

HW5

6304641829 wasawat sombutsaengrai

1)

2 consumers

1) Draw diagram

- individual demand

- mkt demand

$$A: Q_A = 10 - P \rightarrow P_A = 10 - Q_A$$

$$B: Q_B = 10 - \frac{1}{2}P \rightarrow P_B = 20 - 2Q_B$$

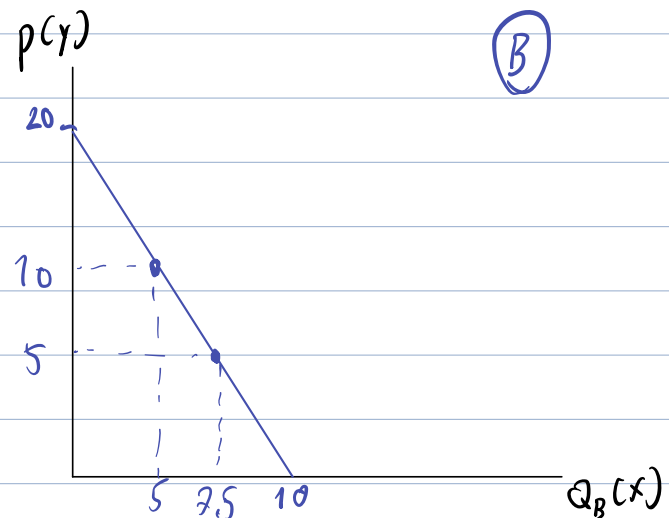
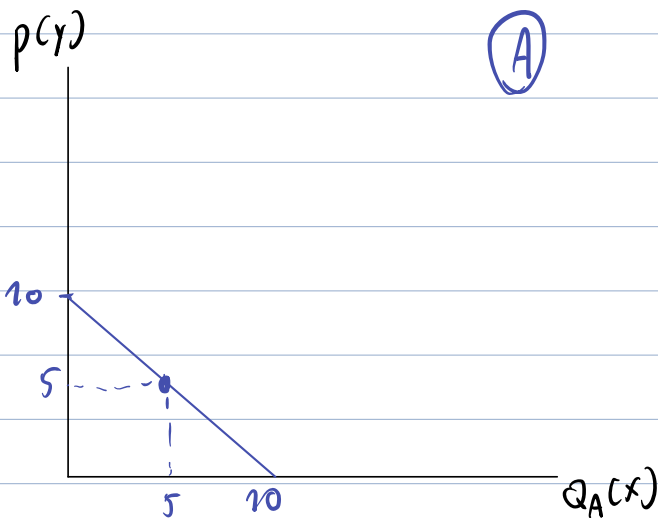
2) Find eqbm. at eqbm. How many buyers

- how many buyers buy

$$1 \text{ sellers } Q = P$$

$$p \geq 10 ; Q_A = 0, Q_B = 10 - \frac{1}{2}P \rightarrow Q_{mkt} = 10 - \frac{1}{2}P$$

$$p < 10 ; Q_A = 10 - P, Q_B = 10 - \frac{1}{2}P \rightarrow Q_{mkt} = Q_A + Q_B = 20 - \frac{3}{2}P$$

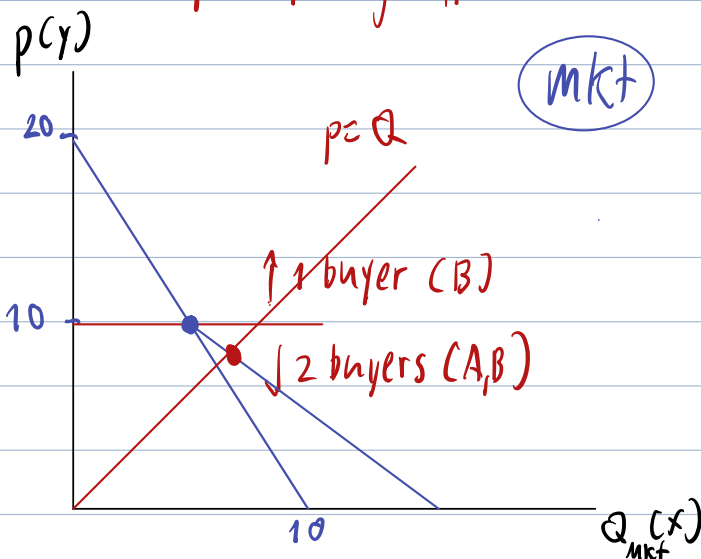


$$p = 10 - Q_A \quad y = mx + c$$

$$x\text{-intercept} \rightarrow y=0 ; Q_A = 10$$

$$p = 20 - 2Q_B$$

$$y=0, p=0 ; Q_B = 10$$



$$Q_{mkt}^D = \begin{cases} 10 - \frac{1}{2}p & \text{for } p \geq 10 \\ 20 - \frac{3}{2}p & \text{for } p < 10 \end{cases}$$

$$\text{Equilibrium } Q^S = Q^D$$

$$Q = 20 - \frac{3}{2}Q$$

$$\frac{2Q + 3Q}{2} = 20$$

$$5Q = 40 \rightarrow Q = 8$$

2) Example 3.J: Excess burden formula under linear model & Tax-Revenue-maximizing tax rate

Demand: $p^d = a - bQ^d$; $a \geq 0$, $b \leq 0$.

Supply : $p^s = c + dQ^s$; $d \geq 0$.
^{p supply}

- Solve for quantity and prices equilibrium when the unit tax is imposed. Analyze the result

Before tax solve for P^* , Q^*

$$P^* = f(a, b, c, d)$$

$$Q^* = f(a, b, c, d)$$

Find Q^* : $p^d = p^s$

$$a - bQ^* = c + dQ^*$$

$$a - c = dQ^* + bQ^*$$

$$a - c = Q^*(b + d)$$

$$Q^* = \frac{a - c}{b + d}$$

Find P^* : plug in Q^*

$$p^* = a - b\left(\frac{a - c}{b + d}\right)$$

$$p^* = \frac{(c + d)(a - c)}{b + d}$$

After Tax Assume tax per unit = t

new s : $p = c + dQ + t$

$$p_{+tax}^* = f(a, b, c, d, t)$$

$$Q_{+tax}^* = f(a, b, c, d, t)$$

$$a - bQ^* = c + dQ^* + t$$

$$a - c - t = bQ^* + dQ^*$$

$$Q_{+tax}^* = \frac{a - c - t}{b + d}$$

Find p_{+tax}^* : plug in Q_{+tax}^*

$$p_B^* = c + t + d\left(\frac{a - c - t}{b + d}\right)$$

HW

- Derive the excess burden formula for buyers and sellers

$$\text{consumers' burden} = (P_B - P^*) \times Q + \text{tax}$$

$$= \left[\left[c + t + d \left(\frac{a - c - t}{d + b} \right) \right] - \left[c + d \left(\frac{a - c}{d + b} \right) \right] \right] \left(\frac{a - c - t}{d + b} \right)$$

$$\begin{aligned} P_S &= c + d \left(Q_{\text{tax}}^* \right) \\ &= c + d \left(\frac{a - c - t}{d + b} \right) \end{aligned}$$

$$\text{producers' burden} = (P^* - P_S) \times Q + \text{tax}$$

$$= \left[\left[c + d \left(\frac{a - c}{d + b} \right) \right] - \left[c + d \left(\frac{a - c - t}{d + b} \right) \right] \right] \left(\frac{a - c - t}{d + b} \right)$$

- Calculate the tax rate that maximizes the tax revenue of government.

$$\text{tax revenue} = t \times Q_{\text{tax}}(\dots, t)$$

$$\frac{\partial \text{tax revenue}}{\partial t} = 0 \Rightarrow t^*$$

$$\begin{aligned} \text{tax rev} &= t \times Q_{\text{tax}} \\ &= t \times \left(\frac{a - c - t}{d + b} \right) \\ &= \frac{at}{d + b} - \frac{ct}{d + b} - \frac{t^2}{d + b} \\ \frac{\partial \text{tax rev.}}{\partial t} &= \frac{a}{d + b} - \frac{c}{d + b} - \frac{2t}{d + b} \end{aligned}$$

Example 3.K Price control and Welfare

Consider the market for apartment rentals in Chicago. The price of rent is determined by the following system of equations.

Demand: $p = -2q_d + 160$ $q_d = \frac{p-160}{-2}$

Supply: $p = q_s + 10$

- What is the equilibrium price and quantity in the market for apartment rentals?

HW

$$p^d = p^s$$

$$-2q^* + 160 = q^* + 10$$

$$3q^* = 150$$

$$q^* = 50$$

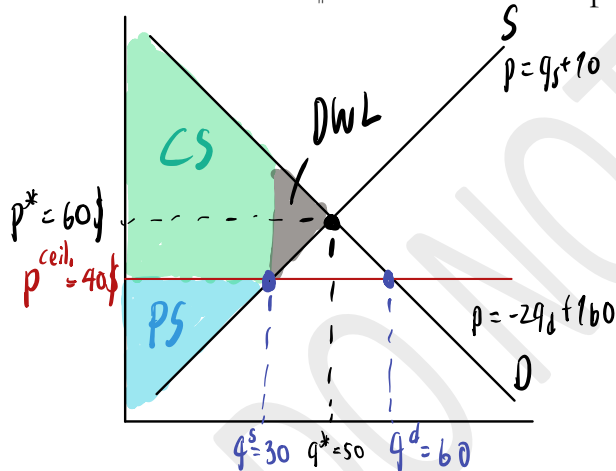
plug in $q^* = 50$ into $p^s = q_s + 10$

$$= 50 + 10$$

$$p^* = 60$$

HW

- Suppose the government tries to control the rent prices through a price ceiling of \$40. Discuss the implication of this policy. Is there any deadweight loss?



If price ceiling = 40\$ $p = -2q_d + 160 \rightarrow q_d = \frac{40-160}{-2} = \frac{-120}{-2} = 60$

$$p = q_s + 10 \rightarrow q_s = 40 - 10 = 30$$

1. output decrease since price is lower. (60 $\rightarrow$ 40)
2. Consumer surplus increase, producer surplus decrease
3. There is DWL

Because of the price ceiling, the price is decrease which affect producers to produce less whilst consumer consume more but can't since limited amount of supply. Therefore, there is a deadweight loss for the amount that consumer consume less from equilibrium.