



ECO.MIC24 Tradable Pollution Permits, Regulation and Government Failure

AQA 7136 · Calculators not allowed · about 80 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer all questions. Write full sentences for the levels-marked questions only. No calculator is required.

Time guidance: approximately 80 minutes.

- 1** Multiple choice, UK factory emissions context: a firm holds tradable pollution permits and can either buy permits at GBP 30 per tonne or abate at marginal cost GBP 18 per tonne. Which action minimises the firm's cost for an additional tonne of emissions?

- ☐ A: Buy a permit at GBP 30
- ☐ B: Abate at marginal cost GBP 18
- ☐ C: Do nothing, continue emitting without a permit
- ☐ D: Lobby the regulator to raise the cap

(Total for Question 1 is 1 mark)

- 2** Define a tradable pollution permit in the context of a cap-and-trade environmental policy for UK industry.

(Total for Question 2 is 2 marks)

- 3** Explain how a cap-and-trade scheme for air pollution, operating in the UK, provides firms with a financial incentive to reduce emissions. Draw a simple diagram showing firm marginal abatement cost and the permit price, and indicate the effect of a permit price above the firm's marginal abatement cost.

Figure (to be drawn): Student to draw marginal abatement cost (MAC) upward sloping with emissions on horizontal axis and cost per tonne on vertical axis. Horizontal line at permit price P_p intersects MAC, showing abatement chosen where $MAC = P_p$. Label axes, initial emissions without abatement, and reduced emissions after abatement.

(Total for Question 3 is 4 marks)

- 4** Define regulation in the context of environmental policy, naming a typical command-and-control measure used in UK pollution control.

(Total for Question 4 is 2 marks)

- 5** Explain how a command-and-control regulation that sets a maximum emission limit per firm can reduce pollution, using an example such as limits on sulphur dioxide emissions from power stations in the UK.

(Total for Question 5 is 3 marks)

- 6** Define regulatory capture in the context of environmental regulation in the UK or similar economies.

(Total for Question 6 is 2 marks)

- 7** Explain, with an example, how an unintended consequence of a pollution regulation might reduce the policy's effectiveness in a UK context.

(Total for Question 7 is 3 marks)

- 8** Define administrative cost as a cause of government failure in the delivery of environmental policy in the UK.

(Total for Question 8 is 2 marks)

- 9** Explain how imperfect information facing policymakers can lead to government failure when designing pollution control, giving a UK-style example.

(Total for Question 9 is 3 marks)

- 10** A small UK firm emits 1 200 tonnes CO₂ per year. Under a cap-and-trade scheme the permit price is GBP 25 per tonne. The firm can reduce emissions by 200 tonnes at total abatement cost GBP 3 000. Calculate the cost to the firm of meeting the reduction by: a) buying permits for the 200 tonnes, and b) carrying out the abatement itself. Which option is cheaper and by how much?

(Total for Question 10 is 4 marks)

- 11** Data extract: The Midlands cap-and-trade pilot reported in Year 1 that the regional cap was 1 000 000 tonnes CO₂ and the average permit price was GBP 18. In Year 2 the cap was reduced to 900 000 tonnes and the average permit price rose to GBP 28. Emissions reported by monitored firms fell from 980 000 tonnes to 870 000 tonnes. Explain how the data show that tightening the cap changed firms' incentives to abate in this regional UK pilot.

(Total for Question 11 is 9 marks)

12 Evaluate the view that government intervention always improves on the market outcome when dealing with environmental externalities in the UK or similar economies. In your answer, consider tradable permits, regulation, direct provision and information policies, as well as possible government failures such as regulatory capture, unintended consequences, administrative cost and imperfect information. You should include diagrams where relevant and reach a supported judgement.

Evaluate whether government intervention inevitably leads to a better outcome than leaving environmental externalities to the market, discussing different instruments and the limits imposed by government failure.

(Total for Question 12 is 25 marks)

Mark scheme · ECO.MIC24 Tradable Pollution Permits, Regulation and Government Failure

Question 1

- **B1** B, abate at GBP 18, because it is cheaper than buying a permit at GBP 30
- **Answer: B**

Question 2

- **B1** a permit is a government issued allowance giving the holder the legal right to emit a specified quantity of pollutant, usually measured in tonnes
- **B1** permits are tradable, meaning firms can buy and sell allowances so the total emissions stay within the cap
- **Answer: A government issued allowance to emit a specified quantity of pollutant, tradable between firms so total emissions respect the cap.**

Question 3

- **M1** states that a permit price creates an opportunity cost of emitting, so firms face a cost per extra tonne emitted
- **M1** diagram: correctly labelled axes, upward sloping MAC curve, horizontal permit price line and old and new emission points
- **A1** explains that if permit price is higher than the firm's marginal abatement cost for an extra tonne, the firm will abate that tonne instead of buying a permit
- **A1** explains trading outcome: firms with low abatement cost sell permits, firms with high abatement cost buy permits, achieving cost-effective overall abatement
- **Answer: A permit price makes emitting costly. Firms abate up to the point where MAC equals the permit price; if MAC is below the permit price they reduce emissions rather than buy permits, and trading lets abatement occur where it is cheapest across firms.**

Question 4

- **B1** regulation is government-imposed rules or standards that firms must follow to limit harmful behaviour or protect public goods
- **B1** example given, e.g. emission limit values, technology standards, or mandatory filters on smokestacks
- **Answer: Regulation is government rules setting required standards or limits; example: mandatory emission limit values or required use of specified abatement technology.**

Question 5

- **M1** identifies mechanism: regulator sets legal limit on emissions per firm
- **A1** explains that firms must install abatement technology or change processes to comply, causing emissions to fall
- **B1** gives concrete example, e.g. power stations installing desulphurisation equipment to meet SO₂ caps
- **Answer: A legal maximum forces firms to reduce emissions by installing abatement technology or changing production, for example power stations installing flue gas desulphurisation to meet SO₂ limits.**

Question 6

- **B1** regulatory capture occurs when the regulator acts in the interest of the industry it regulates rather than the public interest
- **B1** often arises through close relationships, revolving doors, or lobbying that influence rule making and enforcement
- **Answer: When a regulator favors the regulated industry over the public, often due to close industry influence, lobbying or personnel links, undermining regulatory objectives.**

Question 7

- **M1** identifies an unintended consequence, e.g. firms relocating production overseas leading to carbon leakage
- **A1** explains mechanism: relocation reduces domestic emissions but global emissions may rise if production shifts to less efficient jurisdictions
- **B1** gives an example or development, e.g. UK manufacturing moving abroad to avoid strict limits, undermining environmental goals
- **Answer: An example is carbon leakage where firms relocate production to countries with weaker rules; domestic emissions fall but global emissions may rise reducing net environmental benefit**

Question 8

- **B1** administrative cost is the resource cost of implementing, monitoring and enforcing a policy, including staff, compliance checks and legal processes
- **B1** high administrative costs can make policies inefficient or reduce funds available for direct benefits
- **Answer: The resource cost of designing, monitoring and enforcing policy, which if high can make intervention inefficient and reduce net benefits.**

Question 9

- **M1** identifies imperfect information problem, e.g. regulator cannot precisely observe firms' marginal abatement costs or true emissions
- **A1** explains consequence: wrong permit cap or price, or poorly targeted regulation, leading to either excessive cost or insufficient abatement
- **B1** gives example, e.g. cap set too tight raising permit prices excessively and harming competitiveness, or too loose giving little environmental benefit
- **Answer: If regulators lack accurate data on abatement costs or emissions, they may set caps or standards poorly, causing excessive costs or weak environmental outcomes, for example an overly tight cap that spikes permit prices and damages industry competitiveness.**

Question 10

- **M1** cost of buying permits = 200×25
- **A1** = GBP 5 000
- **M1** cost of abatement = GBP 3 000 (given)
- **A1** abating is cheaper by GBP 2 000
- **Answer: Buying permits costs GBP 5 000; abatement costs GBP 3 000. Abatement is cheaper by GBP 2 000.**

Question 11

- **Level 1** (1-3): Simple statements that restate parts of the data with limited linkage to incentives
- **Level 2** (4-6): Developed explanation linking cap reduction and higher permit price to stronger abatement incentives, using the data to support the argument
- **Level 3** (7-9): Sophisticated response that explains causation, refers to permit price mechanism, trading behaviour and provides evaluation or alternative explanations supported by the data
- **Indicative content:**
 - Year 1 cap 1 000 000 to Year 2 cap 900 000 shows the regulator tightened the supply of permits, an expected cause of a permit price rise
 - Permit price rose from GBP 18 to GBP 28, increasing the marginal cost of emitting and therefore the financial incentive for firms to abate rather than buy permits
 - Reported emissions fell from 980 000 to 870 000 tonnes, a fall larger than the nominal cap reduction, indicating firms undertook additional abatement rather than simply trading permits
 - Firms with low abatement cost would sell permits, high cost firms would abate up to where their marginal abatement cost equals GBP 28, supporting cost effective abatement across the region
 - Alternative explanations: broader economic slowdown could lower emissions, or improved monitoring could reveal previous underreporting; evaluation should weigh these against the matching timing of cap tightening and price rise

Question 12

- **Level 1** (1-5): Basic explanation of one or two arguments for intervention or against it, little or no use of economic analysis, limited or no diagram, no clear judgement
- **Level 2** (6-10): Clear explanation of arguments for intervention and some government failure issues, some economic analysis and at least one diagram or example, partial judgement
- **Level 3** (11-15): Balanced and sustained evaluation, includes analysis of multiple instruments, diagrams, discussion of the magnitude and likelihood of government failure problems, and a reasoned, supported judgement
- **Level 4** (16-20): Comprehensive analysis and evaluation with detailed examples, well drawn diagrams applied to the argument, precise discussion of trade offs, distributional effects and institutional constraints, leading to a strong judgement
- **Level 5** (21-25): Outstanding, well-structured response that integrates theory and evidence across instruments, critically examines government failure mechanisms with depth, addresses counterarguments and uncertainty, and reaches a nuanced, justified conclusion
- **Indicative content:**
 - For intervention: market failure from negative externalities means private firms emit more than socially optimal; diagrams: negative production externality with marginal private cost and marginal social cost, and how a Pigovian instrument or cap shifts outcome closer to social optimum
 - Tradable permits: can achieve cost effective abatement, provide clear price signal, allow flexibility; diagram: permit price line and MAC equalisation across firms; evidence of success in some emissions trading systems
 - Regulation and direct provision: can deliver targeted reductions and ensure minimum standards where markets fail badly or when information is weak, direct provision of public goods or monitoring can be justified
 - Information provision and labelling: can change consumer behaviour at low administrative cost, useful where consumers misjudge environmental impacts
 - Government failure arguments: regulatory capture can bias rules towards industry, high administrative and monitoring costs can make intervention inefficient, imperfect information can lead to wrong cap setting or wrong standards, unintended consequences like carbon leakage, and time lags reduce effectiveness
 - Evaluation of instruments: permits perform well where monitoring is feasible and markets are liquid, but may fail if market power or low liquidity drive price volatility; command-and-control avoids market failures from thin markets but can be costlier and less flexible
 - Magnitude and probability: weigh how severe the externality is, institutional capacity, and the political economy; small administrative costs may be acceptable for large environmental gains, but capture and poor design can wipe out benefits
 - Distributional effects and winners and losers: firms, consumers and future generations; consider transitional support and compensation to improve political feasibility
 - Conclusion: intervention is often necessary to correct environmental externalities, but it does not always improve outcomes; careful instrument choice, good information, transparency and safeguards against capture are required to ensure net improvement