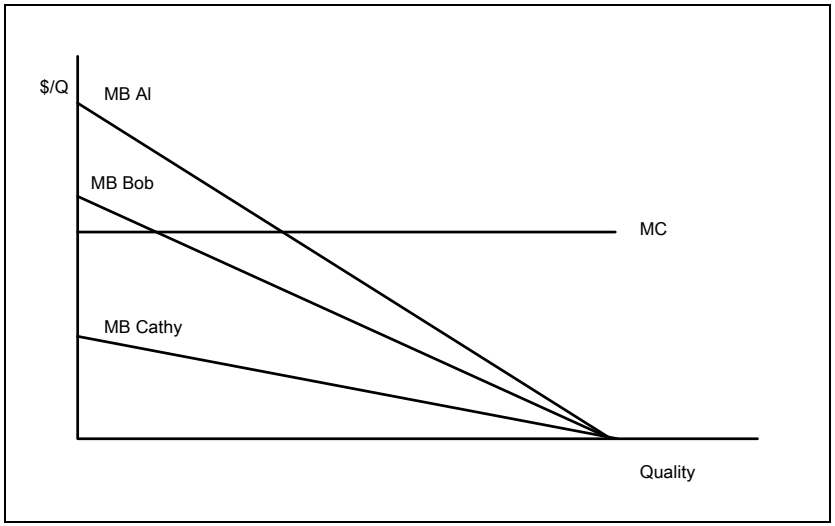
Econ 335 Environmental Economics Spring 2008
GMU Review Sheet 2 R. Congleton

1. Identify and/or Define:

a. Marginal Benefit
b. Marginal External Cost
c. Pigovian Tax
d. Expected Value
e. Present Value
f. Median Voter Model
g. the Regulatory Dilemma
h. NIMBY
i. Race to the Bottom
j. Federalism
k.Effluent Market
l. Niskanan Model
m.Carbon Tax
n. Acid Rain
o. CFC agreements
p. Global Warming
q. Sustainable Development
r. Kyoto Protocol

2. Consider the following series of voter demands for municipal water quality.



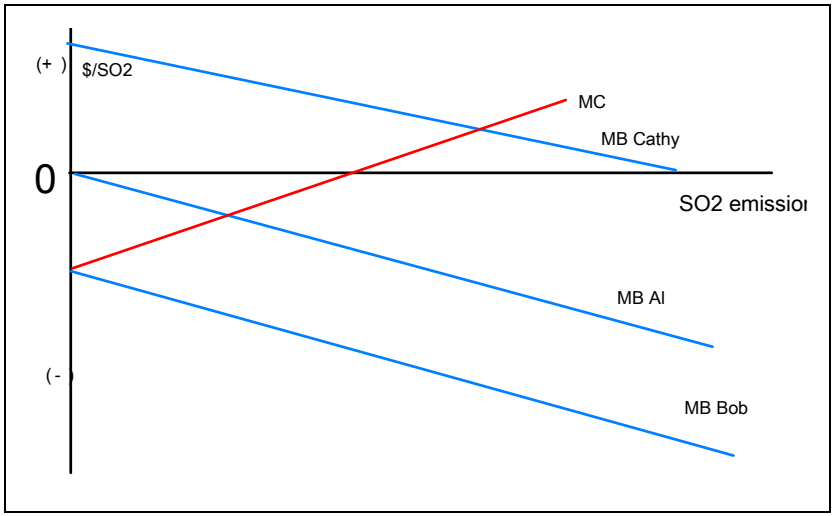
a. Find the Pareto Efficient level of water quality when the municipal water plant can provide only a single quality level for all three voters simultaneously.

b. Find the level that would be preferred by the median voter in the case in which the cost of water quality are shared equally.

w (Hint, in this case each voter pays MC/3 in taxes.)

c. Find the level that would be preferred if only Al and Bob share the tax burden.

3. Consider the following series of demands for SO2 emissions.



a. Suppose that MC represents the cost of production associated with SO2 emissions.

w What level will Cathy select if she controls the production process.

w What level is Pareto Efficient?

w What level of emissions will be preferred by the median voter given the existing distribution of costs (0 for Bob and Al).

b. Explain why are SO2 emissions levels > 0 can be Pareto efficient even if SO2 emissions are disliked by most persons. Note supporting areas in your diagram.

4. Now redraw the SO2 problem in the electricity production domain with market supply and consumer demands for electricity. Include a marginal external cost curve.

a. Determine the Pareto efficient output of electricity.

- How high would an electricity tax have to be to reduce emissions to the efficient level? (Show this on your diagram and discuss briefly.)
- How would the effect of direct regulation of SO2 emissions affect your diagram?

b. How would an SO_2 emissions market affect the cost of meeting emissions targets?

- Use a diagram to illustrate your reasoning.
- Are there any cases where subsidizing emission reducing technology is a better solution? Discuss.
- Are there cases in which the median voter might prefer an emissions tax to direct regulation?

5. In separate diagrams show that the median voter model can generate CFC regulatory policies that are (i) too lax, (ii) Pareto optimal (maximize social net benefits) and (iii) too stringent.

a. Describe briefly the characteristics of the distribution of voter ideal points which account for these three possibilities.

b. Are some environmental problems more amenable to solution by majority voting than others? Discuss.

c. How do international aspects of a thinning Ozone layer affect your analysis?

- Does it require a separate diagram or game matrix.

6. Many current international environmental problems tend to be very long run problems. For example, the noticeable effects of accumulating CO_2 on global temperatures are between 50 and 200 years in the future.

a. Construct a simple cost benefit analysis of long run costs and benefits associated with global warming.

- Assume an infinite time horizon, a 3 percent real discount rate, that there are benefits associated with stablising the earth's average temperature, and that the costs of implementing your regulations are significant--perhaps equal to 60% of the damages avoided.
- List consequences that generate costs and benefits and (arbitrarily) assign values for time streams of their benefits and costs.
- How serious is the problem according to your calculations?
- Now suppose that there is a fifty percent chance that there will be no change in global temperatures because of negative feedback.
- How does this change your analysis and conclusions?

b. List reasons why the median voter might choose to address such intergenerational externalities.

- Would the age of the median voter matter?
- Would it matter whether or not the median voter had children or not?
- Would the ideology of the median voter matter?

c. Use a diagram and/or game matrix to illustrate why carbon taxes may be set too low by even an environmentally concerned country--assuming that there would be substantial global warming without them and that the damages would be severe.

d. Discuss how an interest group might try to influence policies on global warming even in democratic governments dominated by the median voter.

7. International environmental externality and commons problems can only be addressed via Coasian contracts (treaties) between the governments of the parties affected by the externalities.

a. Explain why Coasian contracts are the only policy device for addressing international environmental problems.

b. Construct a 3x3 diagram that illustrates the "regulatory externality" generated by one country's efforts to regulate an effluent that is eventually carried across the border by the wind or water.

- Use a 3x3 game matrix to illustrate the nature of the international regulation dilemma.
- Use a 3x3 game matrix to illustrate the free-riding problem associated with implementing an international agreement. Discuss how such problems might be addressed via a treaty.

c. To be effective, treaties have to be "self enforcing" in the sense that no signatory has an incentive to default on his treaty obligations.

- (i) Use your game in part "d" to demonstrate that each party has an incentive to cheat on the original agreement.

- (ii) Is there a way to solve this problem? If so describe, if not criticize.
- (iii) How can the *repeated* nature of the game help solve this problem?

d. Explain why (or whether) Coasian contracts between nations are more problematic than those between individuals within a single nation.

8. Discuss briefly how you would attempt to assess the costs and benefits of unregulated global warming.

a. Discuss uncertainties involved in trying to estimate the damages associated with future fossil fuel use.

b. Discuss how increasing scarcity of fossil fuels may affect future CO2 densities.

c. Discuss some of the core scientific issues involved in estimating the effects of increased CO2 emissions on the average temperature of the earth.

- Write down an algebraic expression for the present value of adhering to the Kyoto accords for the case in which all scientific questions have been completely solved.
- Now write down an algebraic expression for the expected present value of implementing Kyoto given scientific uncertainties.

9. Can there be international NIMBY or Race to the Top problems?

- Create a 3x3 game to illustrate such a case.
- Show how a treaty might be used to solve the problem.
- Can you think of a way to make the treaty “self enforcing”?

10. Niskanen's model of bureaucracy models bureaucrats as budget maximizers. Explore some implications of the Niskanen model for environmental policy making.

a. According to that model, the EPA will prefer one kind of regulation over another because of anticipated increases in its budget. Consider how different solutions (direct regulation, Pigovian taxes and subsidies, cap and trade systems, etc) would affect EPA budgets.

b. Illustrate the Niskanan bureaucrat's "ideal" regulatory stringency for direct regulations under the assumption that budgets increase as the stringency of environmental controls increases.

c. Would budgetary concerns ever affect the agency's allocation of research grants to scholars interested in environmental science?

11. In a democracy, an ideal bureaucracy might adopt policies that the median voter would have preferred had she/he sufficient information to assess her/his own benefits and costs on the policy matters of interest. Voters may lack relevant information because of information problems faced by the median voter. So, it can be argued that an ideal bureaucracy would not always try to advance the current policy "goals" of the median voter.

a. Is there a method to distinguish the environmental policies of an ideal bureaucracy from that of a Niskanan budget maximizer? Discuss.

b. Contrast the policies of an ideal environmental bureaucracy with one that maximizes social net benefits.

12. There has long been a market for used metals, glass and some paper products that would be commercially recycled by profit maximizing firms. Given this, analyze the merits of subsidized recycling using either an externality diagram or a game matrix.

a. In what sense can the commercial recycling market be said to have failed?

- Is there an externality problem? (Explain)
- Is there a free-riding problem? (Explain)

b. Should everything be recycled? Are their cases in which recycling is not an economically efficient objective? Explain.

c. Discus why the current generation may NOT use resources at "sustainable rates." but still be inclined to regulate itself to assure higher standards of living for future generations.

13. [Remember to check through Study Guide 1 to make sure that you still can apply the tools and ideas from the first half of the semester. The exam is cumulative.]