

Resource & Environmental Economics Field Examination

May 28, 2015

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. Suppose you are asked to conduct a hedonic analysis of house properties to evaluate the potential impacts of hydraulic fracturing (fracking) which is an oil extraction technology having negative local noise, water quality, and air quality implications. Answer the following.
 - a. Presuming that your audience is undergraduate students, develop and describe a simple hedonic model for the above circumstances. You might do this by relying on the pioneering efforts of Rosen and others. Assume that only cross-sectional property transaction data is available.
 - b. For advanced audiences such as economics graduate students and Ph.D.s, explain how the analysis above can be enhanced using time-series data, i.e. repeated sales data. Your efforts here should be more technical and rigorous.
 - c. Also for advanced audiences, explain remaining concerns involving identification and endogeneity problems, even when time series data is pooled with cross sectional data. What is the “sorting” problem?
 - d. Offer at least one approach that improves on the pooled approach such that you can be confident that your model handles sorting issues.

2. Some economists have only disdain for stated preference (SP) models in modeling behavior and obtaining values (maximum willingness to pay, or WTP) for various changes in relevant conditions.
 - a. What would you say are the top three most serious problems that arise for SP modeling? Confine your answer to the context of applications in resource/environmental economics.
 - b. If you can do so, defend the use of SP approaches using at least two reasons why resource economists should continue to use them in light of the argued problems. These reasons may depend on recent improvements in SP modelling. If you cannot find at least two compelling reasons for continuing to use SP approaches, explain why you believe it is ok to discontinue their use. If, for example, you believe revealed preference (RP) approaches are adequate for addressing our questions in resource economics, explain this.

3. The figure below presents a simulated series of prices for a nonrenewable resource from Livernois (2009). The author states that this stochastic simulation is based on the standard Hotelling model of optimal allocation of nonrenewable resources, but with a few important real-world features added to it.

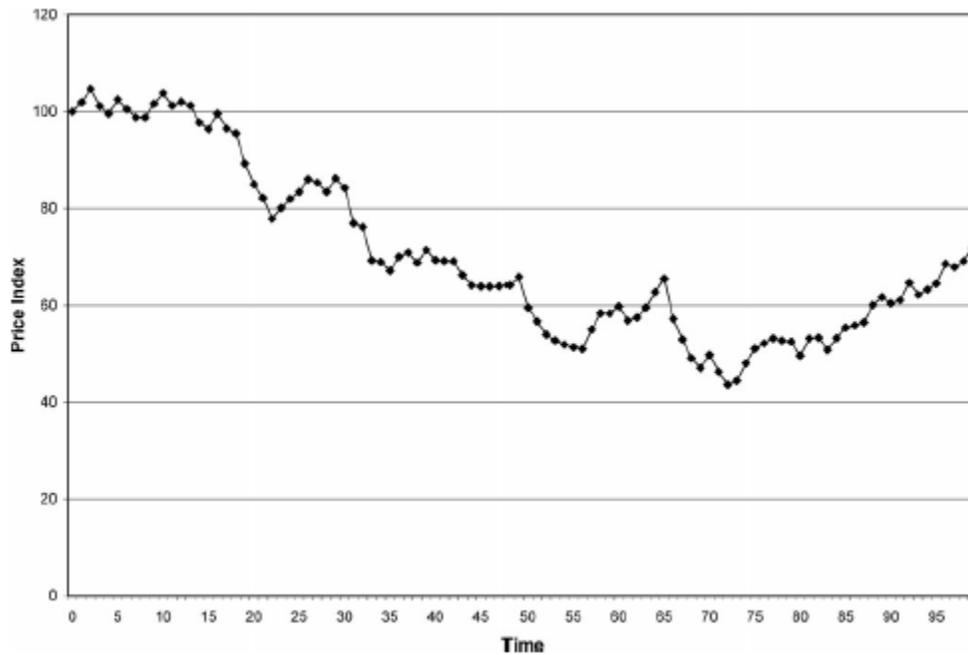


Figure 1. Simulated price path for a nonrenewable resource.

- Are the simulated results largely consistent or inconsistent with the predictions of the standard simple Hotelling model? Present the standard theoretical model and derive the implications for changes in prices over time.
- Discuss two real-world features that one might want to add to the standard model and explain how those features might have effects yielding predictions that are more or less consistent with the simulated series presented in the figure.
- There have been many attempts to test whether prices are consistent with the Hotelling model. What is one approach that might be used to test whether the simulations graphed above are consistent with Hotelling-type behavior? Assume that any required price or quantity data are available.

4. There are a variety of greenhouse gas (GHG) sources with fossil fuel based emissions being the largest. Some say that efforts to reduce climate change should focus exclusively on fossil fuel use, but we could also limit GHG emissions from a variety of other sources including livestock, fertilization, rice fields, and coal mines. Others argue that lifestyle changes such as altering our diets must be a major part of any strategy to reduce greenhouse gas emissions.
 - a. Develop an economic framework that explains the implications of focusing exclusively on fossil fuels.
 - b. Discuss the economic issues that should be taken into account when considering whether policy makers might want to implement policies that seek to alter the use of a commodity such as meat versus policies that seek to reduce emissions from animal production by altering management.

5. Summer ozone (O₃) levels in Houston regularly fail ambient air quality requirements, though not across the entire city. [Recall that ground-level ozone is a gas that is harmful to health (not to be confused with upper atmosphere ozone layer issues). Although ozone is an unstable compound that can decay quickly, summer heat and sunlight form ozone from the emissions of automobiles and fuel-burning plants.] Ozone hot spots occur at locations that are downwind of major emission points, including industrial sites and high traffic areas, especially on sunny summer days. Because the health-focused nature of this problem suggests that policies target pollution peaks and hot spots (rather than means), there is justification for policy instruments that can discriminate on the basis of emission location and/or time of year.

Generally inventory and discuss the variety of policies available for negative externalities. Of these inventoried policies, which ones are reasonable approaches for air quality issues in general and why or why not? Can any of the policy approaches for air quality be designed and implemented to fit the spatial and temporal features of the Houston ozone issue? Explain. Do you see one or more recommendable policies and why/not?