



AFRICAN ECONOMIC RESEARCH CONSORTIUM

Collaborative MA Programme in Economics for Anglophone Africa
(Except Nigeria)

JOINT FACILITY FOR ELECTIVES
JUNE – SEPTEMBER 2007

ENVIRONMENTAL ECONOMICS II

Second Semester: Final Examination

Duration: 3 Hours

Tuesday, September 25, 2007

INSTRUCTIONS:

1. This examination has **FOUR** questions. Answer **ANY THREE** questions.
2. All questions carry equal marks.
3. Write legibly.

Question 1:

Public Goods and Externalities

(20 marks)

- (a) Imagine a number of fishing firms with free access to a potentially productive resource, such as a fishing ground. Although the activity of each individual depletes the flow of services available for others, each has free use of the resource, paying only for the cost of the hired labour input (l). Using a simple mathematical model to capture this scenario and by considering the effect of an increase in firm k 's input level on firm j 's profits, show that this open access situation involves negative externalities. [5 marks]
- (b) Use game theory to illustrate the incentives to overexploit an open access fishery. In light of several examples documented in Ostrom's book entitled "Governing the Commons", what other property rights regime(s) can mitigate the potentially disastrous consequences of such open access resources? Under what circumstances is self-coordination of strategies likely to be successful in the property rights regime(s) in question? [15 marks]

Question 2:

Environmental Valuation Analysis

(20 marks)

- (a) Briefly describe the steps involved in valuing environmental amenities using the contingent valuation method. What are the following biases: starting point bias, payment vehicle bias, scope insensitivity and strategic bias? [10 marks]



- (b) One of the main benefits of national parks is their biodiversity. Some African governments earn significant revenue from the viewing of birds and animals in these parks. How would you estimate the value from viewing a rare bird species such as the flamingo for a country such as Kenya using the travel cost method? You are welcome to make reference to the methodology adopted by Navrud and Mungatana (1994), which was one of the mandatory course readings. In your answer, comment on the appropriateness of consumer surpluses of tourists and citizens as measures of local welfare, which the African governments should ideally be maximising. [10 marks]

Question 3: Environmental Policy Instruments (20 marks)

- (a) Suppose you are given the marginal costs of abatement of the only two firms in the economy, A and B:

$$MC_i = p_i a_i$$

where $i=A, B$ and a_i is the abatement level by firm i . Each firm also has fixed costs of abatement of 17. Assume that $p_A=1$ and $p_B=h$.

Demonstrate that the cost penalty from sharing abatement equally between the two firms rather than using the least-cost distribution of abatement is larger the greater is the difference in the firms' abatement marginal cost functions (as measured by the value of the slope parameter in the abatement cost functions). Assume an abatement target of $2a$.

[10 marks]

- (b) The implementation of a marketable permits system requires that the Environmental Protection Agency (EPA) selects a method by which the total allowable quantity of permits (the cap) is initially allocated among pollution sources. Explain and graphically show how the market price of permits is determined in each of the two cases where the EPA either sells all permits by auction or allocates all permits at no charge. Discuss the distributional implications of these different methods by which marketable permits may be initially allocated. State all your assumptions clearly. [10 marks]

Question 4: International Environmental Issues (20 marks)

- (a) Suppose the 14 Southern African Development Community (SADC) countries have to choose between two strategies, namely *reducing CO₂ emissions* and *business as usual*. Assume that *reducing CO₂ emissions* (i.e. CO₂ abatement) comes at a cost of 5 to the abating country; it confers benefits of 3 to the abating country and benefits of 3 to each of the other SADC countries. Which outcome with respect to CO₂ emissions in SADC would you predict? Show your working. Is the game that SADC countries are playing different from the Prisoner's Dilemma? Support your position. [5 marks]

SECTION B

Answer ONE question. Each question carries 22 marks.

Question Two (22 marks)

- a) What are the role and implications of subsidies as environmental policy instruments? Discuss. (6 marks)
- b) Compare and contrast emission charges and product charges as environmental policy instruments. (10 marks)
- c) Briefly discuss the concept of genuine savings and their implications for sustainable development. (6 marks)

Question Three (22 marks)

- a) Given a negatively sloped marginal benefit of abatement curve, use diagrams to discuss how uncertainty about the marginal cost of abatement could affect the choice between emission taxes and emission permits. (12 marks)
- b) Write a short note on "Economy-wide policies and the environment". Mention examples of policy measures and their possible effects on the environment. (10 marks)

SECTION C

Answer ONE question. Each question carries 14 marks.

Question Four (14 marks)

- a) What are debt-for-nature swaps? (5 marks)
- b) Discuss the role and implications of debt-for-nature swaps in relation to environmental problems in developing countries. (9 marks)

Question Five (14 marks)

- a) What are the problems with conventional project analysis in relation to the treatment of environmental issues? (5 marks)
- b) Briefly discuss the nature and implications of the concept of environmentally compensating projects. (9 marks)