

FINAL EXAM STUDY QUESTIONS

Instructions: The exam will be a selection of theoretical and applied questions. Quantitative questions will be based on the assignment questions from the term homework and numerical examples from lecture. In addition, a series of study questions have been assigned. Below are a set of possible exam questions grouped by category

Externalities - consumption, production, general equilibrium
Policies - taxes, subsidies, standards, marketable permits

1. Beatrice is a smoker. Alfred is a non-smoker whose health is adversely affected by Beatrice's second-hand smoke. Explain how they can bargain to a Pareto optimal equilibrium and illustrate the possible solutions given different initial property rights.
2. In a partial equilibrium model of a production externality, show under what circumstances taxes, subsidies, and standards are equivalent in terms of their effect on pollution levels.
3. Why is cost efficiency a desirable goal of environmental policy? How is it achieved?
4. How would you design a marketable permit system to achieve a specific ambient environmental quality target for areas that are in compliance with the target when the policy is introduced, and for areas not in compliance with the target when the policy is introduced.
5. What policy instrument would you advocate for a transboundary pollutant? Take into account efficiency, uncertainty, market structure, enforcement.
6. Explain how the modified ABS marketable permit policy works and what problems it is meant to address.
7. What are the cost efficient marketable permit schemes for: (a) uniformly mixed assimilative pollutants; (b) non-uniformly mixed assimilative pollutants; (c) uniformly mixed accumulative pollutants? Show in theory how a marketable permit scheme would achieve cost efficiency for each type of pollutant.

Uncertainty

8. When a decision maker is uncertain about the location of the MB and MD curves, explain how information about their relative elasticities may help design a policy that maximizes the expected welfare from pollution control.
9. How do MBIs differ from CACs with regard to incentives created by the policy to reveal information about the polluter's marginal costs of abatement to the regulator?

(note: MBI is "Market Based Incentive")

Welfare Economics

10. How does CV, EV, and CS measure a person's willingness to pay for changes in environmental quality? How do the three approaches differ and what are the advantages/disadvantages of each?
11. How does the hedonic model measure WTP for changes in environmental quality? What are the problems likely to be encountered with this technique?

12) Suppose the government wishes to regulate mercury emissions of factories in a specific industry by either setting an emissions standard or imposing an emissions fee (per ton of mercury). The government is uncertain as to the marginal abatement costs, which may be high (MC_1) or low (MC_2).

$$MC_1 = 15M + 500$$

$$MC_2 = 15M - 500$$

where M is the units of mercury abated. The government believes there is a 50% chance of each of the marginal abatement costs. The marginal benefit of abatement is known to be:

$$MB = 1500 - 10M$$

- What is the optimal level of emissions for each of the cost curves above?
- What is the expected marginal abatement cost (equation)?
- What is the optimal emissions standard according to the expected abatement costs?
- What is the optimal abatement fee according to the expected abatement costs?
- Which regulation will result in a lower DWL in the presence of the uncertainty? Explicitly compute the expected DWL arising from each proposal.

13) A firm operating in a competitive market has the following profit function

$$\pi = PQ - Q^2 - 2A^2 + 24A$$

Where P is price, Q is output and A is abatement. Further, the level of pollution, denoted Z , is determined by $Z = 2Q - 2A$.

If the price is \$240 and the socially optimal Z is 48 then

- What is the level of Q and A that the firm would choose if there were no environmental regulations? What would be the level of pollution?
- Use the Lagrange method to find the socially optimal Q , A and profits.
- Assume the government fixes the level of A equal to your answer in (b) but allows the firm to choose Q . Find the optimal Q and determine the actual pollution Z .
- Assume the government fixes the level of Q equal to your answer in (b) but allows the firm to choose A . Find the optimal A and determine the actual pollution Z .
- Carefully illustrate your answers to (a) to (d) in a graph