Resource & Environmental Economics Field Examination

May 26, 2016

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.

1. There are three major owner types for U.S. forests: public (federal government), private/corporate, and private non-corporate. Publicly owned forests are found on lands managed by the U.S. Dept. of Agriculture, the National Park Service, and the U.S. Bureau of Land Management, among other agencies.

    a. What is the optimal rotation age for forests managed by private corporations? You may assume that these owners seek only timber profits. Lay out a model that identifies this optimal age.

    b. How would your model change for the non-corporate owners and the forests on lands managed by the government? Be sure to state your assumptions for these management types. Highlight the differences you expect to see in the optimal rotation age for the public lands versus the privately managed/owned land. Which types of forest stands will be cut sooner?

2. Stated preference (SP) approaches to nonmarket valuation get criticized by some mainstream economists.

    a. What key problems limit the SP approach to valuation of say, damages from fracking (hydraulic fracturing)? In your answer, you may assume that the reader has some basic familiarity with issues associated with fracking.

    b. Again using the fracking situation as context, do you believe that discrete choice experiments (DCE or stated choice) have advantages over contingent valuation? Why or why not?

    c. Do DCE's have any advantages in this fracking context over revealed preference approaches?

3. The accumulation of greenhouse gases in the atmosphere is expected to impose significant costs on the global economy. One of the reasons the problem is particularly difficult to solve is that the planet's atmosphere is a common property resource.

    a. Using a parsimonious (simple) mathematical model, demonstrate that the actions of nations will not lead to a socially efficient outcome in this dynamic, environmental problem. You may assume that nations are homogenous in important respects, that there are a large number of them, and that they do not cooperate with one another in environmental management.

    b. Building on your answer in part a, describe a policy that would be mutually beneficial to all nations while moving countries in the direction of the social optimum.

    c. Explain how you would analyze whether or not the policy developed in part b could be enforced through sanctions that would impose costs on the nations that deviate from the socially optimal path. For example, sanctions can include tarrifs, taxes, or other penalties with economic consequences. Assume that the sanctions impose costs on the offending nation and are costly to the nations that impose those sanctions.

4. Increased year-to-year variances in natural water supply are a predicted consequence of climate change for many regions of the world. For example, in the southwestern US (i) a rising variance in supply appears to be combining with (ii) slowly declining mean annual precipitation, (iii) reduced mean snowpack accumulations, and (iv) slowly rising demand. All four forces are potentially significant.

   What important policy instruments or tools can an economist propose to assist water allocation in the southwest under these conditions? Discuss the important features and potential achievements of these instruments/tools. Explain how these things would be put into practice, especially describing the governmental roles (what must governments do?) and any institutional modifications needed to install them. Do not neglect the environmental side of allocation policy, in which freshwater inflows to estuaries and instream flows will need to be sustained in an economically responsible manner.

5. The mayor of College Station is considering the replacement of existing air conditioning (AC) units in government buildings with high efficiency AC units. The mayor has asked you to consult on this project. The mayor wants to know the causal effect of high efficiency AC units on electricity consumption. To answer this question, she plans to install high efficiency AC units in government buildings with energy consumption in the top decile. She hopes to estimate the causal effect by comparing average energy consumption in buildings with the high efficiency units to consumption in buildings without these units.

   a. Explain to the mayor how, if at all, her proposed experiment differs from an ideal economic experiment to estimate the effect of high efficiency AC units on energy consumption. Compare, using the potential outcomes framework, the causal effect estimate from the mayor's experiment to the causal effect estimate in your ideal experiment.

   b. You have convinced the Mayor to run your ideal experiment, but she wants to make one small tweak, or change in your proposed plan. She wants to save money by using a very small treatment group (5% of population). Using words and equations, describe your ideal experiment and explain how the 5% restriction will affect your estimate of the causal effect.

   c. The mayor relents and allows you to run your ideal experiment without the 5% restriction. Once the experiment is over, you find out that some building managers did not like the new AC units and replaced them with the old units during the experiment. Provide a detailed explaination to the mayor, again using the potential outcomes framework, what can still be learned from this experiment, even when the building managers took this action.