

Elasticity

□ Law of supply and demand

$$[P \uparrow \rightarrow Q^d \downarrow, Q^s \uparrow]$$

⇒ Elasticity measures the extent to which demand will

⇒ Elasticity measures ^{change} the size of the change.

⇒ measure of responsiveness of quantity demand and quantity supply to a change with in or of its determinants or factors.

⇒ measure the percentage change in Q^d or Q^s with an additional change in price.

☐ Responsiveness to price change:

~~⇒~~

⇒ Necessary goods tend to be ⁱⁿelastic.

⇒ Higher elasticity → Flatter Curve

⇒ Higher inelasticity → Steeper Curve

4 Types of Elasticity → (1) PED (2) PES

(3) YED (4) XED

Price Elasticity of Demand: [PED]

⇒ measures the percentage change in the quantity demanded due to the percentage change in price.

$$PED = \frac{\Delta \text{Quantity (\%)}}{\Delta \text{Price (\%)}} = \frac{\frac{Q_{old} - Q_{new}}{Q_{old}}}{\frac{P_{old} - P_{new}}{P_{old}}}$$

• Midpoint Method of PED: $\frac{Q_2 - Q_1}{\frac{Q_2 + Q_1}{2}}$

$$\text{Price elasticity of demand} = \left| \frac{\frac{Q_2 - Q_1}{\frac{Q_2 + Q_1}{2}}}{\frac{P_2 - P_1}{\frac{P_2 + P_1}{2}}} \right|$$

1. $PED > 1 \rightarrow$ Elastic [Luxury Goods]

2. $PED < 1 \rightarrow$ inelastic [Necessary Goods]

3. $PED = 1 \rightarrow$ Unit elastic

4. $PED = \infty \rightarrow$ Perfectly elastic Demand

5. $PED = 0 \rightarrow$ Perfectly inelastic "

↳ no matter how price fluctuates, Qd would remain unchanged

▶ Slightly change in price, people will stop buying that good. [unrealistic]

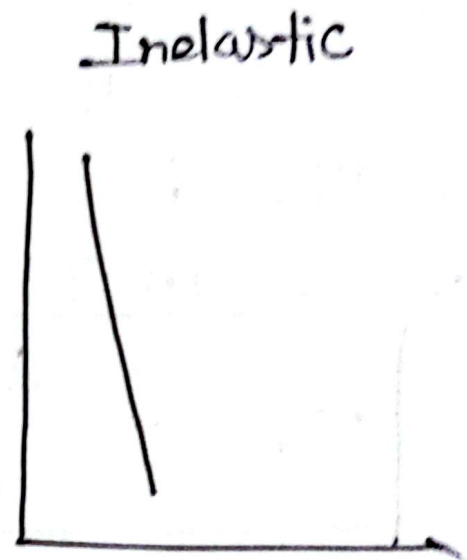
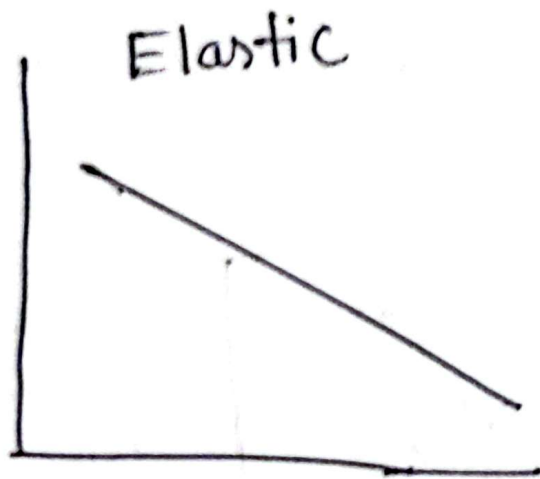
Sergel[®]

Esomeprazole USP

(luxury goods)



Healthcare



Total Revenue = Price \times Quantity

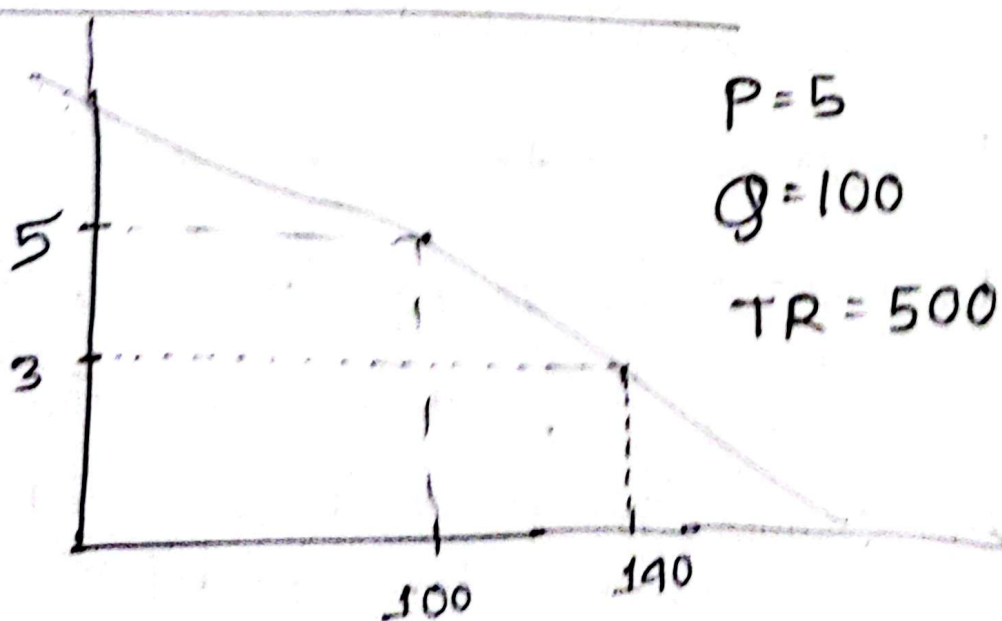
↳ depends on the elasticity of the goods

• elastic $\rightarrow P \uparrow TR \downarrow$

• inelastic $\rightarrow P \uparrow TR \uparrow$

$P \uparrow$ Sub \uparrow
 $P \downarrow$ Sub \downarrow

▣ Total Revenue (TR): graph:

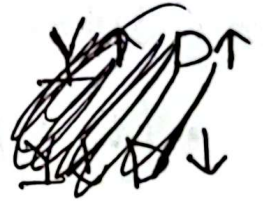


Income elasticity of Demand: (YED)

⇒ measures the percentage change in Q^d due to 1% change in income (Y).

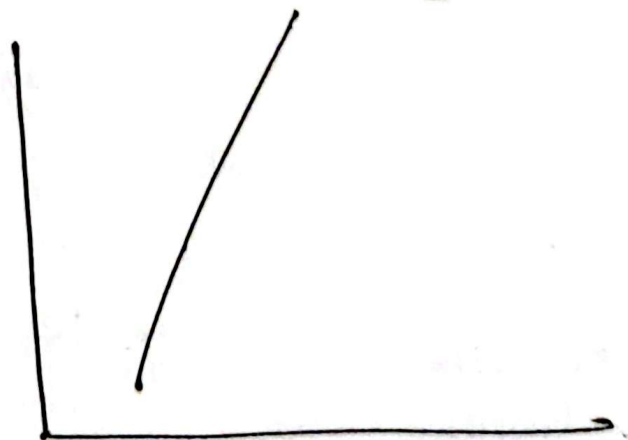
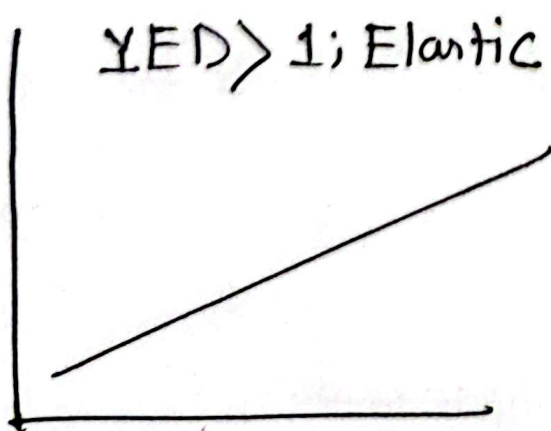
$$YED(\eta) = \frac{\frac{Q_2 - Q_1}{\frac{(Q_2 + Q_1)}{2}}}{\frac{Y_2 - Y_1}{\frac{(Y_2 + Y_1)}{2}}}$$

1. $0 < \eta \leq 1$ → Necessary goods
2. $\eta > 1$ → Luxury good
3. $\eta < 0$ → Inferior good (negative)



• Normal goods → $P \downarrow D \uparrow$ or $P \uparrow D \downarrow$
and $[Q^d \uparrow I \uparrow]$ and $D \uparrow Y \uparrow$
 $D \downarrow Y \downarrow$

• Inferior goods → ~~$Q^d \uparrow I \uparrow$~~ $D \uparrow Y \downarrow$, $Y \uparrow D \downarrow$
 $0 < YED \leq 1$: Inelastic



• Positive sign denotes a normal good
• Negative sign denotes a inferior good

Sergel
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Healthcare

Cross Price Elasticity (XED):

⇒ Measures the change in quantity of one good (Good A) due to change in price of another good (Good B)

- If $XED > 0$ then Good A and Good B are substitute good

- If $XED < 0$ then Good A and Good B are complementary good.

- If $XED = 0$ then the goods are neutral.

1. $XED > 1 \Rightarrow$ elastic

2. ~~$XED > 1$~~ $0 < XED < 1 \Rightarrow$ inelastic

3. $-1 < XED < 0 \Rightarrow$ inelastic

4. $XED < -1$

$$XED = \frac{\% \text{ change in Demand for one good}}{\% \text{ change in Demand for another good}}$$

- Positive sign denotes Substitute goods
- Negative " " Complementary "

Price Elasticity of Supply (PES):

$$PES = \frac{\frac{Q_2 - Q_1}{\frac{Q_2 + Q_1}{2}}}{\frac{P_2 - P_1}{\frac{P_2 + P_1}{2}}}$$

• $PES \in (0, 1)$

⇒ For 1% increase in price, supplied increased by - - - - .

$P \uparrow Q_s \uparrow$ and $P \downarrow Q_s \downarrow$

- $PES > 1 \Rightarrow$ elastic good
- $PES = 1 \Rightarrow$ unit elastic good
- $PES = 0 \Rightarrow$ Perfectly inelastic good
- $0 < PES \leq 1 \Rightarrow$ inelastic good
- $PES = \infty \Rightarrow$ Perfectly elastic good

Summary of the Four Elasticity Concepts

Type	Definition	Possibilities	Terminology
Price elasticity of demand	$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$	$E_d > 1$	Elastic
		$E_d < 1$	Inelastic
		$E_d = 1$	Unit elastic
		$E_d = \infty$	Perfectly elastic
		$E_d = 0$	Perfectly inelastic
Cross elasticity of demand	$\frac{\text{Percentage change in quantity demanded of one good}}{\text{Percentage change in price of another good}}$	$E_c < 0$	Complements
		$E_c > 0$	Substitutes
Income elasticity of demand	$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$	$E_y > 0$	Normal good
		$E_y < 0$	Inferior good
		$E_y > 1$	Income elastic
		$E_y < 1$	Income inelastic
		$E_y = 1$	Income unit elastic
Price elasticity of supply	$\frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$	$E_s > 1$	Elastic
		$E_s < 1$	Inelastic
		$E_s = 1$	Unit elastic
		$E_s = \infty$	Perfectly elastic
		$E_s = 0$	Perfectly inelastic