

Resource & Environmental Economics Field Examination  
Jan 2011

Instructions:

- You have 4 hours to complete the exam. This time commences at the end of the 15-minute reading period during which no writing is allowed.
- Please use your assigned "alpha letter" on every page to identify your exam and number each page. Do not use your name or social security number. Write on only one side of the page leaving at least one inch margins. When you submit the exam, make sure the pages are in order.
- You have four questions to answer.

Answer four of the following five questions.

**Question #1**

The Brazilian government is considering a program to pay rural landowners for reducing deforestation and forest degradation (a "REDD" program) in the Amazon region with the objective of reducing greenhouse gas emissions. One major concern with payments in such a REDD program is the level of additionality (i.e., the level of emissions reduction with the payment relative to the level without payment).

Assume that you have extensive spatial data for the region.

- a) How would you empirically assess the additionality of the payments?
- b) How would you incorporate the assessment of additionality into the program design?
- c) What econometric issues would you face when attempting to measure additionality?

**Question #2**

There has been a great deal of concern for the problem of species extinctions world wide. The question arises as to why rational decision making would ever drive a species to extinction. We wish you to explore the reasons for this under two basic sets of assumptions

- a) Show why extinction can result when the benefits that relate to the species' existence are public and the costs of preservation are private. Note that a complete answer would also show conditions under which extinction would not result.
- b) Show why extinction can still be the optimal when both the benefits of existence and the costs of preservation are private. Again, a complete answer would also show conditions under which extinction would not result.

In your answer it is critical that you

- Provide economic intuition **and** a formal (though simple) model.
- Keep in mind, that given that question refers to changes over time, your models and the economic intuition should include some attention to dynamic processes.

### Question #3

There has been a long debate on whether a country that trades will obtain economic growth and, thus, whether trading will lead to more or less environmental degradation. Climate change may change the resource and production position of some countries such as China, making it less productive for them to produce their own food, or less able to utilize their coal in power production, as examples. Choose a developing country that has natural resources of interest to the rest of the world (it can be China, or even be an imaginary one) and explain whether you think that climate change, its connection to trading goods and services, and to growth, will result in better or worse environmental conditions in that country.

- a) In your answer, integrate the recent empirical evidence we have about the Environmental Kuznets Curve. Be specific in regard to types of pollutants that you are thinking about.
- b) What type of economic model would be most suited to answer this question? What are the key components of such a model that will allow the direction on environmental conditions to be determined?

### Question #4

The U.S. government is currently promoting renewable fuels and renewably produced electricity. Issues include the advisability of promotional policies relative to other policy options and the effects that such promotions would potentially have on water use efficiency and water scarcity.

- a) What are the primary resources problems being addressed by these promotional policies? What alternative policies could be used for this problem?
- b) Suppose the region is concerned about potential increased water use and is simultaneously considering the implementation of a program that subsidizes irrigation efficiency. Use a simple economic framework to develop water implications of the two policies on renewable energy promotion and water conservation, both independently and simultaneously.
- c) Suppose you were asked to provide a detailed study on water use implications. Describe an analytic, empirical framework to analyze the increased biofuel production stemming from renewable fuel promotions and how you would modify it to address the following two situations:
  - i. Implications for a region using surface water that does not have meaningful water storage.
  - ii. Implications for a region using ground water from a depletable aquifer.

### Question #5

Cap and trade is one proposed approach to reduce global warming. Some argue that the use of carbon taxes is a better approach than cap and trade.

- a) Explain which of these two approaches you favor and why, specifically targeting their effectiveness in reducing global warming.
- b) In your answer, explain what an economist would mean by “better,” in terms of the choice between approaches taken.