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?

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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

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Question 9

		Fishermen	
		No treatment plant	Treatment plant
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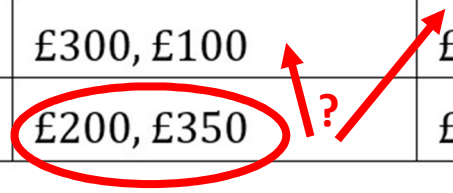

d) Suppose the fishermen have the property right to clean water, which requires the factory to install the filter. As previously, the parties are allowed to negotiate. What will happen?

- 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

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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 $= 600\text{-}450 = 150$
- Stereo Solution: Jones tolerates for £80
- Singing Solution: Smith tolerates for £75
- Surplus for sharing: $150 - 80 - 75 = -5$ $\Rightarrow$ 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: $150-40-75=35$ $\Rightarrow$ Live Together

How to split rent:

- Smith (no rent) costs $=75+40=115$ $\Rightarrow$ 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
  - $\Rightarrow$ Smith pays $185-0.5*35=167.5$
  - $\Rightarrow$ 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 $MB = MC = 260$

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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 $\mathrm{MC} = 10 + Q + t$

Then, equilibrium is:

$$100 - Q = 10 + Q + t$$

For $Q = 30$, we have:

$$100 - 30 = 10 + 30 + t$$

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

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

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

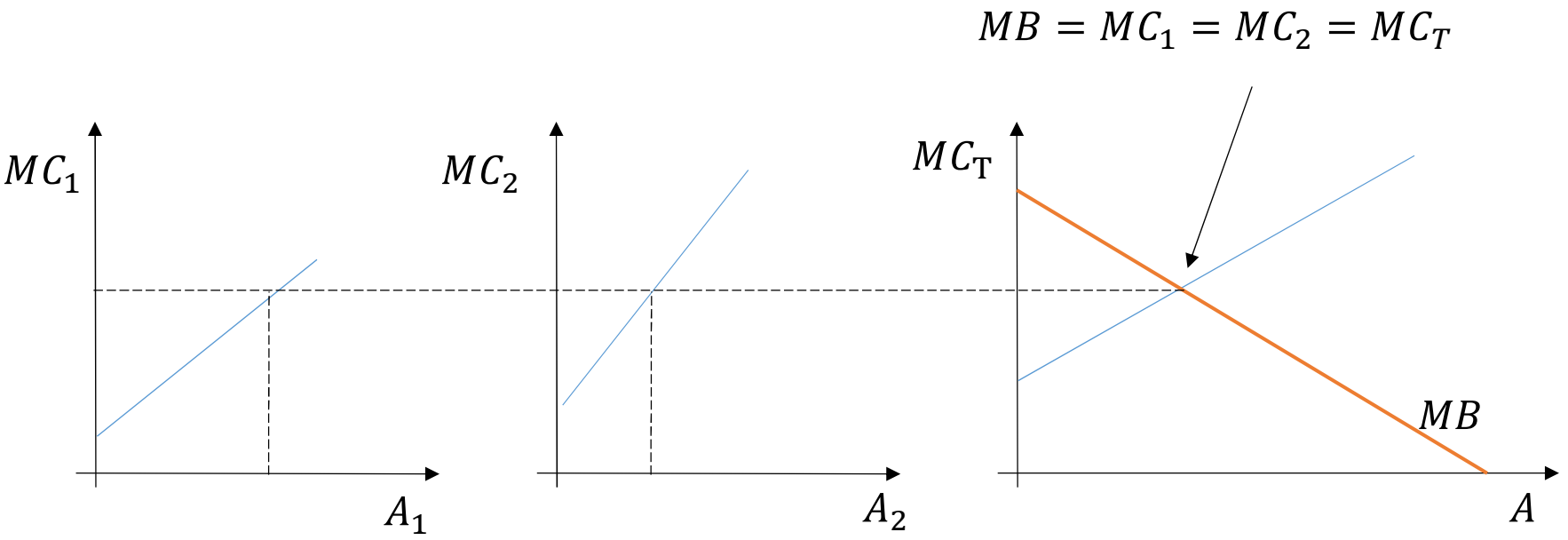
- Market for dry cleaning
- Demand $P = 100 - Q$
- Private $MC = 10 + Q$
- Marginal external cost $MEC = Q$

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



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

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

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

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

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

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

$$MC_T = MB$$

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

$$\Longrightarrow \quad A = 7\ mln\ tons.$$

$$MC_T = 53.$$

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

Rule we used (remember graph): $MB = MC_T = 53 = MC_1 = MC_2$

$$53 = MC_1 = 20 + 6A_1 \implies A_1 = 5.5$$

$$53 = MC_2 = 50 + 2A_2 \implies A_2 = 1.5$$

c) Optimal emission Fee

Firms will abate according to $MC_{\mathrm{i}} = Fee$

$$Optimal\ Fee = 53$$