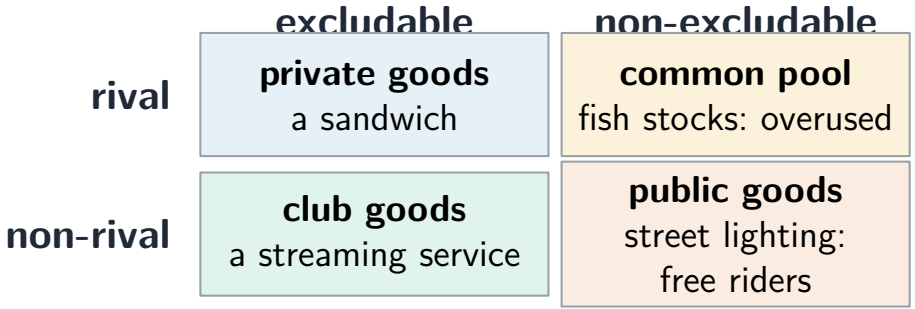
Exercise walk-through

3.1
Externalities, public goods and fairness: supported rehearsal

International Baccalaureate · IB Diploma · Economics · HL

Figure: Market failure and equity



non-rival + non-excludable → free-rider problem → the market under-provides or provides none

- Classify goods by rivalry and excludability.
- Match each part of the diagram to the text.

Data-response practice (Paper 2 style) (2)

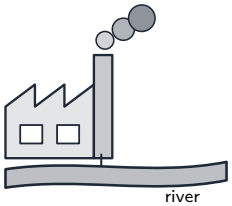
- (d) Calculate the cost to Firm K of each way to cover its extra 0.2 million tonnes, and state which it will choose. [2]
- (e) Using information from the text and your knowledge of economics, evaluate the use of tradable permits, compared with a **carbon tax** , to reduce carbon emissions. [15]
- **Certainty of quantity.** A permit scheme fixes the total emissions (the cap), and the market finds the price. A **carbon tax** fixes the price, and the quantity is uncertain, because the government does not know how strongly firms will respond. For a climate target in tonnes, the cap is the more direct tool.

Data-response practice (Paper 2 style) (3)

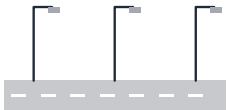
- **Cost-effectiveness.** Both tools give every firm the same price per tonne, so the cheapest cuts happen first: Firm K cuts, because €60 is below €90. Permits do this without the government needing to know each firm's costs.
- **Price instability.** The EU price stayed below €10 for years because too many permits were issued. That gave firms little reason to invest, and the price must be stable for firms to plan long-lived investments such as new furnaces. A **carbon tax** gives a known, steady price. Sweden has used one since 1991, and it is now among the highest in the world. The EU had to remove permits to make its price work, which shows the risk of government failure in setting the cap.
- **Revenue and fairness.** Auctioned permits and a tax both raise revenue that could cut other taxes or help poor households with higher energy bills. Permits given away free reward existing polluters.

Exercises 2.1·2.2

2.1 Define an externality and give one negative and one positive example. [2]

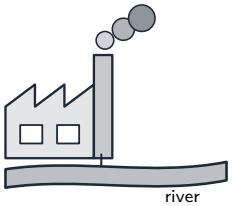


2.2 State the two properties of a public good and name the problem they create for private provision. [2]



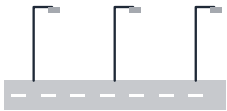
Exercises 2.1·2.2

2.1 Define an externality and give one negative and one positive example. [2]



2.1 An externality is a cost or benefit of a transaction falling on a third party not involved in it (1). Negative: pollution from production (1). Positive: vaccination protecting others (1).

2.2 State the two properties of a public good and name the problem they create for private provision. [2]



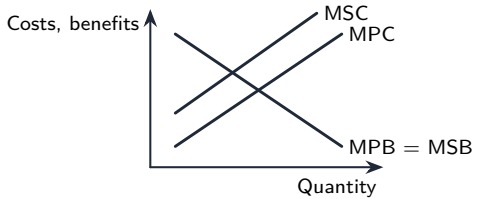
2.2 Non-rival and non-excludable (1). They create the free-rider problem – no one can be made to pay, so private firms cannot provide the good profitably (1).

Exercises 2.3·2.4

2.3 Distinguish a common pool resource from a public good by rivalry and excludability. [2]



2.4 Write the MSC and MSB relationships and state the social-optimum condition. [2]



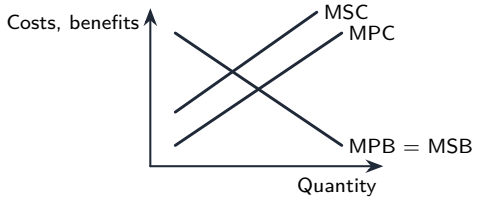
Exercises 2.3·2.4

2.3 Distinguish a common pool resource from a public good by rivalry and excludability. [2]



2.3 A common pool resource is RIVAL but non-excludable (each fish caught is gone); a public good is non-rival AND non-excludable (lighting for one is lighting for all).

2.4 Write the MSC and MSB relationships and state the social-optimum condition. [2]



2.4 MSC = MPC + external cost; MSB = MPB + external benefit; the social optimum is where MSB = MSC.

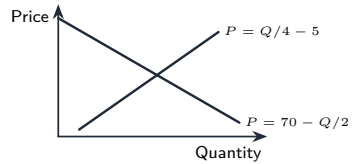
Exercises 2.5·3.1

2.5 Quintile income shares are 5, 10, 15, 20 and 50 percent. State the Lorenz curve's cumulative points and compute the Gini coefficient. [4]

5, 10, 15, 20, 50 percent

3.1 *(Original.)* With demand $P = 70 - Q/2$, supply $P = Q/4 - 5$ and an external cost of 6 per unit produced: find the market equilibrium and the social optimum, size the over-production, and calculate the welfare loss. [5]

external cost 6 per unit



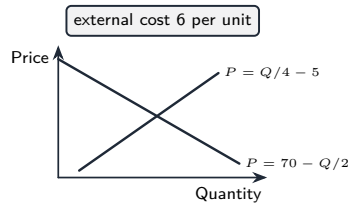
Exercises 2.5·3.1

2.5 Quintile income shares are 5, 10, 15, 20 and 50 percent. State the Lorenz curve's cumulative points and compute the Gini coefficient. [4]

5, 10, 15, 20, 50 percent

2.5 Cumulative points $(0,0), (20,5), (40,15), (60,30), (80,50), (100,100)$. Area under the Lorenz $= 50 + 200 + 450 + 800 + 1500 = 3000$ of 10000, so Gini $= 1 - 2 \times 0.30 = 0.40$.

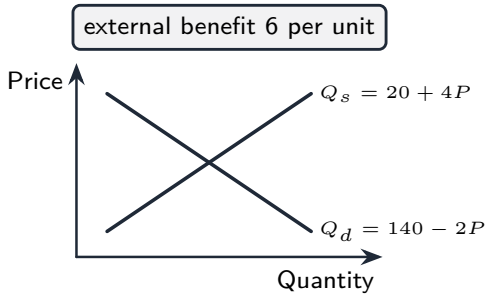
3.1 *(Original.)* With demand $P = 70 - Q/2$, supply $P = Q/4 - 5$ and an external cost of 6 per unit produced: find the market equilibrium and the social optimum, size the over-production, and calculate the welfare loss. [5]



3.1 Market: $70 - Q/2 = Q/4 - 5$ gives $75 = 0.75Q$, so $Q = 100$, $P = 20$. Social: MSC $= Q/4 + 1$ meets MSB at $70 - Q/2 = Q/4 + 1$, so $69 = 0.75Q$, $Q = 92$, $P = 24$. Over-production $= 100 - 92 = 8$ units. Welfare loss $= \frac{1}{2} \times 8 \times 6 = 24$ per day – for every unit between 92 and 100 society's cost exceeded its benefit.

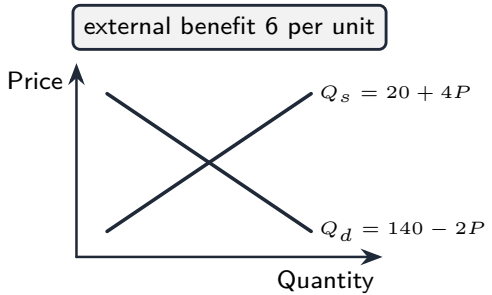
Exercise 3.2

3.2 *(Original.)* Explain the policy response to a positive consumption externality of 6 per unit in this market, and calculate the new equilibrium under the correct instrument. [3]



Exercise 3.2

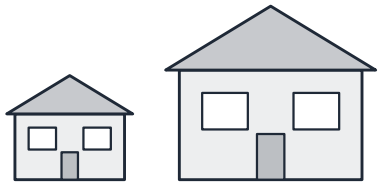
3.2 *(Original.)* Explain the policy response to a positive consumption externality of 6 per unit in this market, and calculate the new equilibrium under the correct instrument. [3]



3.2 A positive consumption externality calls for a SUBSIDY of 6 per unit (equal to the marginal external benefit): supply in consumer prices becomes $Q_s = 4P + 44$-equivalent – i.e. $P = Q/4 - 11$ – and setting $70 - Q/2 = Q/4 - 11$ gives $81 = 0.75Q$, so $Q = 108$, $P = 16$: output rises to the social optimum, price falls, and the government pays $6 \times 108 = 648$ per day.

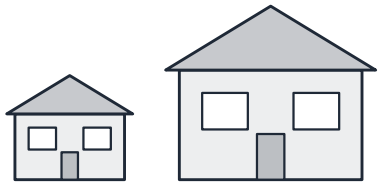
Exercise 3.3

3.3 *(Original, equity.)* Explain why an efficient market outcome may still fail the equity test, naming one instrument that trades the two against each other. [3]



Exercise 3.3

3.3 *(Original, equity.)* Explain why an efficient market outcome may still fail the equity test, naming one instrument that trades the two against each other. [3]



3.3 The price mechanism answers "for whom?" by willingness AND ability to pay, so it rewards resource ownership, not need: an allocation can be Pareto-efficient while leaving the poor without basics (equity failure, not market failure). One instrument with its trade-off: progressive taxation with transfers buys equity but may weaken work incentives (the efficiency-equity trade-off); or minimum wages raise pay at the possible cost of jobs.

Local review guidance: externality answers show BOTH equilibria and the shaded triangle, not just the direction; the Gini shows the trapezium areas before the final figure; (R1 3.3) the instrument named with BOTH sides of its trade-off. This is authored classroom guidance.