Pornpavee 6304641209

1.2.2) Comparative Static analysis in Math framework

H.W.

Having solved for the equilibrium solution, what economists usually ask is what would happen to the equilibrium if something, previously assumed to be fixed, has changed.

Example 1.C (cont.): National income model

Due date this weekend

- From the example 1.B, it is straightforward to solve for all the endogenous equilibrium solutions, Y^*, C^*, Y_d^*.

$y^* \rightarrow y^*_d = y^* - T_0$

$\rightarrow C^* = a + b y_d^*$

$Y = C + I + G$

$Y = a + b(Y - T) + I_0 + G_0$

$Y = a + bY - bT + I_0 + G_0$

$(1-b)Y = a - bT + I_0 + G_0$

$Y^* = \frac{1}{1-b}(a + bT + I_0 + G_0)$

- Numerically, if a = 1, T_0 = \$0 I_0 = \$1, G_0 = \$1 and b = 0.5, this yields us,

$Y^* = \frac{1}{1-0.5}(1 - 0.5(0) + 1 + 1)$

$Y^* = 2(3)$

$Y^* = 6$

$C^* = 1 + 0.5(6-0)$

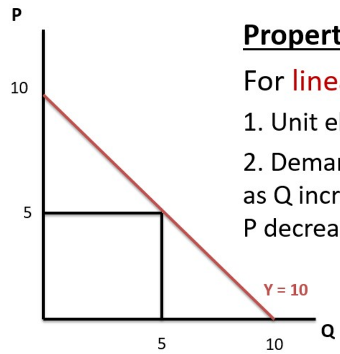
$C^* = 4$

$Y_d^* = 6 - 0$

$Y_d^* = 6$

H.W.

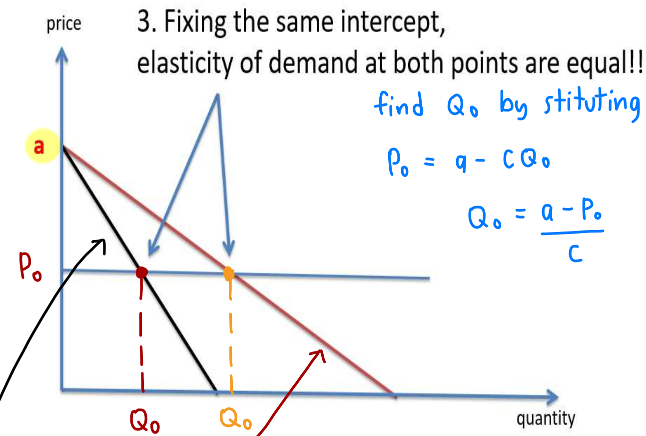
Linear function: slope v.s. elasticity



Property:

For linear demand curve:

1. Unit elasticity at the mid point.
2. Demand becomes more inelastic as Q increases, (correspondingly to P decreases)



find Q_0 by stituting

$P_0 = a - cQ_0$

$Q_0 = \frac{a - P_0}{c}$

Prove PED

Exercise 2.A: $p = a - cQ$ use $\frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$

2.A.1) Given a demand function by $p = a - bQ$, derive the formula for the elasticity of demand, and show that the third property holds

& Point PES ใช้อันไหนก็ได้

2.A.2) Given the market supply $p = c + dQ$ where $d \geq 0$, show that

Hint :

(i) elasticity of supply is always greater than 1 if $c > 0$,

(ii) elasticity of supply is always eqaul to 1 if $c = 0$,

(iii) elasticity of supply is always less to 1 if $c < 0$.

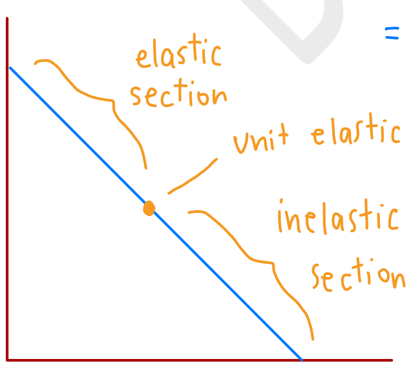
$\left.\right\}$ try use $\frac{\%\Delta Q_s}{\%\Delta P} = \frac{\frac{Q_1 - Q_0}{Q_0}}{\frac{P_1 - P_0}{P_0}}$

$$PED = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

$$= -\frac{1}{b} \times \left(\frac{a + bQ}{Q}\right)$$

$$= \frac{-a + bQ}{bQ}$$

$$= 1 - \frac{a}{bQ}$$



$$2.2)\ PES = \frac{1}{d} \times \left(\frac{c + dQ}{Q}\right)$$

$$= \frac{c + dQ}{dQ}$$

$$= 1 + \frac{c}{dQ}$$

if $c > 0$, $PES = 1 + \frac{c}{dQ} > 1$

if $c = 0$, $PES = 1 + \frac{c}{dQ} = 1$

if $c < 0$, $PES = 1 + \frac{c}{dQ} < 1$

$mc = \frac{\Delta\pi}{\Delta Q} = 4$ H.W. Due 22 sat

Example 2.I: A monopolist firm faces the market demand given by P = 10 - Q. Consider the following questions if the cost function C(Q) = 4Q.

$P(Q)$

- What is the revenue-maximizing level of output?

revenue function ; $TR(Q) = P(Q) \times Q$

$= (10 - Q) \times Q$

$= 10Q - Q^2$

slope $= \frac{\partial TR}{\partial Q} = 10 - 2Q$

maximum occurs when

$\frac{\partial TR}{\partial Q} = 0$

$-10 - 2Q = 0$

$Q = 5$

At $Q = 5$, TR is max

$TR = 25$

- What is the break-even output?

H.W.

$\pi = 0 \longrightarrow TR = TC$

$4Q = 10Q - Q^2$

$Q^2 - 6Q = 0$

$Q = 0, 6$

$\therefore Q = 6$

- What is the profit-maximizing level of output?

H.W.

① $MR = MC$

② $\pi = TR - TC$

$= 10Q - Q^2 - 4Q$

$\frac{d\pi}{dQ} = 0 \rightarrow Q^*$

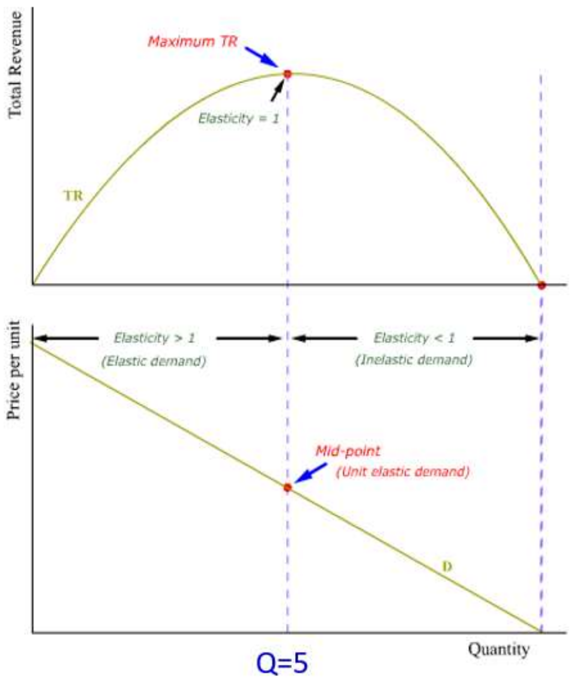
$\frac{d\pi}{dQ} = 10 - 2Q - 4 = 0$

$6 - 2Q = 0$

$Q = 3$

prove PED DUE Monday

Quadratic function: revenue function/break even analysis



$$\left|\frac{\%\Delta Q}{\%\Delta P}\right| : \begin{array}{lll} > 1 & ; & \textit{elastic} \\ = 1 & ; & \textit{unit elastic} \\ < 1 & ; & \textit{inelastic} \end{array}$$

Revenue maximizing output:
unit elasticity

Profit-maximizing output:
under region with **elastic** demand

48

Laffer Curve

Exrcise 2B. Consider a function that relates tax revenues R, in billions of dollars, to the average tax rate t such that $R = 350t - 500t^2$.

(a) What tax rate(s) is consistent with raising tax revenues equal to \$60 billion? t_1 & t_2

(b) What tax rate(s) is consistent with raising tax revenues equal to \$61.25 billion?

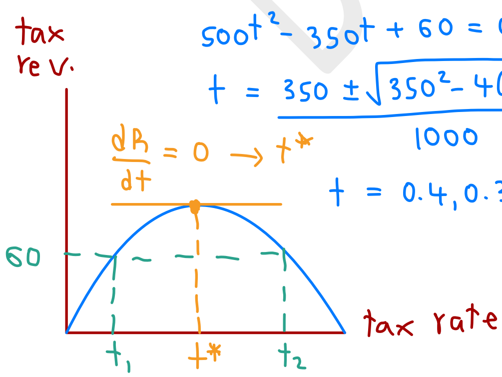
(c) What tax rate is consistent with the maximum tax revenue? t^*

a) $60 = 350t - 500t^2$

$500t^2 - 350t + 60 = 0$

$t = \dfrac{350 \pm \sqrt{350^2 - 4(500)(60)}}{1000}$

$t = 0.4, 0.3$



b) $61.25 = 350t - 500t^2$

$500t^2 = 350t + 61.25$

$t = \dfrac{350 \pm \sqrt{350^2 - 4(500)(61.25)}}{1000}$

$t = 0.35$

c) $\dfrac{dR}{dt} = 350 - 1000t$

$350 - 1000t = 0$

$t = 35\%$