Resource & Environmental Economics Field Examination
May 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.

Answer four of the following five questions.

Question #1

The stated choice model (SCM) is now probably the most popular non-market valuation approach used that relies on stated preferences (SP), as opposed to revealed preferences (RP).

a) Explain why you think this has happened and make sure to explain the difference between SP and RP.
b) Also explain what advantages stated preferences might have over a purely revealed preference approach, and explain its limitations.
c) In your view, what are two of the most important recent innovations that have been developed to bolster the credibility of the SCM approach? Explain why.

Question #2

The United States Department of Agriculture (USDA) administers the Conservation Reserve program (CRP) where farmers are paid to retire cropland and allow the land to be put into less intensive uses (e.g., pasture, other non-cropland uses). A major issue with these USDA payments is that the program effectiveness may be reduced due to slippage where farmed acreage is increased by cultivating lands that were not previously in cropland or CRP.

a) Provide an economic model to explain how these farm CRP payments affect land use decisions and how slippage effects can result.
b) Describe the empirical approach and data you could use to measure the level of slippage associated with the USDA CRP program.
c) What econometric issues would you face when attempting this approach?

Question #3

Various approaches have been used to deal with the potential damage from climate change. Today one of the big issues is climate adaptation. Mitigation is another topic that is being discussed.

a) What is the difference between adaptation and mitigation?
b) Why from an economic viewpoint might adaptation be an issue worthy of discussion?
c) Why from an economic viewpoint might mitigation be a focus?

d) Economically and conceptually how would one establish a balance between investing in adaptation and investing in climate change mitigation?

Question #4

Discount rates alter actions over time
a) Explain how the choice of a social discount rate may affect the outcome of a benefit-cost and optimal water use analysis for water pumping from a depletable aquifer. Also, make sure to draw on the literature to explain why this is critical.
b) Would we expect the social and private discount rate to be the same?
c) What do you believe the principles are behind selecting the proper social discount rate for assessing whether society should take actions to slow extraction today.
d) Would you expect discount rates to be constant over time for an individual? That is, discuss whether there is an age effect on the discount rate for private individuals, and whether as the population gets older this might affect the choice of a social discount rate.

Question #5

As a set of pollutants, the gases that cause climate change, might be modeled as a single composite pollutant. Denote by E_t the stock of the composite pollutant in the atmosphere at time t, and e_t the rate of emissions of the composite pollutant. Assume for simplicity that the stock pollutant does not deteriorate so that $\dot{E}_t = e_t$. Assume for this question that there is a downward sloping marginal benefit function for emissions, $B(e)$ so that the direct benefits of emissions e_t are $\int_0^{e_t} B(e)de$. There exists a level of emissions $\bar{e}$ where $B(\bar{e}) = 0$. At the same time, the economy suffers damages from the stock of the pollutant, $D(E_t)$ with $\partial D/\partial E > 0$.

The functions B and D are assumed to hold at all points in time for the foreseeable future. The planner and all other participants in the economy discount benefits and costs at the rate r.

a) Describe in words what would be meant by the "optimal" rate of emissions.
b) State the optimization that would be used to solve the present-value optimization problem and, from the first-order conditions alone, explain the conditions under which the optimal path for emissions will be increasing over time?
c) In the absence of regulations. What would be the time path of E? Explain.
d) Describe a policy that could be used to move the economy toward the socially optimal path. How would your policy ensure that the optimal *path* is achieved as opposed to the optimal rate at some point in time?