

Homework

- Market demand

$$P = 10 - Q$$

- Marginal cost of upstream

$$MC_u = m = 2$$

- Downstream firm has no additional MC other than intermediate input price charge by upstream firm

- Calculate $P_D^*, P_u^*, Q_D^*, Q_u^*$
 π_D^*, π_u^*

- If two firms merge to form single monopolist \rightarrow calculate $P^*, Q^* \rightarrow \pi^*$

- Compare welfare of consumers and producers

Step 1: TR=?

$$TR = (10 - Q)Q = 10Q - Q^2$$

$$MR = \frac{dTR}{dQ} = 10 - 2Q \quad \text{MR of downstream} = \text{Demand of upstream}$$

Step 2: $TR = (10 - 2Q)Q = 10Q - 2Q^2$

$$MR = \frac{dTR_u}{dQ} = 10 - 4Q$$

Step 3: Upstream monopoly Max π

$$MR_u = MC_u$$

$$10 - 4Q = 2$$

$$4Q = 8$$

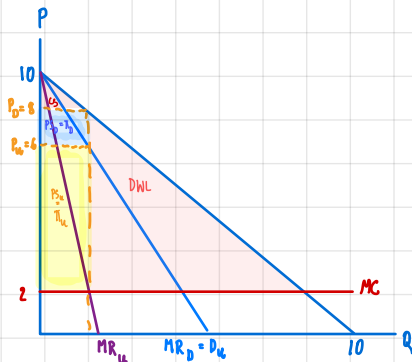
$$Q_u = 2$$

Demand of u

$$P_u = 10 - 2(2) = 6$$

Market Demand

$$P_D = 10 - 2 = 8$$



$$\pi_u = TR_u - TC_u = 6(2) - 2(2) = 8$$

The revenue of u become total cost of D

$$\pi_D = TR_D - TC_D = 8(2) - 6(2) = 4$$

$$\pi_{total} = 8 + 4 = 12$$

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

$$PS_D = 4$$

$$PS_u = 8$$

$$\text{Total PS} = PS_D + PS_u = 4 + 8 = 12$$

$$DWL = \frac{1}{2} \times 6 \times 6 = 18$$

Monopoly

$$MR = 10 - 2Q = MC = 2$$

$$10 - 2Q = 2$$

$$2Q = 8$$

$$Q_m = 4$$

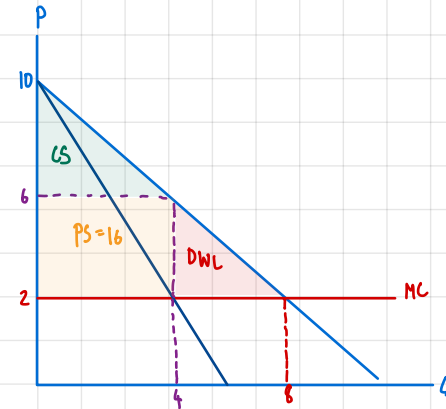
$$P_m = 10 - 4 = 6$$

$$\pi_m = 6(4) - 2(4) = 16$$

$$CS_m = \frac{1}{2} \times 4 \times 4 = 8$$

$$PS_m = 16$$

$$DWL = \frac{1}{2} \times 4 \times 4 = 8$$



In conclusion, merge cause producer surplus, consumer surplus more than double marginalization but deadweight loss of merge is less than double marginalization. Therefore, the benefit of merge is more than double marginalization.