EE320(sec 046402)
Semester 1/2020

Quiz#1

Let a market for a product have market demand and market supply as the followings:

Market Demand: $Q_D = 8 - 2P$
Market Supply: $Q_S = -2 + P$
Q_D is total quantity demanded(in units), Q_S is total quantity supplied(in units), and P is price of the product (Baht).

Please answer below questions and show how you can derive your answers carefully.

(1.) What are equilibrium market price and quantity? 1 pt
(2.) If government imposes specific tax 1 baht per unit on producers, find equilibrium market price and quantity after tax. What is the price that consumers pay? What is the price that producers receive? 3 pts
(3.) How much is total tax revenue? How much are consumer burden and producer burden? 3 pts
(4.) Compare the burden between consumers and producers and show that whoever has lower price elasticity(in absolute term) will bare larger tax burden. 3 pts

1) $Q_d = Q_S$

$8 - 2P = -2 + P$

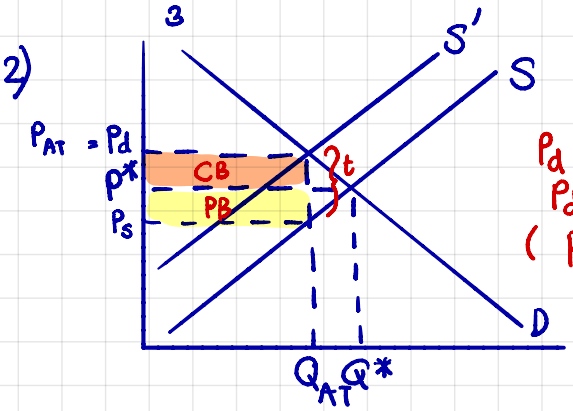
$10 = 3P$

$\frac{10}{3} = P^*$

$Q = -2 + \frac{10}{3}$

$Q^* = \frac{4}{3}$

2)



$P_d - P_S = t$

$P_d - t = P_S$

(producers receive a lower price while consumers have to pay a higher price as a result of the new tax)

New price equilibrium (P_d is now also P_{AT})

$Q_d = Q_S$

$8 - 2P = -2 + P - 1$ ← Producers receive a lower price, $P_S = P - 1$

$11 = 3P$

$\frac{11}{3} = P_{AT} = P_d$

$P_S = P_{AT} - 1 = \frac{11}{3} - 1 = \frac{8}{3}$

$Q_{AT} = 8 - 2P = 8 - 2\left(\frac{11}{3}\right) = \frac{2}{3}$

3) Total tax revenue $= t \times Q_{AT}$

$= 1 \times \frac{2}{3}$

$= \frac{2}{3}$

Consumer burden (Area highlighted in orange)

- Extra amount that consumer have to pay

$$CB = (P_d - P^*) \times Q_{AT}$$

$$= \left(\frac{11}{3} - \frac{10}{3}\right) \times \frac{2}{3}$$

$$= \frac{1}{3} \times \frac{2}{3}$$

$$CB = \frac{2}{9}$$

Producer burden (Area highlighted in yellow)

- Decline in revenue producers face after tax

$$PB = (P^* - P_S) \times Q_{AT}$$

$$= \left(\frac{10}{3} - \frac{8}{3}\right) \times \frac{2}{3}$$

$$= \frac{2}{3} \times \frac{2}{3}$$

$$PB = \frac{4}{9}$$

Producers bare larger tax burden

4) At equilibrium before tax

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

($\frac{\Delta Q}{\Delta P}$: slope)

From market demand equation: $Q_d = 8 - 2P$

-2 is the slope

Market supply : $Q_S = -2 + P$

1 is the slope

$$\varepsilon_p^d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

$$= -2 \times \frac{\frac{10}{3}}{\frac{4}{3}}$$

$$= -5$$

$$|\varepsilon_p^d| = 5$$

$$\varepsilon_p^s = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

$$= 1 \times \frac{\frac{10}{3}}{\frac{4}{3}}$$

$$= 2.5$$

$|\varepsilon_p^s| < |\varepsilon_p^d|$, producers have lower elasticity and hence receive more tax burden