

market demand : $P = 10 - Q$

MC upstream : $MC_{up} = 2$

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

$$MR = \frac{dTR}{dQ} = 10 - 2Q$$

demand upstream ; $P_{up} = 10 - 2Q$

$$TR_{up} = (10 - 2Q)Q = 10Q - 2Q^2$$

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

upstream monopoly max π

$$MR_{up} = MC_{up}$$

$$10 - 4Q = 2$$

$$4Q = 8$$

$$Q = 2$$

profit in demand upstream ; $P_{up} = 10 - 2(2) = 6$

profit in market demand ; $P = 10 - 2 = 8$

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

$$PS_D = 4$$

$$PS_{up} = 8$$

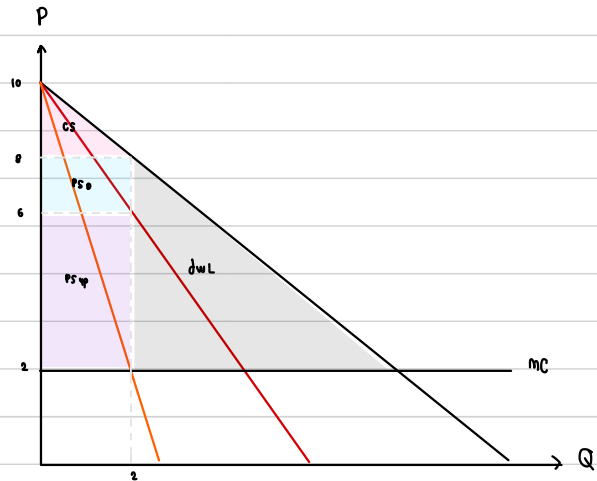
$$\text{total } PS = 12 \text{ #}$$

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

$$\pi_{up} = TR_{up} - TC_{up} = 6(2) - 2(2) = 8$$

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

$$\text{total } \pi = 8 + 4 = 12 \text{ #}$$



"monopoly" 2 firms merge
 market demand : $P = 10 - Q$
 MC : $MC = 2$
 MR : $10 - 2Q = MC = 0$
 $10 - 2Q = 0$
 $2Q = 8$

$$Q_m = 4$$

$$P_m = 10 - 4 = 6$$

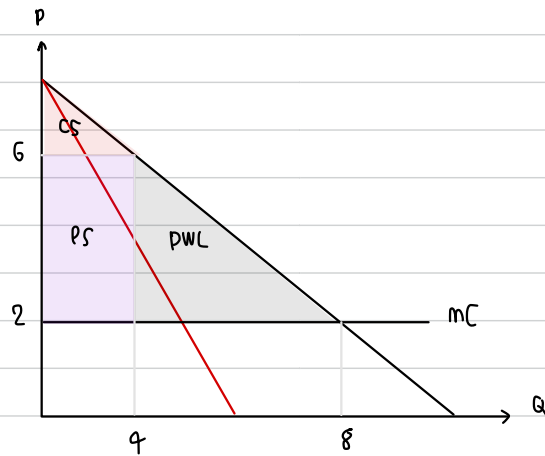
$$\pi_m = 6(4) - 2(4) = 16$$

$$CS = \frac{1}{2} \times 4 \times 4 = 8 \text{ #}$$

$$PS_m = 16 \text{ #}$$

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

∴ the profit, welfare of consumer and producer will get higher



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