ECONOMICS 1 (sem 2)
Tutorial 9

Diego Battiston
https://diegobattiston.github.io

You can download these slides from

https://diegobattiston.github.io/T9.pdf

Question 9

		Fishermen	
		No treatment plant	Treatment plant
Factory	No filter	£300, £100	£300, £150
	Filter	£200, £350	£200, £200

a) If the factory and the fishermen are profit maximisers and make their decisions individually, what will they do?

Question 9

		Fishermen	
		No treatment plant	Treatment plant
Factory	No filter	£300, £100	£300, £150
	Filter	£200, £350	£200, £200

b) Which outcome is the social optimum?

Question 9

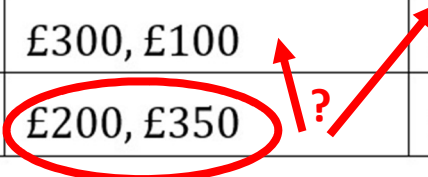|		Fishermen	
		No treatment plant	Treatment plant
Factory	No filter	£300, £100	£300, £150
	Filter	£200, £350	£200, £200

c) Suppose the **factory** has the property right to dump effluent into the river. Suppose further that the parties are allowed to negotiate. What will happen?

- Factory would install filter if compensated with £100

- Fishermen would be better by £200

Deal: Fishermen offer £100 to factory if it install filters. The factory accepts and fishermen do not need treatment plant

Question 9

		Fishermen	
		No treatment plant	Treatment plant
Factory	No filter	£300, £100	£300, £150
	Filter	£200, £350	£200, £200

d) Suppose the fishermen have the property right to clean water, which requires the factory to install the filter. As previously, the parties are allowed to negotiate. What will happen?

- Factory would pay max £100 to NOT install the filter

- Fishermen would only agree if compensated with £200

They start from a Pareto efficient situation, can't move to other cell without making one of them worse

Question 10

- Smith and Jones, live separately: £300 each

- Shared Apt: £450

- Indifferent between living alone or sharing except for costs:

  - Smith plays stereo at night: Sacrifice £155 rather than stop. Jones would tolerate this for £80

  - Jones sings at 6am: Sacrifice £80 rather than stop. Smith would tolerate this for £75

a) Should they live together?

- Rent Savings = 600-450 = 150

- Stereo Solution: Jones tolerates for £80

- Singing Solution: Smith tolerates for £75

- Surplus for sharing: $150 - 80 - 75 = -5$ ⇒ Do not live together

b) Smith gets free headphones. Still willing to pay £40 for listening to stereo

Should they live together? How split rent?

- Same rent savings (150) and singing solution (Smith tolerates for 75)

- Stereo Solution: Now Smith gives up stereo for £40

- Surplus for sharing: $150 - 40 - 75 = 35$ ⇒ Live Together

How to split rent:

- Smith (no rent) costs $= 75 + 40 = 115$ ⇒ Pays at most $300 - 115 = 185$
- If Smith pays 185, he is indifferent between living alone or sharing
- Surplus can be split in equal parts: 0.5*35
  - ⇒ Smith pays $185 - 0.5*35 = 167.5$
  - ⇒ Jones pays remaining 282.5

Question 11

- Benefits and costs of reducing sulfur dioxide emissions

- Benefits of abating (reducing) emissions: $MB = 500 - 20A$

- Costs of abating emissions: $MC = 200 + 5A$

- A is the quantity abated in millions of tons

a) What is the socially efficient level of emissions abatement?

$$MB = MC$$

$$500 - 20A = 200 + 5A.$$

A = 12 million tons and $MB = MC = 260$

Question 11

- Benefits and costs of reducing sulfur dioxide emissions
- Benefits of abating (reducing) emissions: $MB = 500 - 20A$
- Costs of abating emissions: $MC = 200 + 5A$
- A is the quantity abated in millions of tons

b) Actual A is 11. What is the optimal fee per ton?

Firm's decision:

Reduce emissions if MC is less than the Fee (it is cheaper)

- Then, reduce units until MC = Fee.

- In order to have A=12, set fee 260

Question 12

- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

a) Calculate the output and price of dry cleaning if it is produced under competitive conditions without regulation

$$P = 100 - Q = MC = 10 + Q$$

$$Q = 45 \text{ and } P = 55$$

Question 12

- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

b) Determine the socially efficient price and output of dry cleaning

- Demand is social benefit: $P = 100 - Q$
- Marginal social cost is $MC + MEC = 10 + Q + Q$

$$100 - Q = 10 + 2Q$$

$Q = 30$ and $P = 70$

Question 12

- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

c) Per-unit tax to reach social optimal in the competitive case

Private Marginal Cost now is $MC = 10 + Q + t$

Then, equilibrium is:
$$100 - Q = 10 + 2Q + t$$

For $Q = 30$, we have:
$$100 - 30 = 10 + 2 * 30 + t$$

Then, $t = 30$

Question 12

- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

d) Calculate the output and price of dry cleaning if it is produced under monopolistic conditions without regulation.

Monopoly rule MR = MC

$$100 - 2Q = 10 + 2Q$$

Then, $Q = 30$ and $P = 70$

Question 12

- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

e) Per-unit tax to reach social optimal in the monopoly case

No tax needed as Q = 30 is already the social optimal

Question 12

- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

f) Assuming that no attempt is made to monitor or regulate the pollution, which market structure yields higher social welfare? Discuss

Question 13

- Two firms face the following costs of abating emissions:
- $MC_1 = 20 + 6A_1$ and $MC_2 = 50 + 2A_2$.
- $MB = 77.5 - 3.5A$
- With $A = A_1 + A_2$

a) Socially efficient level of emissions abatement

$$MB = MC_1 = MC_2 = MC_T$$
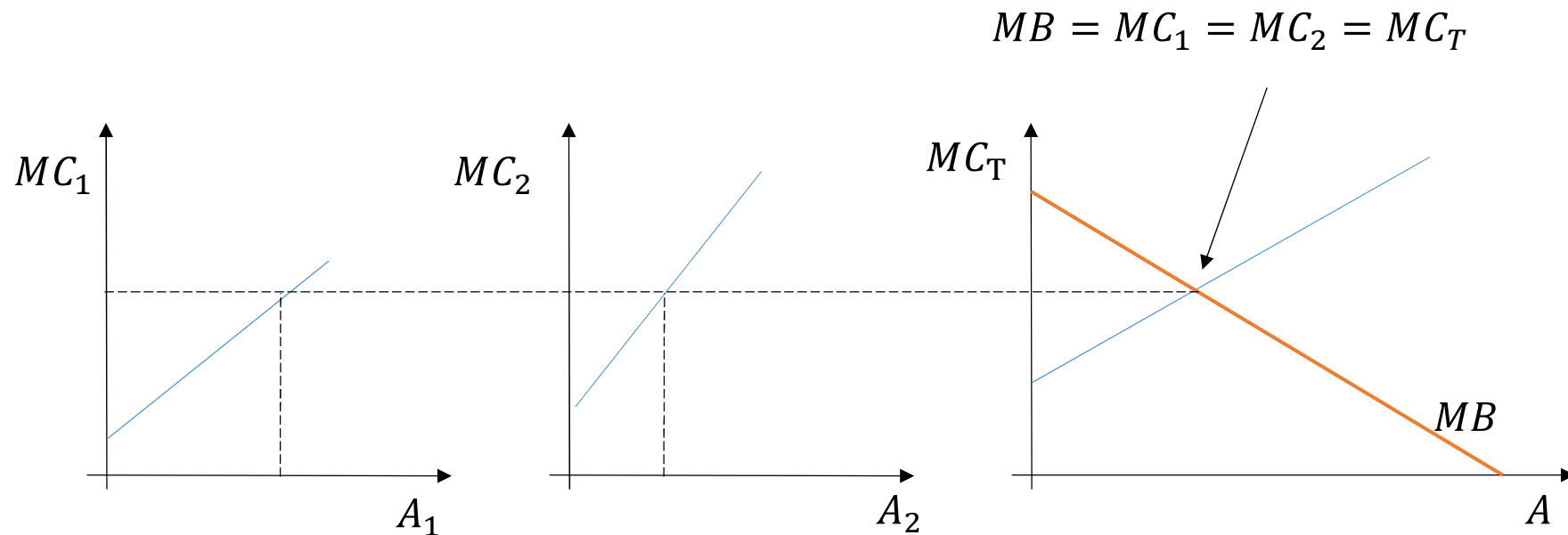
$$MC_1 = 20 + 6A_1 \longrightarrow A_1 = \frac{MC_1}{6} - \frac{20}{6}$$

$$MC_2 = 50 + 2A_2 \longrightarrow A_2 = \frac{MC_2}{2} - 25$$

$$A_1 + A_2 = A = \left(\frac{MC_T}{6} - \frac{20}{6}\right) + \left(\frac{MC_T}{2} - 25\right)$$

$$A = \frac{4MC_T}{6} - \frac{170}{6}$$

$$\boxed{MC_T = 1.5A + 42.5}$$

Now that we have MC_T we can equate to MB to get optimal A

$$MC_T = MB$$

$$1.5A + 42.5 = 77.5 - 3.5A$$

$$\implies A = 7 \; mln \; tons.$$

$$MC_T = 53.$$

b) What should the level of emissions abated by each firm be?

Rule we used (remember graph): $MB = MC_T = \textcolor{red}{53} = MC_1 = MC_2$

$$53 = MC_1 = 20 + 6A_1 \quad \Longrightarrow \quad \textcolor{red}{A_1 = 5.5}$$

$$53 = MC_2 = 50 + 2A_2 \quad \Longrightarrow \quad \textcolor{red}{A_2 = 1.5}$$

c) Optimal emission Fee

Firms will abate according to $MC_i = Fee$

$Optimal\ Fee = 53$