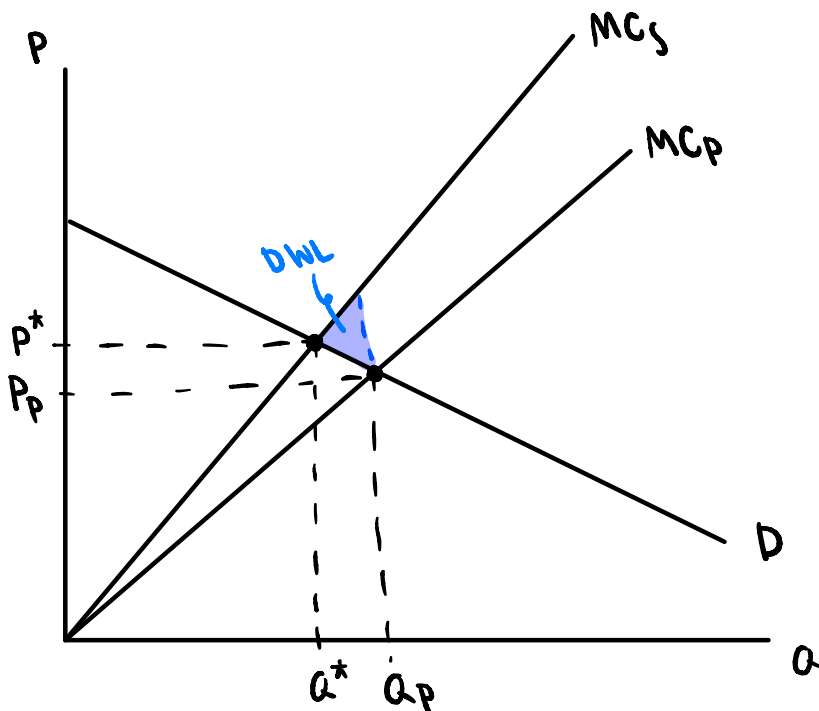


Question 1:

Suppose that the demand curve derived from marginal benefit associated with a consumption of chocolate is $360 - 4Q$ and the marginal cost of chocolate production is $6Q$. The marginal damage from pollutions generated by chocolate production is $2Q$

- Find the social optimum or efficient production level (P^* , Q^*)
- Find the private equilibrium price and quantity when external costs could be ignored by firms
- What tax level should be set to achieve the efficient/social optimal
- Calculate deadweight loss from externalities in this case
- Drawing a graph to illustrate the result from a) to d)



$$MC_P = 6Q$$

$$P = 360 - 4Q$$

$$MC_S = 8Q$$

$$\begin{aligned} \text{a) } MC_S &= P \\ 8Q^* &= 360 - 4Q^* \\ Q^* &= 30 \# \quad P^* = 240 \# \end{aligned}$$

$$\begin{aligned} \text{b) } MC_P &= P \\ 6Q_P &= 360 - 4Q_P \\ Q_P &= 36 \# \quad P_P = 216 \# \end{aligned}$$

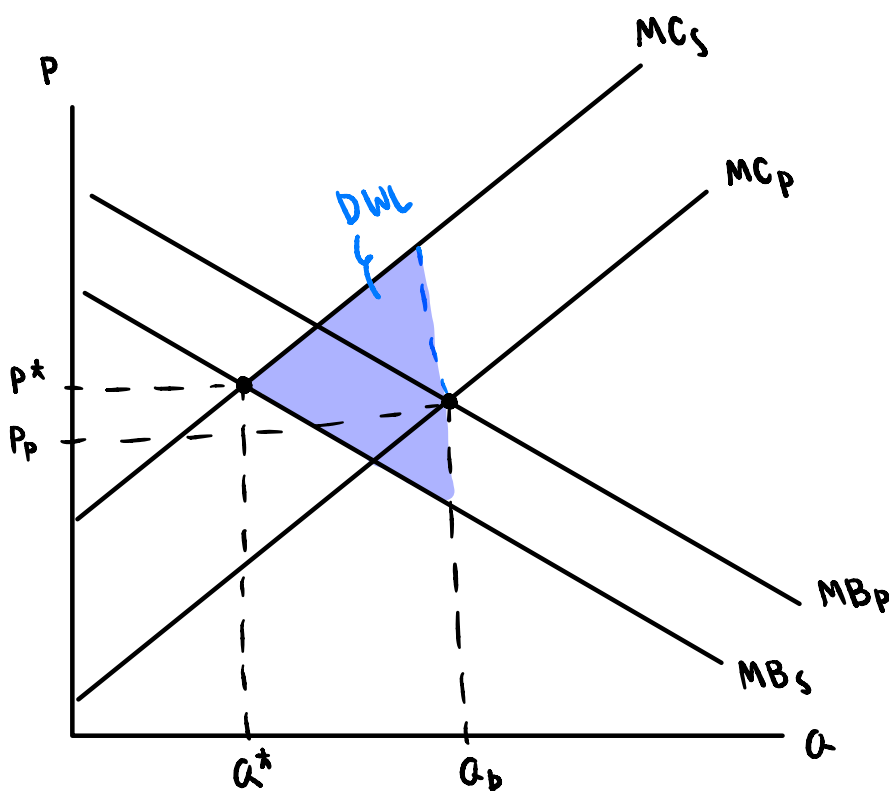
$$\begin{aligned} \text{c) } T &= \text{externalities at } Q_P \\ &= 2(36) = 72 \# \end{aligned}$$

$$\begin{aligned} \text{d) at } Q_P, \text{ externalities} &= 72 \\ DWL &= \frac{1}{2} \times 72 \times 6 = 216 \# \end{aligned}$$

Question 2:

The production of cigarettes increases water pollutions while the consumption of cigarettes can put their neighbors at health risks (Hint: Impact on social marginal benefits as a whole)

- Explain how externalities in this case create inefficiencies in the cigarette market and draw a graph to illustrate your explanation, including the market equilibrium for cigarettes at i) socially optimal level, P^* and Q^* ; ii) private optimal level (P_P and Q_P) when externalities are not internalized by both firms and consumers and; iii) the deadweight loss area.
- What policies could be considered to reduce deadweight loss in this case and describe the effects of such policies in the cigarette market.



a) By not including water pollution to the private marginal cost and deducting the health risks from the private marginal benefit, over production occurs at (Q_P, P_P) . The inefficient allocation creates dead weight loss in the society.

- By imposing tax on producers, MC_P would shift up along with P_P and Q_P would decrease. This reduces negative externalities due to water pollutions.
 - Implement labelling standards regarding health risks could shift MB_P downwards and reduce Q_P . Less overproduction indicates more efficient allocation and lowers dead weight loss.