

REVISION SLIDE 2

ELASTICITIES

OUTLINE

- Price Elasticity of Demand (PED)
- Income Elasticity of Demand (YED)
- Cross Elasticity of Demand (XED)
- Price Elasticity of Supply (PES)

PRICE ELASTICITY OF DEMAND

PED is a measure of responsiveness of how Quantity Demanded (Qd) changes when Price (P) changes.

$$\mathbf{PED} = \frac{\% \Delta Qd}{\% \Delta P} \quad \text{where } \% \Delta X = \frac{X_1 - X_0}{X_0}$$

$$\mathbf{Point-PED} = \frac{\frac{Q_1 - Q_0}{Q_0}}{\frac{P_1 - P_0}{P_0}} = \frac{\frac{\Delta Q}{Q_0}}{\frac{\Delta P}{P_0}} = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

That is, PED is calculated from **the slope of the demand curve** (NOT inverse demand) and **the original point before the price change**.

VALUES OF PED

PED is a negative value since a rise in price (positive $\% \Delta$ in P) corresponds to a fall in quantity demanded (negative $\% \Delta$ in Qd).

However, PED is sometimes reported in an absolute value, as we are interested in the “**magnitude**” of the change, not the “direction”.

When

$|\text{PED}| > 1$, demand is price-elastic.

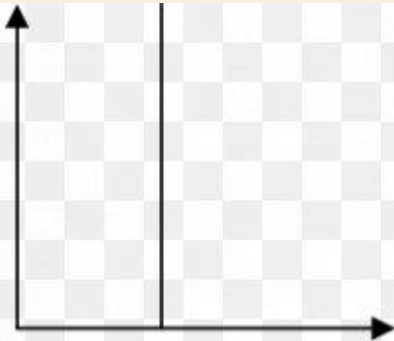
$|\text{PED}| = \infty$, demand is perfectly price-elastic

$|\text{PED}| < 1$, demand is price-inelastic.

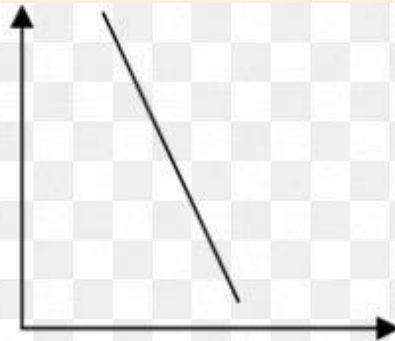
$|\text{PED}| = 0$, demand is perfectly price-inelastic

$|\text{PED}| = 1$, demand is unit-elastic.

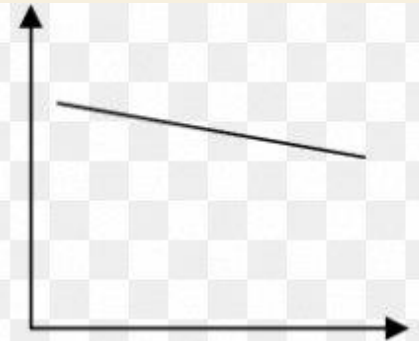
VALUES OF PED



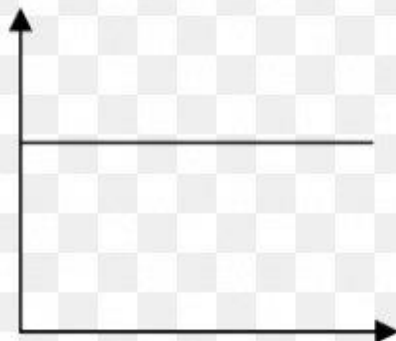
Value = 0
Perfectly inelastic demand



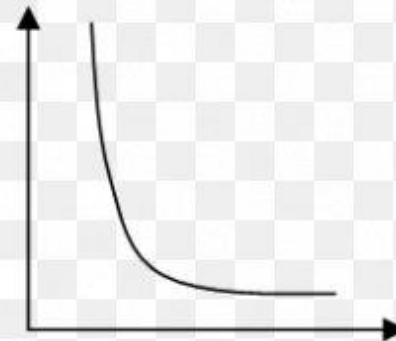
Value = 0 & 1
Inelastic demand



Value = 1 & infinity
Elastic demand



Value = Infinity
Perfectly elastic demand



Value = Unitary
Unitary elastic

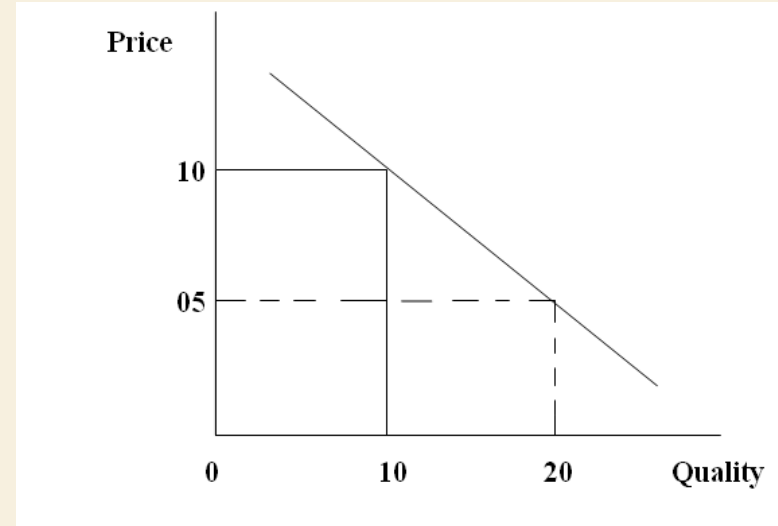
PED CALCULATION

Suppose P falls from 10 to 5.

$$\text{PED} = \frac{\frac{20-10}{5-10}}{\frac{10}{10}} = \frac{\frac{10}{-5}}{\frac{1}{1}} = -2 \quad |\text{PED}| = 2$$

Suppose P rises from 5 to 10.

$$\text{PED} = \frac{\frac{10-20}{10-5}}{\frac{20}{5}} = \frac{\frac{-10}{5}}{\frac{20}{5}} = -\frac{1}{2} \quad |\text{PED}| = \frac{1}{2}$$

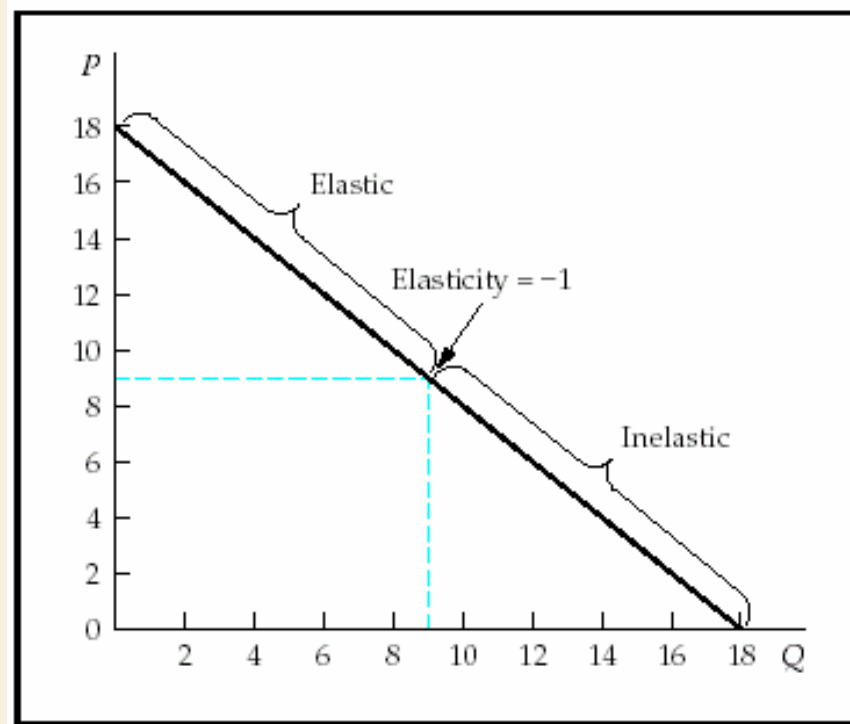


Thus, PED at different points on the same demand curve may vary.

PED ALONG THE DEMAND CURVE

PED along the LINEAR demand curve varies.

At each point on the demand, the proportion of $\% \Delta Q_d$ to $\% \Delta P$ varies.



DETERMINANTS OF PED

- 1) Availability of Substitutes
more substitutes >>> elastic
- 2) Proportion of Income Spent on the Good
large proportion of income spent (relatively expensive) >>> elastic
- 3) Necessity vs Luxury
necessity >>> inelastic
- 4) Addiction / Habit-Forming
addictive >>> inelastic
- 5) Time (to look for substitutes / to adjust behavior)
more time >>> elastic

INCOME ELASTICITY OF DEMAND

YED is a measure of responsiveness of how Quantity Demanded (Q_d) changes when Income (Y) changes.

$$\mathbf{YED} = \frac{\% \Delta Q_d}{\% \Delta Y}$$

VALUES OF YED

When

$YED > 0$, the good is **NORMAL**.

When income rises, consumers demand more.

For $YED > 1$, the good is a normal and **LUXURY** good.

- A change in income causes a large change in quantity demanded.

For $YED < 1$, the good is a normal and **NECESSITY** good.

- A change in income causes a small change in quantity demanded.

$YED < 0$, the good is **INFERIOR**.

When income rises, consumers demand less.

CROSS ELASTICITY OF DEMAND

XED is a measure of responsiveness of how Quantity Demanded (Q_d) changes when Price of Related Product (P') changes.

$$\mathbf{XED} = \frac{\% \Delta Q_d}{\% \Delta P'}$$

VALUES OF XED

Let X be Good 1 and Y be Good 2.

When

$XED > 0$, a rise in P_y causes a fall in Q_y , BUT a rise in Q_x

Thus, the two goods are **SUBSTITUTES**.

$XED < 0$, a rise in P_y causes a fall in Q_y , AND a fall in Q_x .

Thus, the two goods are **COMPLEMENTS**.

$XED = 0$, a rise in P_y causes a fall in Q_y , BUT no effect on Q_x .

Thus, the two goods are **UNRELATED**.

PRICE ELASTICITY OF SUPPLY

PES is a measure of responsiveness of how Quantity Supplied (Q_s) changes when Price (P) changes.

$$\mathbf{PES} = \frac{\% \Delta Q_s}{\% \Delta P}$$

$$\mathbf{Point-PES} = \frac{\frac{Q_1 - Q_0}{Q_0}}{\frac{P_1 - P_0}{P_0}} = \frac{\frac{\Delta Q}{Q_0}}{\frac{\Delta P}{P_0}} = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

VALUES OF PES

PES is a positive value since a rise in price (positive $\% \Delta$ in P) corresponds to a rise in quantity supplied (positive $\% \Delta$ in Q_s).

When

$PES > 1$, supply is price-elastic.

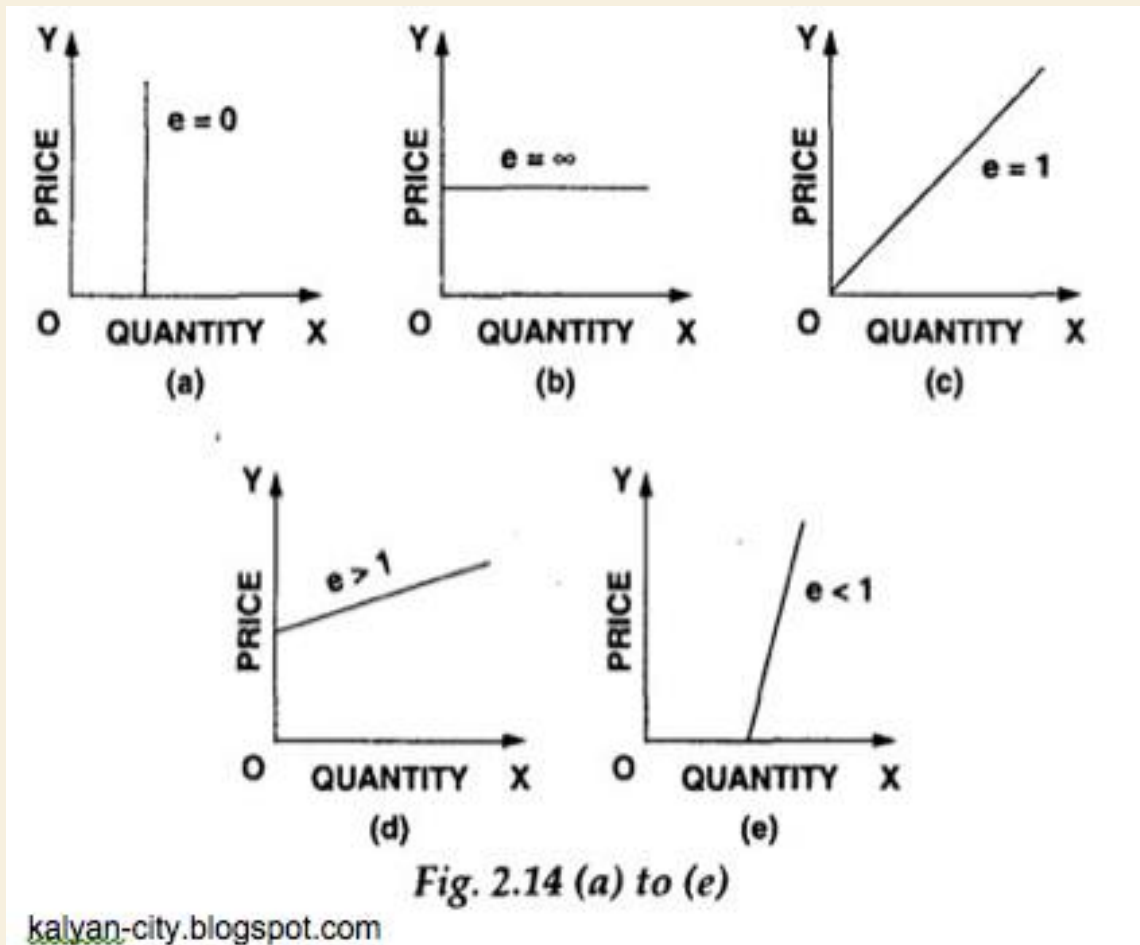
$PES = \infty$, supply is perfectly price-elastic

$PES < 1$, supply is price-inelastic.

$PES = 0$, supply is perfectly price-inelastic

$PES = 1$, supply is unit-elastic.

VALUES OF PED



DETERMINANTS OF PES

When producers can READILY adjust their production to the price change, then the supply is elastic. Such READINESS depends on

1) Unused Capacity (unused inputs)

more unused inputs >>> ready to respond to ΔP >>> elastic

2) Mobility of Factors of Production

mobile FOP >>> ready to respond to ΔP >>> elastic

3) Ability to Stock

able to stock output >>> ready to respond to ΔP >>> elastic

4) Time

more time >>> ready to respond to ΔP >>> elastic