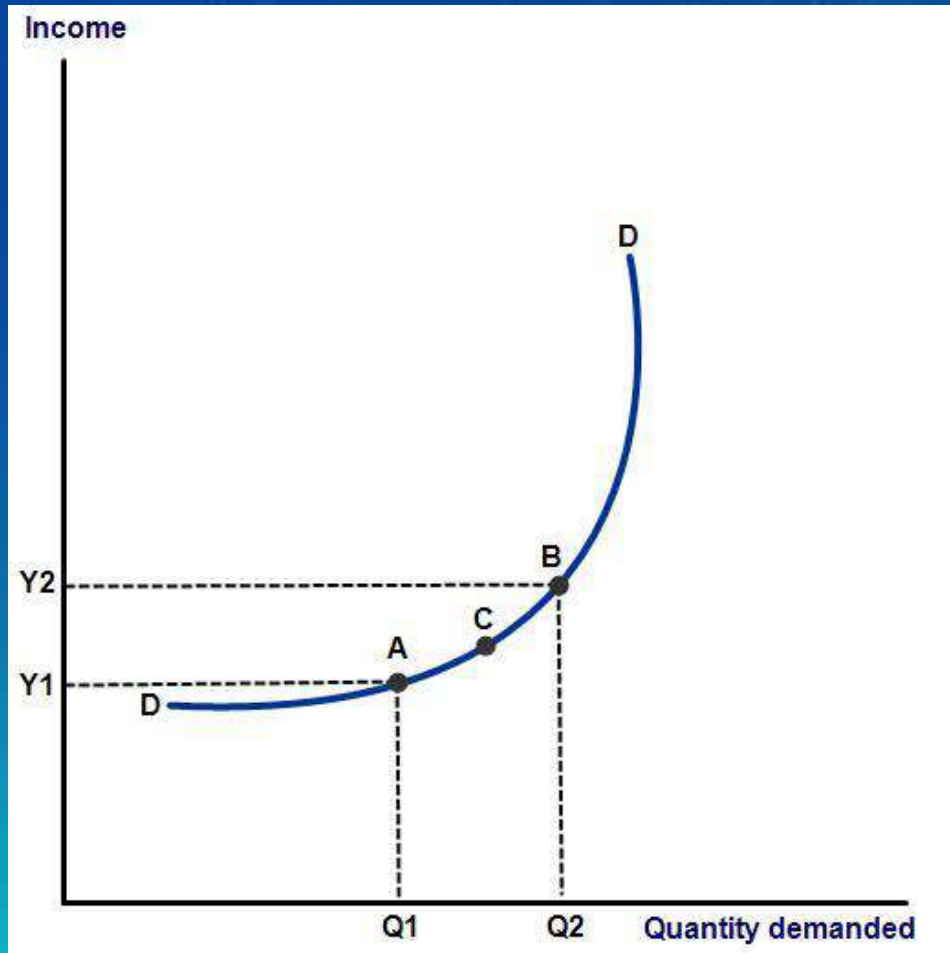
ΔBAC and ΔAEQ_1 are similar triangles in account of AAA property.

Thus, ratios of the sides of both the triangles are equal.

iii. Arc Method

Arc method is also a geometric method of measuring income elasticity of demand between any two points on an income demand curve.

While ‘point method’ is used to calculate income elasticity at any given point on an income demand curve, this method is used to measure income elasticity over a certain range or between two points on the curve.



In the figure,

we can see that AB is an arc on the income demand curve DD, and C is the mid-point of AB.

Here, income elasticity of demand at point C is calculated by following ways.

At first, average of income as well as quantity demanded is measured.

1. Income Elasticity of Demand for a Normal Good

A normal good has an Income Elasticity of Demand > 0 . This means the demand for a normal good will increase as the consumer's income increases.

2. Income Elasticity of Demand for an Inferior Good

An inferior good has an Income Elasticity of Demand < 0 . This means the demand for an inferior good will decrease as the consumer's income decreases.

3. Income Elasticity of Demand for a Luxury Good

Luxury goods usually have Income Elasticity of Demand > 1 , which means they are income elastic. This implies that consumer demand is more responsive to a change in income. For example, diamonds are a luxury good that is income elastic.