Tuesday, September 10, 2013
8:00 AM

ELASTICITY: MEASURE OF RESPONSIVENESS OF QUANTITY DEMANDED OR QUANTITY SUPPLIED TO ONE OF ITS DETERMINANTS (PRICE OF THAT GOODS, INCOME, PRICE OF RELATED GOODS)

IN GENERAL: $$\text{ELASTICITY} = \frac{\%\Delta Y \ \text{(CONSEQUENCE)}}{\%\Delta X \ \text{(CAUSE)}}$$

EX: IF X CHANGES BY 1%, Y CHANGE BY HOW MANY %

PRICE ELASTICITY OF DEMAND

$$E^P = \frac{\%\Delta Q^D_X}{\%\Delta P_X}$$

⇒ PERCENTAGE CHANGE IN QUANTITY DEMANDED FOR GOOD X

⇒ PERCENTAGE CHANGE IN PRICE OF GOOD X.

Q: WHY PERCENTAGE CHANGE, NOT AN ABSOLUTE CHANGE ? $\cancel{E^P = \frac{\Delta Q^D_X}{\Delta P_X}}$

CONSIDER TWO GOODS: TOOTHPICK Vs. FERRARI

IF PRICE OF TWO GOODS REDUCES BY 10 BAHT.

$\Delta P = -10$ BAHT

$\%\Delta P$

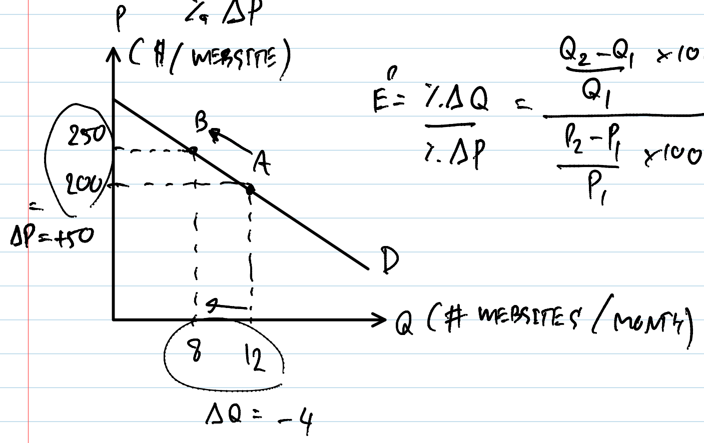
TOOTHPICK: ORIGINAL PRICE = 20 BAHT/PACKAGE
NEW PRICE = 10 BAHT/PACKAGE

$$\%\Delta P = \frac{\text{NEW PRICE} - \text{OLD PRICE}}{\text{OLD PRICE}} \times 100$$
$$= \frac{10-20}{20} \times 100$$
$$= \frac{-\cancel{10}^{1}}{\cancel{20}_{2}} \times \cancel{100}^{50}$$
$$= -50\%$$

FERRARI: ORIGINAL PRICE = 10,000,000
NEW PRICE = 9,999,990

$\%\Delta P = \ ?$

$$E^P = \frac{\%\Delta Q}{\%\Delta P}$$



$$E^P = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{Q_2 - Q_1}{Q_1}\times 100}{\frac{P_2-P_1}{P_1}\times 100} = \frac{\frac{8-12}{12}\times 100}{\frac{250-200}{200}\times 100} = \frac{\frac{-\cancel{4}^{1}}{\cancel{12}_{3}}\times 100}{\frac{\cancel{50}^{1}}{\cancel{200}_{4}}\times 100}$$
$$= \frac{-\frac{100}{3}}{\frac{100}{4}}$$
$$= \frac{-33.33\%}{+25\%}$$

$E^P = \ldots$

$$\boxed{E^P = -1.33}$$ +25 %

IT IMPLIES THAT WHEN PRICE INCREASES BY 1 %, QUANTITY DEMANDED DECREASES BY MORE THAN 1 %, HERE 1.33 %.

OR IT IMPLIES THAT WHEN PRICE INCREASES BY 10 %, QUANTITY DEMANDED DECREASES BY 13.3 %.

NOTICE THAT $\% \Delta Q = -33.33\%$
$\% \Delta P = +25\%$

$\% \Delta Q > \% \Delta P$ (IGNORING THE SIGN)

SO $|E_p| > 1$

WE CALL "DEMAND IS PRICE-ELASTIC."
(B/C $\% \Delta Q > \% \Delta P$)

$$\boxed{E^P = \frac{\% \Delta Q}{\% \Delta P}}$$

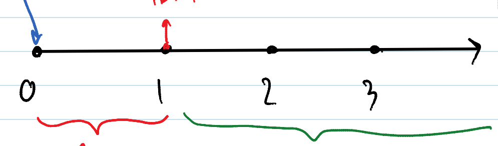
$$|E^P| = \left| \frac{\% \Delta Q}{\% \Delta P} \right|$$

- WHEN $|\% \Delta Q| > |\% \Delta P|$, $|E^P| > 1$.
  WE CALL "DEMAND IS PRICE-ELASTIC."
- WHEN $|\% \Delta Q| = |\% \Delta P|$, $|E^P| = 1$
  WE CALL "DEMAND IS UNIT-ELASTIC".
- WHEN $|\% \Delta Q| < |\% \Delta P|$, $|E^P| < 1$
  WE CALL "DEMAND IS INELASTIC"

PERFECTLY INELASTIC $|E^P| = 0$

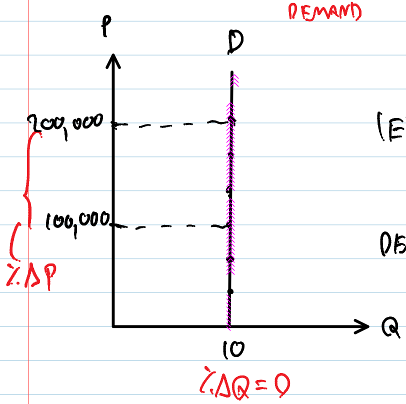
$|E^P| = 1$: UNIT-ELASTIC

$|E| = \infty$: PERFECTLY ELASTIC $|E^P|$



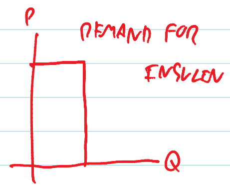
$0 < |E^P| < 1$
INELASTIC DEMAND

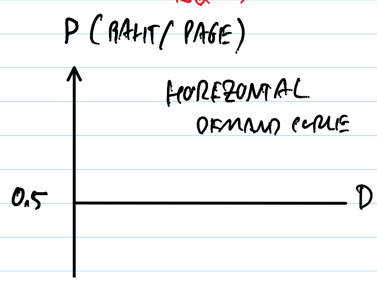
$|E| > 1$
ELASTIC DEMAND



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

DEMAND IS PERFECTLY INELASTIC ;
CONSUMERS PAY NO ATTENTION ON PRICE.





$|E^P| = \infty$

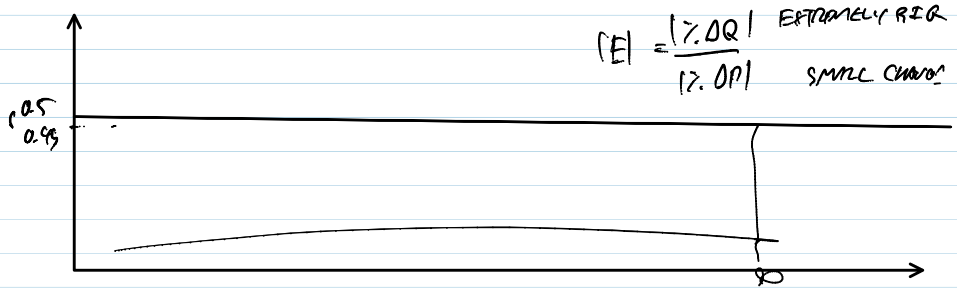
DEMAND IS PERFECTLY ELASTIC :
BUYERS ARE EXTREMELY SENSITIVE

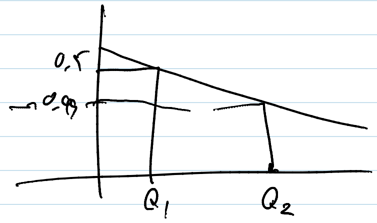
Q (# PAGES COPIED / DAY)

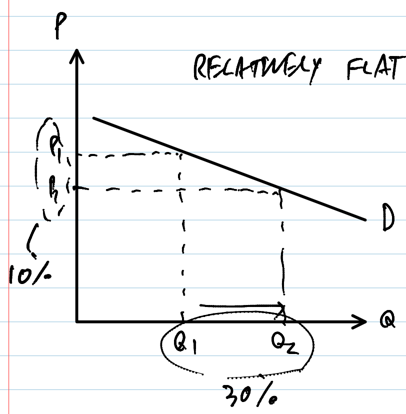
DEMAND IS PERFECTLY ELASTIC:

BUYERS ARE EXTREMELY SENSITIVE TO A CHANGE IN PRICE

$$|E| = \frac{|\%\Delta Q|}{|\%\Delta P|}$$ EXTREMELY BIG / SMALL CHANGE







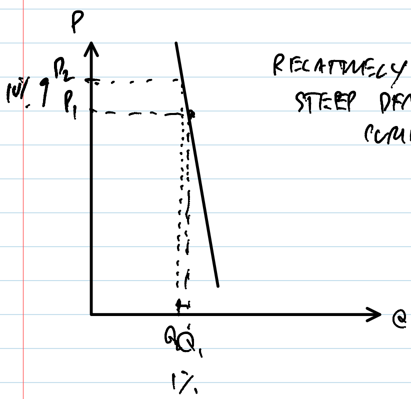
RELATIVELY FLAT DEMAND CURVE

$\boxed{|E^P| > 1}$

$$|E^P| = \frac{|\%\Delta Q|}{|\%\Delta P|} = \frac{30\%}{10\%} = 3.$$

DEMAND IS "PRICE ELASTIC"

10% CHANGE IN PRICE LEADS TO MORE THAN 10% CHANGE IN Q^D (HERE, 30%) IN THE OPPOSITE DIRECTION.



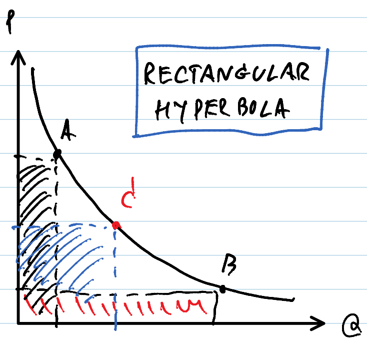
RELATIVELY STEEP DEMAND CURVE

SINCE $|\%\Delta Q| < |\%\Delta P|$

1%   10%

THEN $|E^P| < 1$: DEMAND IS PRICE-INELASTIC.

CONSUMER DO NOT RESPOND MUCH TO A PRICE CHANGE.



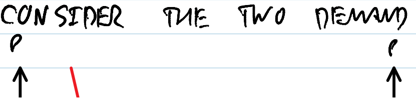
$\boxed{\text{RECTANGULAR HYPERBOLA}}$

$|E^P| = 1$: DEMAND IS UNIT-ELASTIC

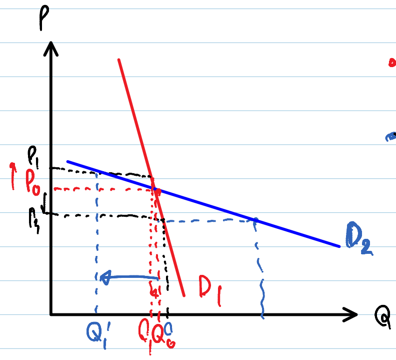
FOR EXAMPLE:

10% CHANGE IN P $\rightarrow$ 10% CHANGE IN Q^D

CONSIDER THE TWO DEMAND CURVES:



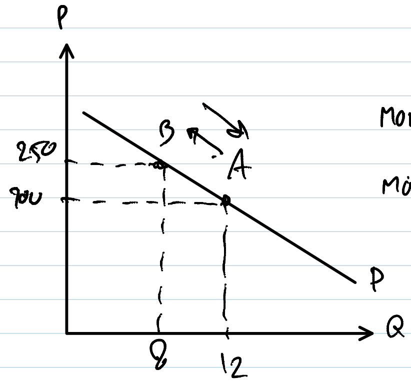
CONSIDER THE TWO DEMAND CURVES :



- D_1 IS A GROUP OF RED BUYERS
- D_2 IS A GROUP OF BLUE BUYERS.

Q: WHICH GROUP IS MORE SENSITIVE TO A CHANGE IN PRICE?

A: BLUE IS MORE PRICE SENSITIVE COMPARED TO RED.



MOVING FROM A TO B : $\boxed{E^P = -1.33}$

MOVING FROM B TO A : $E^P = -2.5$

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

$$= \frac{\frac{12-8}{8} \times \cancel{100}}{\frac{200-250}{250} \times \cancel{100}}$$

$$= \frac{\frac{4}{8}}{\frac{-50}{250}} = \frac{\frac{1}{2}}{-\frac{1}{5}} = \frac{1}{2} \cdot (-5) = -2.5$$

$|\%\Delta Q| > |\%\Delta P|$

25% 10%

OBSERVATION

PRICE ELASTICITY OF DEMAND IS DIFFERENT, DEPENDING UPON WHERE YOU START.

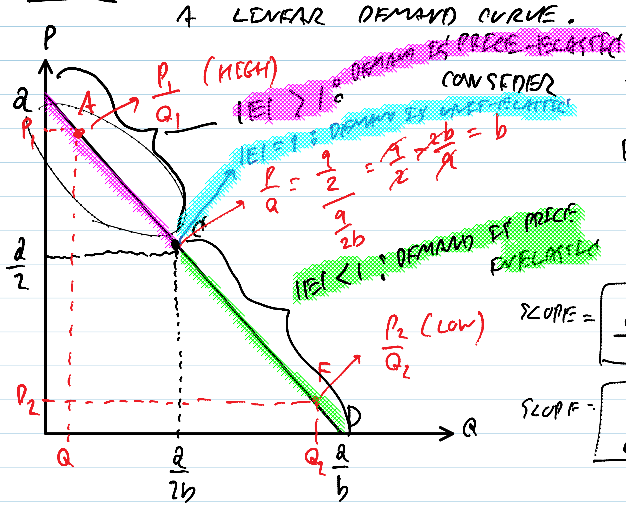
REFLECTION

PRICE ELASTICITY OF DEMAND ALONG A LINEAR DEMAND CURVE

FACT #1 PRICE ELASTICITY OF DEMAND VARIES ALONG A LINEAR DEMAND CURVE.

P

FACT #1 PRICE ELASTICITY OF DEMAND VARIES ALONG A LINEAR DEMAND CURVE.



CONSIDER

$P = f(Q)$ → INVERSE DEMAND FUNCTION

$P = a - bQ$

a: INTERCEPT Y-AXIS

$-b$: SLOPE

$$\text{SLOPE} = \boxed{\frac{\Delta P}{\Delta Q} = -b}$$

OR

$$\text{SLOPE} = \boxed{\frac{dP}{dQ} = -b}$$

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

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

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

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

SINCE $\frac{\Delta P}{\Delta Q}$ = SLOPE, THEN $\frac{\Delta Q}{\Delta P} = \frac{1}{\text{SLOPE}}$.

THEREFORE

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

CONSTANT

$\frac{1}{\text{SLOPE}}$ IS CONSTANT. HOWEVER $\frac{P}{Q}$ VARIES ALONG THE CURVE (EX: $\frac{P}{Q}$ AT A $>$ $\frac{P}{Q}$ AT F).

THEREFORE, E^P VARIES ALONG THE DEMAND CURVE.

AT POINT C:

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

$$= \frac{1}{-b} \cdot \frac{\frac{a}{2}}{\frac{a}{2b}}$$

$$E^P = -1$$

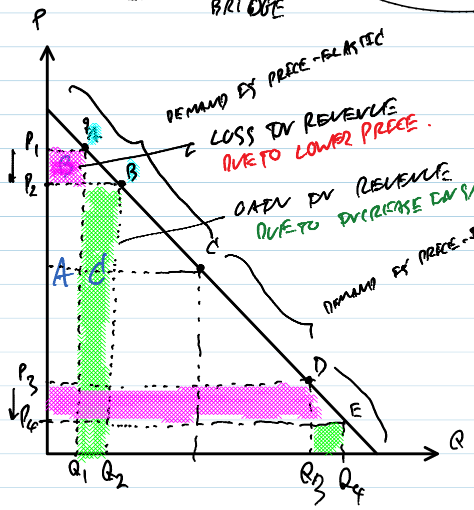
- E^P AT THE MIDPOINT OF THE DEMAND CURVE IS EQUAL TO -1:

  DEMAND IS UNIT-ELASTIC.

• $|E^P|$ FROM THE MIDPOINT UPWARD > 1 (DEMAND IS PRICE ELASTIC)

• $|E^P|$ FROM THE MIDPOINT DOWNWARD < 1 (DEMAND IS PRICE-INELASTIC)

E_P BRIDGE TOTAL REVENUE (RECEIVED BY A FIRM)



AT $P = P_1$, TOTAL REVENUE $= P_1 \times Q_1$ (TR_1)

AT $P = P_2$, TOTAL REVENUE $= P_2 \times Q_2$ (TR_2)

Q: $TR_2 > TR_1$?

$TR_1 = A + B$

$TR_2 = A + C$

$\Delta TR = TR_2 - TR_1 = (A + C) - (A + B)$

$= \cancel{A} + C - \cancel{A} - B$

$= C - B$

SINCE $C > B$, $C - B > 0$:)

GAIN LOSS

AT $P = P_3$, $TR_3 = P_3 \cdot Q_3$

AT $P = P_4$, $TR_4 = P_4 \cdot Q_4$

$TR_4 < TR_3$:(

• WHEN DEMAND IS PRICE-ELASTIC [$|E| > 1$], A REDUCTION IN PRICE (EX: FROM P_1 TO P_2) LEADS TO AN INCREASE IN TOTAL REVENUE. :) → DESIRABLE OUTCOME

• WHEN DEMAND IS PRICE-INELASTIC [$|E| < 1$], A REDUCTION IN PRICE (EX: FROM P_3 TO P_4) LEADS TO A DECREASE IN TOTAL REVENUE. :(→ UNDESIRABLE OUTCOME

• WHEN DEMAND IS PRICE-ELASTIC ($|E| > 1$), AN INCREASE IN PRICE CAUSES TOTAL REVENUE TO FALL. [THINK ABOUT WHEN P ↑ FROM P_2 TO P_1]

• WHEN DEMAND IS PRICE-INELASTIC ($|E| > 1$), AN INCREASE IN PRICE CAUSES TOTAL REVENUE TO RISE.