

## **Resource & Environmental Economics Field Examination**

**May 30, 2013**

### 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. Do not use your name or social security number. Write on only one side of the page leaving at least one inch margins. Number each page, and make sure the pages are in order.
- You have four questions to answer.

Answer four of the five questions.

1. Consider the problem of water pollution. Environmental economics has offered a variety of ways to address problems like this including (a) Coasian bargaining, (b) per-unit effluent charges or effluent reduction payments, and (c) cap and trade. For each of these three approaches (i) explain what is meant by the approach, (ii) explain how it might be applied to deal with water pollution problems, and (iii) a brief explanation of the conditions in which that approach might be the best way to address a water pollution problem.
  
2. Stated choice experiment modeling (SCM) is much in vogue now as a way of valuing environmental goods.  
However, some skeptics argue that it, like the contingent valuation approach (CVM), uses only hypothetical scenarios and therefore is subject to problems.
  - a. What are the advantages, if any, of SCM over CVM?
  - b. Compared to a revealed preference approach that relies on actual behavior, what problems do you see a hypothetical approach having?
  - c. Skeptics have argued that the mental tasks involved in a complicated stated choice experiment lead subjects to make many mistakes in their responses. What new approaches in SCM can be taken to test for these mistakes across a sample of individuals?
  
3. One way of looking at the climate change problem is to consider the earth's atmosphere as a scarce natural resource that can be optimally depleted over time. In other words, the atmosphere has some capacity to handle CO<sub>2</sub> emissions and remain in a state that provides key services to us. However, increasing CO<sub>2</sub> might be thought of as depleting this stock of clean air.
  - a. In general terms and with two examples, describe the services provided by the earth's atmosphere that would be diminished as this feature of the atmosphere is depleted.
  - b. Develop and explain a formal model that can be used to analyze the long-term economics of the climate change problem.
  - c. Identify and explain the prescriptive advice emerging from this model.
  - d. Using your model, identify the key factors that determine how fast we should deplete the earth's atmosphere if at all?

4. Due to a large country's traditional doctrine that everyone should have access to low-cost household water, (i) water rates are established at the national level and are the same for all cities, (ii) the nation utilizes a four-tier increasing block rate, and (iii) only the fourth tier price approximates the actual average cost of getting treated water to households. Policy is that the first-tier price is 10% of the last tier.

The financial strain of these policies cause municipal water suppliers (publicly owned) to undersupply quantity demanded. Because of insufficient water quantity and poor infrastructure, households are able to receive piped water for only a few hours each day. During these periods, most households take all the water they can, limited by either the duration of delivery or household storage capacity, and store it for later use.

- a. Within this environment, suppose you were asked to estimate the marginal value of delivered water within a particular city. Discuss this task. Begin with a model of supply and demand recognizing the differences between households. What methods would you select to obtain empirical estimates of marginal value and how would you proceed?
  - b. The question of part (a) arises because the city is interested in assessing the benefits of various water projects or policies. If you had the opportunity to recommend reforms, identify two strategies you feel would be especially beneficial. Describe each one clearly, and discuss why each one is commendable based on your assessment of the problem characteristics.
5. Climate change can be addressed via four policy options:
- i. no action,
  - ii. information gathering to see what is happening and narrow the uncertainty,
  - iii. adaptation, and/or
  - iv. mitigation.
- a. Present and describe an economic model that could be used to assess whether each of the four approaches should be pursued. The model should be sufficiently general to allow for the possibility that any of the four policy options might be found to be desirable.
  - b. For each of the four options, describe the conditions under which economic reasoning would find that the policy option should be pursued.