

**Review Questions for Final Examination**

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**1. Negative Externalities and Policy**

1. What are negative externalities? Suggest alternative policies to control externalities. What criteria should be considered in establishing pollution control policies in developing countries?
2. Compare the relative merits of taxes, subsidies, tradable permits, and direct controls in addressing pollution problems.
3. What principles should guide resource restoration and cleanup policies?
4. How do heterogeneity and uncertainty considerations affect the selection of pollution control policies? What tools can be used to deal with these issues?
5. The marginal benefit (demand) of fertilizers is  $10 - X$  dollars per ton where  $X$  is quantity applied. The price of the chemicals is \$1.00 per ton and the social cost is  $2(X)$  dollars per ton.
  - a. What is the market use level of the fertilizer?
  - b. What are the optimal use level and optimal tax?
  - c. Compare the consequences of using the optimal tax with a limit on fertilizer and tradable permits.

**2. Technological Change and Pollution Control**

1. What are the processes of adoption and diffusion? Provide two alternative explanations to the S-shape of the diffusion curve.
  2. What are conservation technologies (resource-conserving technologies)? What factors explain their adoption? What policies should you use to induce adoption?
  3. What role can the private sector, the public sector, NGOs, and the international community play in inducing adoption of conservation technologies in developing countries?
  4. A thousand ton of coal generates 2 million units of energy with a traditional technology, and emits 1 million units of carbon. A cleaner technology generates 2.2 million units of energy and generates half a million units of carbon. A plant has the capacity to process 10 thousand tons of coal annually. The price of energy is 10 cents per energy unit. Introducing the cleaner technology requires an extra cost of \$300,000 annually.
 

Design policies that will lead to the adoption of the cleaner technology.
- 3. Water**
1. What factors affect the value, price, and use of water?
  2. What mechanisms exist for the allocation of water? What factors affect the transition from water rights to water markets?
  3. What are the main limitations and advantages of water trading systems?

4. What considerations should be incorporated in the design of water project efforts? What is and should be the role of benefit-cost analysis in deciding which projects should be executed and when?

5. What is the role of collective action in water resource management?

6. What types of water quality problems exist in developing countries? Consider alternative mechanisms to address these issues.

**4. The Economics of Climate Change**

1. What are the likely impacts of climate change on agriculture? on developing countries? What factor will determine and affect the magnitudes of these impacts?
  2. What are the elements of the Kyoto Protocol? What are the main issues of disagreement with regard to the implementation of this protocol? How does it address the concern of developing countries?
  3. What are the merits and what is the potential of various carbon sequestration policies? Who are the gainers and losers of these policies? What are the implementation issues that may be encountered?
- 5. Environmental Services**
1. What are the main categories of environmental services and what policies are appropriate to obtain these services?
  2. What are the challenges in managing and designing environmental services programs, and how can they be addressed?
  3. Compare and assess the main features of major environmental services programs in developed and developing countries.
  4. What criteria are used to target resource purchases in developing countries? What are the main issues in implementing such programs? How can they affect the poor?

**6. Environmental and Health Risks of Pesticides**

1. What are the main benefits and costs of pesticide use in developing countries? How do you analyze the impacts of pesticides use in agriculture?
2. Explain the main elements of the risk generation process and illustrate how we can design policies better with quantitative understanding of these processes.
3. What are the main elements of the current regulatory framework of chemical pesticides in the United States (and around the world)? What are the main strengths and weaknesses of the system?
4. What are the main merits and disadvantages of harmonization of pesticide regulations internationally?
5. Each person generates 10 kilograms of waste materials that are disposed into a river. A city consists of 50,000 people, and the river feeds into a lake that is used for fishing. The waste material is bio-accumulating and is stored in the fish, and the annual risk of the disease for each member of the population is
 
$$10^{-6} \cdot \text{total waste in tons} \cdot \text{filtering cost (in units of \$1,000)}$$

- a. How much should be spent on waste treatment if the policy regulation aims to limit risk to  $5 \cdot 10^{-5}$  for each member of the population?
- b. What is the cleaning expense if the policymaker aims to restrict the average number of aggregated disease cases to one?

### **7. Biotechnology and International Property Rights**

1. Explain the notion of public goods and justify the role of the government in providing public goods. What are global public goods? Suggest mechanisms for their provisions. Provide specific examples.
2. What are the roles of the public sector in the innovation process? Analyze the rational for the patent system and the technology transfer arrangements from the university to the private sector.
3. What are the main obstacles for the transfer of technologies and provision of products to serve the poor in developing countries? What policy actions do you suggest to accelerate the availability and enhance the affordability of technologies and products for the poor?