

Homework

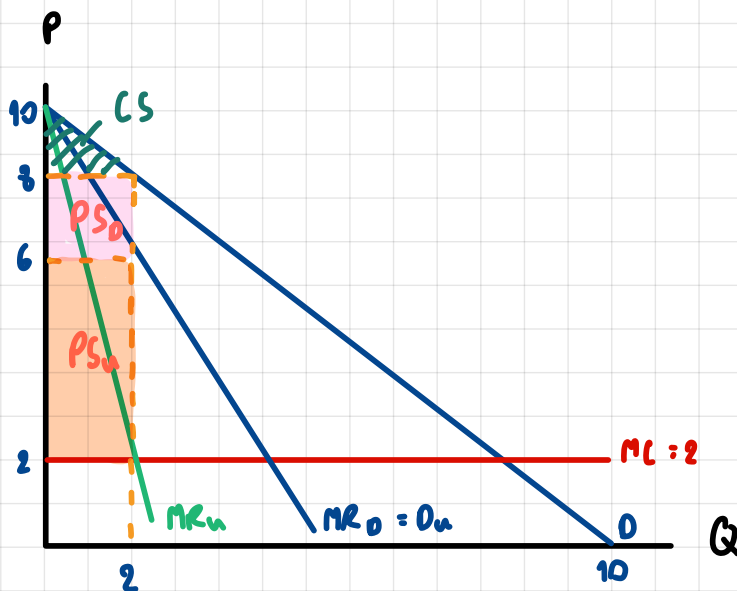
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Market demand : $P = 10 - Q$

Marginal cost of upstream firm : $MC_u = m = 2$

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

- Calculate P_0^* , P_u^* , Q_0^* , Q_u^* , Π_0 , Π_u
- If two firms merge to form a single monopolist, calculate P^* , Q^* , Π^*
- Compare welfare of consumers and producers



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

$$= 10Q - Q^2$$

$$MR = \frac{dTR}{dQ} = 10 - 2Q \rightarrow \text{Upstream Price}$$

Upstream
(Demand)

$$P_u = 10 - 2Q$$

$$TR_u = (10 - 2Q)Q$$

$$= 10Q - 2Q^2$$

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

Monopoly of upstream firm $\rightarrow$ Maximize profit

$$\text{So, } \max \Pi ; MR_u = MC_u$$

$$10 - 4Q = 2$$

$$4Q = 8$$

$$Q = 2$$

Plug in $Q=2$ in D_u ; $P_u = 10 - 2Q$
 $P_u = 10 - 2(2)$
 $P_u = 10 - 4$
 $P_u = 6$

Plug in $Q=2$ in D_n ; $P = 10 - Q$
 $P = 10 - 2$
 $P = 8$

Consumer Surplus is the area of 
 $= \frac{1}{2} \times 2 \times 2 = 2$

Producer Surplus : $PS_0 + PS_u$
 $= (2 \times 2) + (2 \times 4)$
 $= 12$

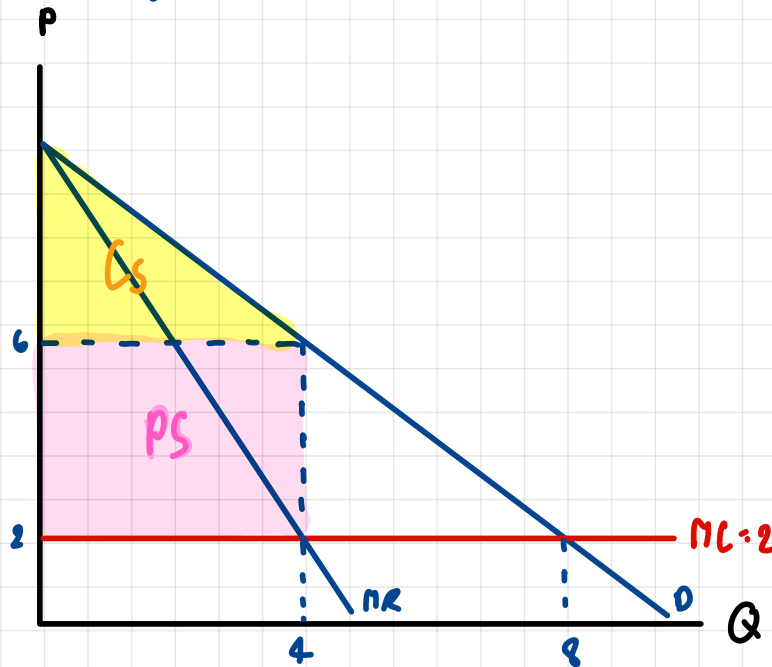
Upstream Firm Profit (Π_u) = $TR_u - TC_u$
 $= 6(2) - 2(2)$
 $= 8$

Market Profit (Π_0) = $TR_0 - TC_0$
 $= 8(2) - 6(2) = 4$

Total Profit (Π) = $\Pi_u + \Pi_0$
 $= 8 + 4 = 12$

- If two firms merge to form a single Monopolist ;

Demand of the market $\rightarrow P = 10 - Q$
 $MC = MC_u = 2$



$$MR = 10 - 2Q$$

$$MC = 2$$

$$MR = MC$$

$$10 - 2Q = 2$$

$$2Q = 8$$

$$Q = 4 \rightarrow Q_m$$

$$P_m = 10 - Q$$

$$P_m = 10 - 4$$

$$P_m = 6$$

$$\pi_m = TR - TC$$

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

$$\pi_m = 16$$

$$CS = \text{the area of } \triangle$$

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

$$= 8$$

$$PS = \text{the area of } \square$$

$$= 4 \times 4$$

$$= 16$$

$\therefore$ You will see that the profit of 2 firms merged together is higher
 And the welfare of consumers and producers in this monopolist will be higher.