

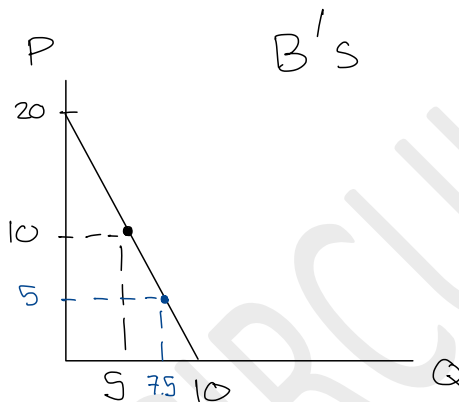
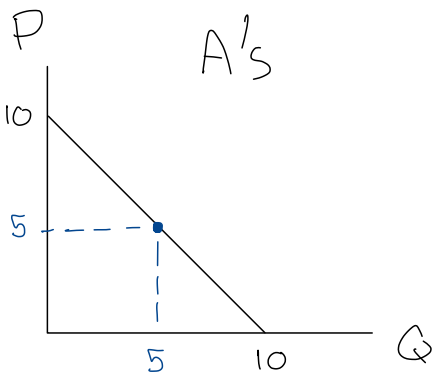
HW

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Example 3.G: Solve for the market equilibrium using the information in **Example 3.E** and **Example 3.F**. Justify your answer!

2 Consumers: A: $Q_A = 10 - P \rightarrow P = 10 - Q$

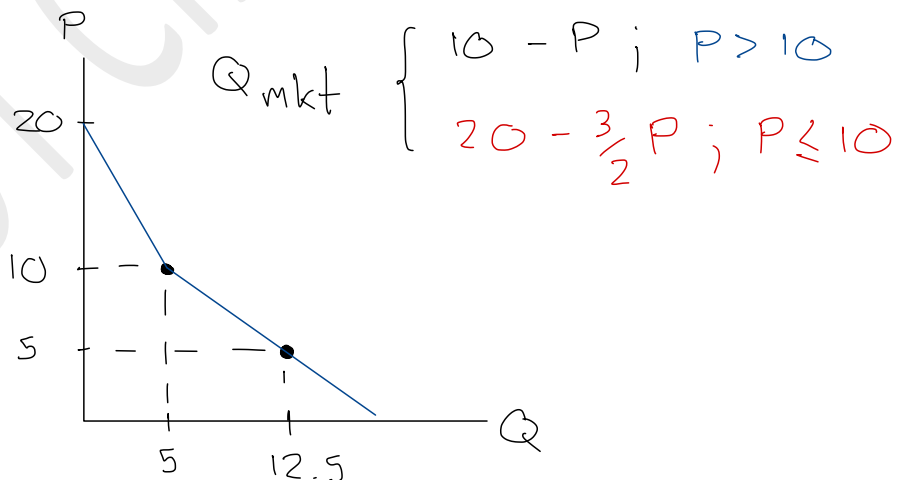
1 Producer: $P = Q$ B: $Q_B = 10 - \frac{1}{2}P \rightarrow P = 20 - 2Q$



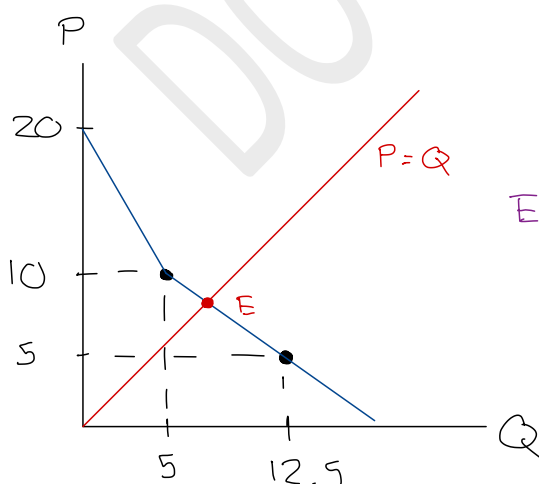
$P > 10$: only B

$P \leq 10$: A & B

Market demand



Equilibrium



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

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

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

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 : $p^s = c + dQ^s$; $d \geq 0$.

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

Equilibrium : $p_d = p_s$

Before tax

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

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

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

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

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

After tax

tax per unit = t

new S: $c + dQ + t$

$$Q (d+b) = a - c - t$$

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

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

↑
 P_B

- Derive the excess burden formula for buyers and sellers

$$\text{Consumer burden} = (P_B - P^*) Q_{\text{tax}}$$

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

$$P_S = c + d (Q^*_{\text{tax}})$$

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

$$\text{Producer tax burden} = (P^* - P_S) Q_{\text{tax}}$$

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

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

$$\text{tax rev} = t \times Q_{\text{tax}}$$

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

$$= \frac{ta}{d+b} - \frac{ct}{d+b} - \frac{t^2}{d+b}$$

$$\frac{d \text{ tax rev}}{dt} = \frac{a}{d+b} - \frac{c}{d+b} - \frac{2t}{d+b}$$

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: $p = -2q_d + 160$

Supply: $p = q_s + 10$

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

$$-2Q + 160 = Q + 10$$

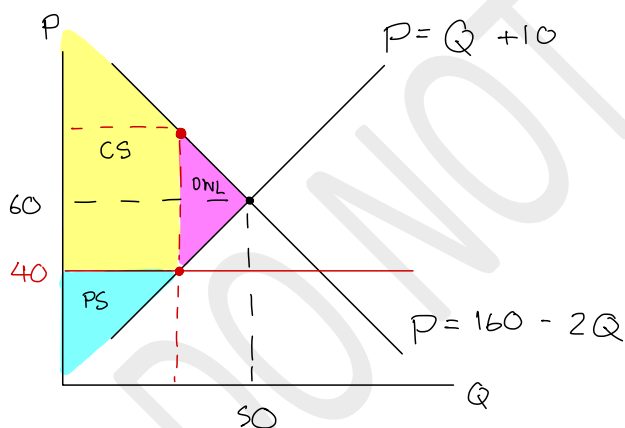
$$150 = 3Q$$

$$Q^* = 50$$

$$P^* = 50 + 10$$

$$P^* = 60$$

- 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?



1. Output decrease

since producers produce less at $P = 40$ compared to at $P = 60$

2. Consumer surplus increase, Producer surplus decrease

3. There is DWL