SØK1101 Spring 2021

Answer all 4 questions. Weights given next to each question.

Question 1 (25%) Externalities

a. Demonstrate and discuss how negative pollution externalities reduce social welfare.

Show ((for instance diagrammatically) how a negative externality leads to deadweight loss.

b. How can assigning property rights potentially solve this problem?

Discuss Coase Theorem and show one of the cases (right to pollute, right to clean air /water etc) and how this leads to an efficient outcome Excellent answers might discuss (a) how it does not matter who gets the rights in terms of getting to the efficient outcome (b) how it does matter for the distribution of wealth and (c) could mention limitations to negotiation.

Question 2 (25%) Pollution

a. Demonstrate and discuss the optimal level of a flow pollutant

Show on a diagram how the optimal level of a flow pollutant is at the point where marginal costs of abatement equal marginal costs of control. Could also discuss (a) how optimal level of pollution will typically not be zero; (b) that the optimal level of pollution may be zero for highly damaging pollutants (at low levels).

b. Compare taxation approaches to cap and trade approaches to reducing pollution.

Show how both taxation and cap and trade can lead to the optimal (cost minimizing) reduction using for instance the two firm example fro class. We also discussed in class how this can make cap and trade superior as it has lower information requirements for the regulator. Very good answers might discuss (and/or show) how cap and trade and taxation perform differently if there is (a) a macroeconomic shock and/or (b) if abatement technology improves

Question 3 (25%) Depletable Resources

Consider a depletable resource stock of Q=24 to be allocated across two periods.

The marginal willingness to pay (demand curve) is given by $P=16-Q$

Where P is the price and Q is the amount extracted.

The demand curve is identical in both periods

The marginal cost of extraction is constant and equal to 4

Here there was a mistake in the initial paper Q=24 is too many. I changed it 30 minutes into the exam to Q=18.

a. Use a discount rate of 0.10 to determine the extraction amount that maximises the present value across both periods. Illustrate and explain graphically.

Use a standard 2 period diagram (see slide set 5) to demonstrate optimal allocation across two periods. X-axis must have the correct endowment, clearly more allocation to first period, and the MNB2 line cutting the y-axis below 12.

b. What is the market price and marginal user cost in both periods?

Q1=9.15; Q2= 8.85

P1=6.85; P2=7.15. MUC1=2.85 MUC2=3.15

c. Why is the marginal user cost higher than the marginal cost of extraction?

I sent through a correction to Q3(c) at the same time as the other. New wording

Why is the marginal user cost greater than zero (i.e. why is price greater than the marginal cost of extraction)?

This is a little more 'open ended'. What I was after was a discussion that marginal user cost must be greater than zero (and price > MC) reflects the scarcity of the resource and the opportunity cost of extraction (and consumption). Could also discuss that MUC goes up over time all others equal, and that it does so as a function of the discount rate.

Question 4 (25%) Freeriding / Common Pool Resources

a. How do free riding problems make agreements on global emission reductions unstable?

I set this up in class as a free rider problem in a prisoners dilemma game theory model. The optimal social solution is co-operation on emissions reduction, but there is always an incentive for the ith country to renege on the agreement and free ride. We did also briefly discuss how (a) repeated game settings may reduce these incentives (b) how punishment strategies may not work in a global emissions reductions setting (c) how agreements may be designed to reduce the incentives to free ride (for instance through issue linkage).

b. What are common pool resources and why do they lead to inefficient rates of harvesting?

Provide standard definition of common pool / open access resources. Demonstrate how this leads to harvesting at AC = AR and this competes away all surplus. See for instance bison harvesting diagram from class / textbook.