

Environmental Economics for Environmental Sciences (ENR-21306)

Date: Monday, 17 December 2012 Time: 9.00 – 12.00 hrs

Instructions: This exam consists of 7 pages. Please answer all questions, starting each question on a NEW page. Please answer in English. English dictionaries are allowed. Always explain your answers, equations and variables. Show your calculations and indicate units where applicable. Please label the axes of graphs with the name of the variables. Calculators are allowed but must not be pre-programmable. You are not allowed to use any books (except for dictionaries), papers, or other course literature. When finished, please hand in both questions and answers. Please do not forget to put your name and registration number on all your answering sheets.

Question 1 (Microeconomics) -- omitted

Question 2 (Public goods) -- omitted

Question 3 (Market failure) – from David

You have been asked to reduce the environmental impact of global pollutants (e.g., Greenhouse gases like CO₂) from national, large scale polluters.

Assuming that measuring emissions is cheap (easy), please give one advantage and one disadvantage for each of these policies (one or two sentences for each advantage or disadvantage).

- a. Coasian (cap and trade) permits given to existing polluters for free (“grandfathering”) that can be traded among companies in the same or different countries (5 points).
- b. Pigouvian taxes that are collected nationally and distributed equally to citizens (5 points).

Question 4 (Externalities and taxation) - omitted

Question 5 (Pollution control) – from David

Suppose that you are visiting a slum in New Delhi, India, where the people get their drinking water from a polluted stream that runs past a factory (f) and small industrial businesses (s) that discharge ($D = d_f + d_s$) into the stream. Slum dwellers often suffer from water-related illnesses.

A local politician, elected recently after promising to deliver clean water to slum dwellers, has asked you to help him choose among three options:

- A. A regulation that requires the factory to discharge clean wastewater.
- B. A tax on factory discharges that will subsidize the price of bottled water in New Delhi.
- C. A tax on factory discharges whose revenue will be distributed equally to slum dwellers.

With respect to taxes, the politician gives you a report prepared by a consultant that lays out the following strategy for setting an optimal tax to reduce a pollution externality. It says: “Given industrial benefits from production equal to $B(D)$ and social costs from discharges of $C(D)$, set an optimal tax equal to $t(D)$.”

Please answer the following sub-questions (assume no corruption):

- Write the social net benefit function (benefits less costs) without a tax. (2 Points)
- Write the factory’s net benefit function with a tax. (2 Points)
- Explain the problem(s) with the consultant’s strategy (1-2 sentences). (2 Points)
- Choose the best option from A, B or C and explain why you chose it (1-2 sentences). (2 Points)
- Describe why you rejected the other two options (1 sentence each). (2 Points)

Question 6 (Game theory) – from David

You just bought a farm that shares a lake with your neighbor. Both of you keep cows. You can give your cows water by taking it in buckets out of the lake (hard work) or letting them go to the lake to drink the water – an option that pollutes the lake. Your neighbor faces the same set of choices: fetch water at a cost or allow his cows to drink the water but damage its quality.

For either of you, the cost of gathering water in buckets is 5, but the cost to both when one allows his cows to drink from the lake is 3. There is, in other words, a negative externality when cows drink from the lake. If both of you allow your cows to drink from the lake, then the damage is 6 to each of you.

- Given these facts, please fill in the table below with the positive or negative payoffs from your potential actions in a non-communication, one-shot game (4 points)

		Neighbor	
		Fetch from Lake	Drink from Lake
You	Fetch from Lake		
	Drink from Lake		

- Now solve the game. What is the Nash equilibrium? (2 points)
- Please give ONE potential action to change this to a sequential or repeated game that may have better results. Note that you have not seen the neighbor's cows at the lake. (2 points)