ECON1922 spring 2024

University of Oslo

POSTPONED EXAM

Instructions:

(i) All problems should be solved. Weights are reported in brackets.
(ii) Each exercise indicates how the question should be answered, whether we expect you to explain in words, provide a graphical illustration, or use calculus.
(iii) Restrict your answer to what the exercise asks for. Non-relevant information is given no credit. Full credit is only given to figures and graphs that are fully explained, correctly illustrated and with notation on the axes.

This exam consists of 4 main questions.
The weight of each question is indicated, and the maximum is 100 points.

Problem 1. Optimal pollution and the measurement challenge (20 points)

Consider a simple static model with flow pollution. Emissions are given by E. Environmental damages (in $) are given by an increasing and convex function of emissions, $D(E)$. Without any pollution control, total emissions are given by $E = E_0$. Abatement is denoted by R. Abatement costs (in $) are given by an increasing and convex function of abatement $C(R)$. Total abatement is given by $R = E_0 - E$. Total welfare costs are given by the sum of environmental damages and abatement costs.

a) (10 points – words and figure)
Illustrate marginal environmental damages and marginal abatement costs in a diagram with emissions measured along the x-axis. Explain how the optimal level of pollution E^* is determined.

b) (10 points - words)
Assume that an environmental regulatory authority wants to reduce the level of pollution to E^*. To implement appropriate environmental policies, we need to measure the value of pollution control. Discuss two methods to measure the value of pollution control: hedonic pricing and contingent valuation.

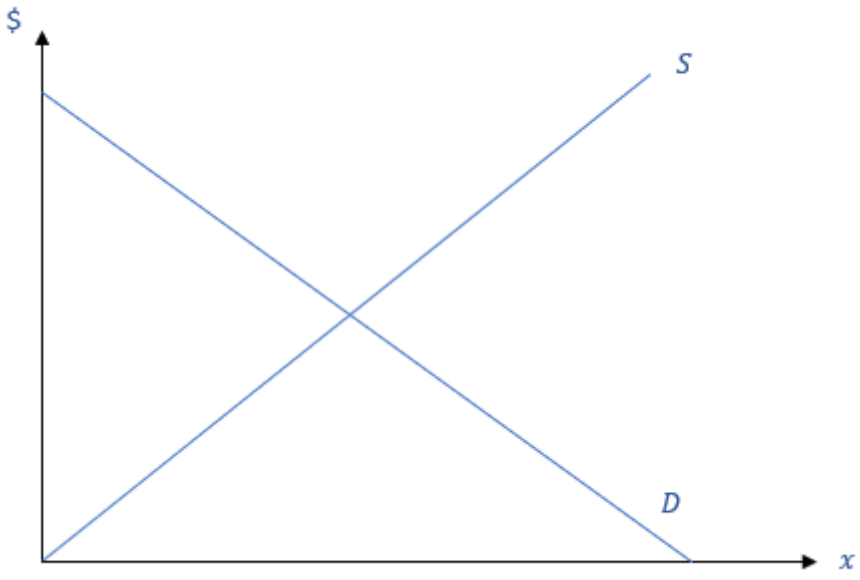
Problem 2. External effects (20 points)

Figure 1 illustrates the market for a private consumption good x. D denotes demand and S denotes supply. The production of x causes environmental degradation. The marginal external cost (measured in $) is constant.

a) (10 points – words and figure)
Reproduce Figure 1 and use the figure to discuss how the equilibrium quantity in an unregulated and perfectly competitive market x^{BaU} differs from the socially optimal quantity x^{SO}. Illustrate and explain how the introduction of a Pigouvian tax can reduce the production of x to the socially optimal quantity x^{SO}.

b) (10 points – words)
In the paper "The Problem of Social Cost", Ronald Coase argued that, in certain conditions, pollution problems and other externalities can be fully rectified through individual bargaining between the parties involved, without the need for any government policy intervention at all. Discuss Coase's argument, and the possible obstacles for successful 'Coasean' bargaining.

Figure 1: Market equilibrium



Problem 3. Public goods (20 points)

a) (10 points - words)
Define and give examples of (non-excludable) public goods.

b) (10 points - words)
Explain why (non-excludable) public goods are underprovided in the market.

Problem 4. Climate change (40 points)

Consider a country with a new green government that is eager to implement policies to mitigate climate change. However, before they make any policy decisions, they have asked for expert advice from an environmental economist.

a) (10 points - words)
Explain to the policy makers how we can understand climate change as a result of market failure.

b) (10 points – words)
Explain to the policy makers how they can reduce carbon emissions by implementing a carbon tax and/or carbon emissions trading (cap-and-trade).

c) (10 points – words)
Explain to the policy makers why the carbon price should be equal across countries.

d) (10 points – words)
Global warming is associated with a great deal of uncertainty regarding climate outcomes. Explain to the policy makers how they should take account of such uncertainties when developing climate policies.