ELASTICITY

- WHAT IS ELASTICITY? / WHY ELASTICITY?
- PRICE ELASTICITY OF DEMAND
- HOW TO COMPUTE IT?
- ELASTICITY & SHAPES OF DEMAND CURVE
- ELASTICITY & TOTAL REVENUE
- FACTORS THAT DETERMINE PRICE ELASTICITY OF DEMAND
- INCOME ELASTICITY OF DEMAND
- CROSS - PRICE ELASTICITY DEMAND
- PRICE ELASTICITY OF SUPPLY

ELASTICITY

ELASTICITY $(E) = \frac{\%\Delta Y}{\%\Delta X}$ → PERCENTAGE CHANGE IN Y → EFFECT; → PERCENTAGE CHANGE IN X → CAUSE

Q: HOW MANY PERCENTAGE CHANGE IN Y IF X CHANGES BY 1% ?

EX: $E = \frac{\%\Delta Y}{\%\Delta X} = \frac{10}{5} = 2$ → IF X RISES BY 1%, THEN Y WILL RISE BY MORE THAN 1%, HERE 2%.

Ton Wrasai at 07-Feb-17 9:43 AM

$E = \frac{\%\Delta Y}{\%\Delta X}$

- $E > 1$ → Y IS QUITE RESPONSIVE TO X
- $E < 1$ → Y IS NOT SO RESPONSIVE TO X
  EX: $E = \frac{1}{10} = 0.1$
- $E = 1$ → WHEN X CHANGES BY 1%, Y WILL CHANGE BY 1% IN THE SAME DIRECTION.
- $E = \frac{\%\Delta Y}{\%\Delta X} = \frac{0}{\text{ANY}\%} = 0$ → Y NEVER RESPONSES TO ANY CHANGE IN X.
- $E = \frac{\%\Delta Y}{\%\Delta X} = \frac{\text{VERY VERY BIG}}{\text{VERY VERY SMALL}} = \infty$ → Y IS EXTREMELY SENSITIVE TO X.

WHY PERCENTAGE CHANGE, NOT JUST ABSOLUTE CHANGE?

- ABSOLUTE CHANGE : $\frac{\Delta Y}{\Delta X}$

  Q: WHEN X CHANGES BY 1 UNIT, Y WILL CHANGE BY ___?___ UNIT?

- PERCENTAGE CHANGE : $\frac{\%\Delta Y}{\%\Delta X}$

  Q: WHEN X CHANGES BY 1 %, Y WILL CHANGE BY ? %

PRICE ELASTICITY OF DEMAND $(E^P) = \frac{\%\Delta Q^D_X}{\%\Delta P_X}$

→ %Δ IN QUANTITY DEMANDED FOR GOOD X
→ %Δ IN PRICE OF GOOD X

Q: IF PRICE OF GOOD X CHANGES BY 1%, Q^D_X WILL CHANGE BY ? % ?
OR IF ―――――――― 10%, ―――――――― BY ? % ?

$|E^P| = \left|\frac{\%\Delta Q^D_X}{\%\Delta P_X}\right|$ ⇒ LET'S TAKE AN ABSOLUTE VALUE SINCE WE CARE NOW ABOUT MAGNITUDE, NOT SIGN!

5 CASES

① IF $|E^P| > 1$, THEN DEMAND FOR GOOD X IS PRICE - ELASTIC. SINCE $|\%\Delta Q| > |\%\Delta P|$.

EX: $|\%\Delta P| = 10$, $|\%\Delta Q| = 50$. $|E^P| = \frac{50}{10} = 5$

WHEN PRICE OF GOOD X CHANGES BY 1%, QUANTITY DEMANDED FOR GOOD X WILL CHANGE BY 5% IN THE OPPOSITE DIRECTION.

② IF $|E^P| < 1$, DEMAND FOR GOOD X IS PRICE - INELASTIC.

EX: $|\%\Delta P| = 20$, $|\%\Delta Q| = 5$. $|E^P| = \frac{5}{20} = \frac{1}{4} = \frac{0.25}{1}$.

Ex: $|\%\Delta P| = 20$, $|\%\Delta Q| = 5$. $|E^P| = \frac{5}{20} = \frac{1}{4} = \frac{0.25}{1}$.

③ IF $|E^P| = 1$, DEMAND FOR GOOD X IS UNITARY PRICE-ELASTIC, AS $|\%\Delta Q| = |\%\Delta P|$.

④ IF $|E^P| = 0$, DEMAND FOR GOOD X IS PERFECTLY PRICE-INELASTIC.

$$|E^P| = \frac{|\%\Delta Q|}{|\%\Delta P|} = \frac{0}{\text{ANY \%}} = 0$$

⑤ IF $|E^P| = \infty$, DEMAND FOR GOOD X IS PERFECTLY PRICE-ELASTIC,

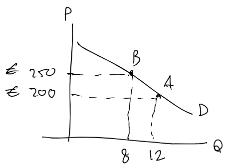
$$|E^P| = \frac{|\%\Delta Q|}{|\%\Delta P|} = \frac{\text{SUPER BIG}}{\text{SUPER SMALL}} = \infty$$

HOW TO COMPUTE $|E^P|$?

$$\boxed{E^P = \frac{\%\Delta Q_X^D}{\%\Delta P_X}}$$

- $\%\Delta Q_X^D = \frac{Q_{NEW} - Q_{OLD}}{Q_{OLD}} \times 100$ OR $\frac{\Delta Q}{Q_{(OLD)}} \times 100$
- $\%\Delta P_X = \frac{P_{NEW} - P_{OLD}}{P_{OLD}} \times 100$ OR $\frac{\Delta P}{P_{(OLD)}} \times 100$

EX



① PRICE INCREASE (MOVEMENT FROM A → B)

$$\%\Delta P = \frac{250-200}{200} \times 100 = \frac{50}{200} \times 100 = +25\%$$

$$\%\Delta Q = \frac{8-12}{12} \times 100 = \frac{-4}{12} \times 100 = -33.33\%$$

$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{-33.33}{+25} = -1.33 \quad \text{OR} \quad |E| = |-1.33| = 1.33$$

② PRICE DECREASE (MOVEMENT FROM B → A)

$$\%\Delta P = \frac{200-250}{250} \times 100 = \frac{-50}{250} \times 100 = -20\%$$

$$\%\Delta Q = \frac{12-8}{8} \times 100 = \frac{4}{8} \times 100 = +50\%$$

$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{+50}{-20} = -2.5 \quad \text{OR} \quad |E| = |-2.5| = 2.5$$

OBSERVATION E^P DIFFERS, DEPENDING ON WHERE YOU START!

IT IS AN ANNOYING PROBLEM.

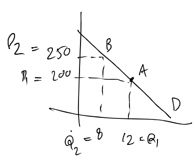
SOLUTION? WE USE MIDPOINT FORMULA.

$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{Q_2 - Q_1}{\left(\frac{Q_1+Q_2}{\cancel{2}}\right)} \cancel{\times 100}}{\frac{P_2 - P_1}{\left(\frac{P_1+P_2}{\cancel{2}}\right)} \cancel{\times 100}} = \frac{Q_2 - Q_1}{P_2 - P_1} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

OR

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

EX: W/ MIDPOINT FORMULA:



$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{8-12}{\left(\frac{8+12}{2}\right)} \times 100}{\frac{250-200}{\left(\frac{200+250}{2}\right)} \times 100} = \frac{\frac{-4}{10} \times 100}{\frac{+50}{225} \times 100} = \frac{-40}{+22.22} = -1.8$$

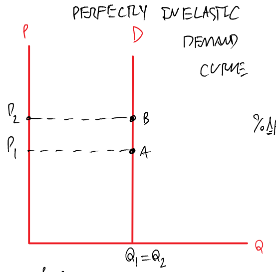
OR $\boxed{|E^P| = 1.8}$

WHEN PRICE "CHANGES" BY 1%, QUANTITY DEMANDED WILL CHANGE BY MORE THAN 1%, HERE 1.8%, IN THE OPPOSITE DIRECTION

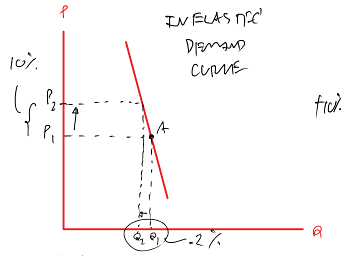
SO, DEMAND IS SAID TO BE "PRICE-ELASTIC."

VARIETIES OF DEMAND CURVES

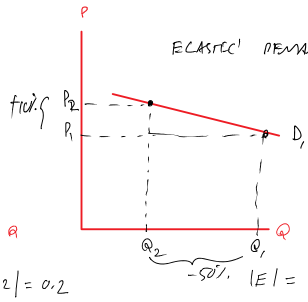
PERFECTLY INELASTIC DEMAND CURVE



INELASTIC DEMAND CURVE



ELASTIC DEMAND CURVE.



E^P : $E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{0\%}{\text{ANY}\%} = 0$

$|E^P| = \left|\frac{\%\Delta Q}{\%\Delta P}\right| = \left|\frac{-2}{+10}\right| = |-0.2| = 0.2$

$|E| = \left|\frac{-50}{+10}\right| = |-5| = 5.0$

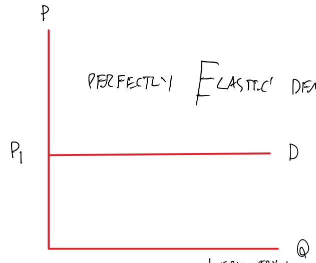
: DEMAND IS "PERFECTLY INELASTIC".

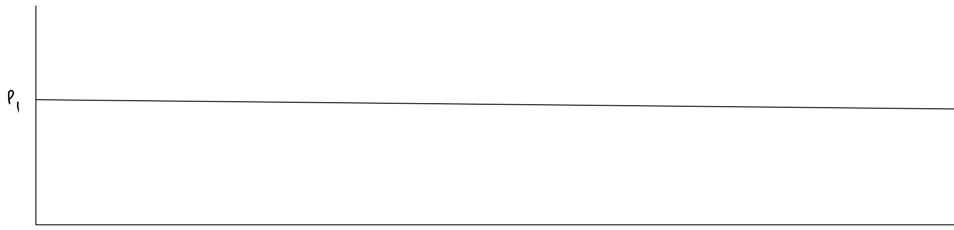
: CONSUMERS DO NOT CARE ABOUT Δ IN PRICE.

SHAPE : VERTICAL

- DEMAND IS PRICE INELASTIC
- CONSUMERS ARE PRICE-NONSENSITIVE.
- RELATIVELY STEEP

- DEMAND IS PRICE ELASTIC
- CONSUMERS ARE PRICE RESPONSIVE.
- RELATIVELY FLAT.





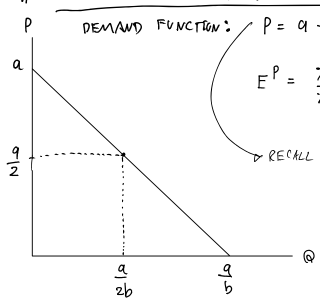
$|E^P| = \left|\frac{\%\Delta Q}{\%\Delta P}\right| = \left|\frac{\text{VERY VERY BIG}}{\text{VERY VERY SMALL}}\right| = \infty$

- DEMAND IS PERFECTLY ELASTIC
- CONSUMERS ARE EXTREMELY PRICE SENSITIVE.

SHAPE • HORIZONTAL

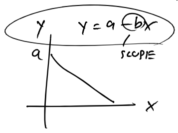
PRICE ELASTICITIES ALONG A LINEAR DEMAND CURVE

DEMAND FUNCTION: $P = a - bQ$



$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{Q_2 - Q_1}{Q_1} \cancel{\times 100}}{\frac{P_2 - P_1}{P_1} \cancel{\times 100}} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$\frac{\Delta Y}{\Delta X} = -b$

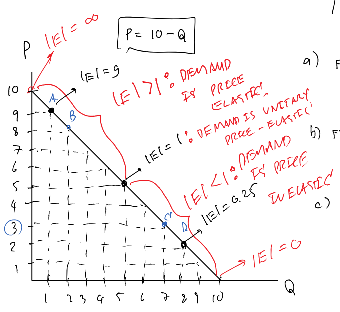


RECALL THAT $\frac{\Delta P}{\Delta Q} = -b$ = SLOPE OF DEMAND CURVE

THEN $E^P = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{1}{\frac{\Delta P}{\Delta Q}} \cdot \frac{P}{Q} = \frac{1}{\text{SLOPE}} \cdot \frac{P}{Q}$

$$\boxed{E^P = \frac{1}{\text{SLOPE}} \cdot \frac{P}{Q}} \quad ***$$

EX $\boxed{P = 10 - Q}$



AT P=9, Q=1
TR = 9
AT P=8, Q=2
TR = 16
ΔTR = 16 − 9 = 7 :)

AT P=3, Q=7
TR = 21
AT P=2, Q=8
TR = 16
ΔTR = 16 − 21 = −5 :(

a) FIND E^P WHEN P = 9

$E^P = \frac{1}{\text{SLOPE}} \cdot \frac{P}{Q} = \frac{1}{-1} \cdot \frac{9}{1} = -9$ OR $|E^P| = 9$

b) FIND E^P WHEN P = 5

$E^P = \frac{1}{\text{SLOPE}} \cdot \frac{P}{Q} = \frac{1}{-1} \cdot \frac{5}{5} = -1$ OR $|E^P| = 1$

c) FIND E^P WHEN P = 2

$E^P = \frac{1}{\text{SLOPE}} \cdot \frac{P}{Q} = \frac{1}{-1} \cdot \frac{2}{8} = -\frac{1}{4} = -0.25$ OR $|E^P| = 0.25$

OBSERVATION #1 : W/ A LINEAR DEMAND CURVE, DIFFERENT POINTS ON THE CURVE GIVE DIFFERENT VALUES OF E^P !

Ton Wrasai at 09-Feb-17 10:51 AM

IN OTHER WORDS, PRICE ELASTICITIES OF DEMAND VARY ALONG THE DEMAND CURVE !

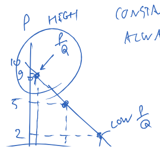
PROOF

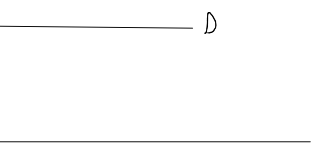
$$\boxed{E^P = \frac{1}{\text{SLOPE}} \cdot \frac{P}{Q}}$$

CONSTANT, ALWAYS

WHEN WE MAKE A MOVE ALONG THE CURVE, $\frac{P}{Q}$ CHANGES

SEE →

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SEE →