

Resource & Environmental Economics Field Examination
Jan, 2010

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.

Answer four of the following five questions.

1. Suppose that you are hired to help the State of Texas determine how to optimally manage its groundwater supplies. First, explain in a simple model what conditions you will need to depict the amount of groundwater to extract at any given time, assuming you have full information. Next, assume you submit your report, but your boss comes back to you and points out that global warming may change the future with respect to what we know about temperature and population growth. At best, the modelers say they can only predict the probability distribution of the future climate, and therefore the future outcomes involve risk. Explain how your key conditions and recommendations will change in this world that must incorporate risks, due to incomplete information.
2. Climate change will likely cause significant sea-level rise affecting areas such as New Orleans and Sri Lanka. Of particular concern are losses of (a) rice-producing areas, (b) environmentally valuable wetlands and (c) areas with numerous human dwellings (housing). Suggest economic approaches you would use to assess damage estimates of land inundation under a particular scenario of sea-level rise (e.g., two meters rise by 2100) pertinent to each of these three concerns (no more than two approaches for each concern) explaining their basic economic setting, main assumptions and basic empirical procedure.
3. You have electricity use data and prices at the state level for the past 25 years. Fuel source for electricity generation in the United States varies by region. For example the majority of generation in the Midwest is from coal-fired plants, whereas in the Northwest hydropower generation provides the majority of electricity. You also suspect there are regional differences in demand for electricity. The U.S. Department of Energy is interested in developing electricity demand elasticities for each region that they might use to determine how electricity price changes may impact electricity use and global warming. Develop a methodology to estimate the necessary elasticities. Be specific in the variables you would include, how you would use the data, potential statistical issues, and estimation technique(s) you would employ.

4. Current legislation being considered within the US Congress proposes to use a cap-and-trade approach to reduce the overall emissions of carbon dioxide and other greenhouse gases in the United States. There are many features that have received substantial attention including the following issues: (a) initial allocation, (b) provisions to allow agricultural offsets from sequestration, and (c) the uncertainty in addressing this problem over the long run.

Drawing on economic theory and experience in other markets, discuss the advantages and disadvantages of a cap and trade approach relative to alternatives of using a tax or using “command and control” type provisions. In your answer, you should discuss at least two of the three issues mentioned above in (a)-(c).

5. Assume that a coal-fired power plant was recently constructed in the vicinity of Beaumont, Texas. Local residents near the plant claim that their property values have decreased due to the emission of air pollution (e.g., particulate matter, mercury). You are hired as a consultant to assess the damages to local residents regarding the negative impact on their home values.
 - a) Briefly discuss an economic model that provides the basis for assessing the impact that the power plant has on property values. Include a graph as part of your answer.
 - b) Explain the empirical analysis that you could perform to estimate the heterogeneity of the impacts on property owners in the region. Be specific about the data you would need and the estimation techniques that you would use for your analysis.
 - c) Based on theory and practice, what are some of the challenges that you would likely face when implementing this analysis?