Economics 33530: Exam 2 Key

Professor Jensen Fall 2007

Part I: Short-answer Essays (10 points each). Be sure to include enough discussion to explain your answer.

1. Compare and contrast the maximum sustainable yield approach to determining the "optimal" harvesting fish to the maximum net economic yield approach.

The maximum sustainable yield approach focuses on choosing the level of effort such that the corresponding catch is the maximum that can occur without reducing the population of fish. The maximum net economic yield approach focuses on choosing the level of effort such that industry profit (net economic benefit) from the catch is maximized. The former focuses on biomass (pounds of fish) without regard to its economic value, while the latter focuses only on economic value, and limits catch only as a way of enhancing profit. Also, the former focuses on sustaining the fish population indefinitely, while the latter is myopic – it ignores the effects on current catch on the future population, and so on the future costs of fishing, and future net economic yield, as well. Neither considers consumer surplus.

2. Briefly describe two types of limits currently used to regulate harvesting in open-access fisheries. Also describe two types of non-regulatory policies that could be used to reduce the size of harvests in open-access fisheries.

Limits currently placed on how (catch techniques used), which (minimum size), when (not in spawning season), where (not near spawning grounds), and how many. Alternatively, we could place taxes on effort (number of vessels) or the size of the catch, use marketable permits on effort or size of catch, or encourage (subsidize) aquafarming.

3. What are "greenhouse" gases? Give two examples.

Greenhouse gases are gases like carbon dioxide, methane, nitrous oxide, and water vapor that absorb infrared radiation (heat) in the atmosphere.

4. Suppose that the EPA reports that acid deposition has decreased the pH level of the water in Lake Michigan from 6.5 to 5.5. What does this mean?

A decrease in pH level of 1 unit means a ten-fold increase in the acidity of the water.

5. What are the two main sources of energy in the U.S. and what are their primary uses? What is the main reason these fuels are over-used, leading to excessive air pollution?

The two main sources of energy are coal, typically used to provide power to plants that generate electricity, and oil, typically used to provide power to move vehicles. Their prices do not include all the social costs of their use, so the market typically over-provides them, leading to pollution in excess of socially optimal levels.

6. Describe one possible policy that could be used to both reduce their current level of use of fossil fuels and also encourage the development of competitively priced alternative energy sources. Briefly explain how and why it would do this.

Consider, for example, a tax on a barrel of unrefined oil equal to its current market price, and a tax on a ton of coal equal to its current market price. The taxes would increase the costs of each, and so increase the market prices of each, as well as the prices of all the products produced from them. The demands for oil and coal are not perfectly inelastic, so we would definitely observe a reduction in the consumption of each, and an increase (although less than double) in the price of each. The reduction in consumption of each would definitely reduce the pollution associated with the use of each, and the increase in prices would encourage the development of alternatives by making them less expensive relative to oil and coal. A quota on the use of each would have the same effects, as would several other policies.

7. What is the depletion allowance for mineral deposits and what effect does it have on the use of mineral resources?

This allows firms to charge the reduction in the value of their mineral deposits that occurs from normal mining operations as expenses. Thus, more mining results in greater expenses, and so lower "book" profits, which lowers the firms' tax obligations. This gives them an incentive to mine more in any year than they would have without the allowance, thus depleting our mineral resources more rapidly than is socially optimal.

8. Explain why there is too much solid waste in the U.S., and briefly describe a comprehensive policy to reduce solid waste disposal.

There is too much trash because the cost of trash disposal does not include its full social costs. A comprehensive policy to combat this would include:
(1) forcing consumers and producers to pay the full social cost of waste disposal by incorporating the scarcity value of landfills into the tipping fee and marginal cost pricing (through the use of standardized containers, for example);
(2) reducing of the quantity of solid waste produced (packaging tax);
(3) removing hazardous waste (deposit-refill systems for batteries or other toxic substances);
(4) encouraging recycling (at least until economies of scale are achieved).
(5) preventing illegal disposal (which might increase as the cost of waste disposal rises).

Part II. Problem. Be sure to show your work for partial credit. (20 points)

Assume the marginal private benefit of wheat (measured in bushels, B) grown in the U.S. is

$$MPB_{US} = 600 - 10B$$

and the marginal private cost of growing wheat in the U.S. is

$$MPC_{US} = 5B.$$

Wheat is also grown in Canada, where its marginal private benefit is

$MPB_C = 300 - 5B$

and the marginal private cost of growing wheat in Canada is

$MPC_C = 10B$.

a. What are the net social benefits from the wheat market in each country in this situation?

In US, $MPB_{US} = 600 - 10B = MPC_{US} = 5B$ implies $15B = 600$, so market quantity is $B = 40$ and price = 600–10(40) = 200.
Consumer surplus is (½)(40)(600–200) = 8000, producer surplus is (½)(40)(200) = 4000, so total net benefit in US is 12,000.

In Canada, $MPB_C = 300 - 5B = MPC_C = 10B$ implies $15B = 300$, quantity is $B = 20$ and price is 300–5(20) = 200.
Consumer surplus is (½)(20)(300–200) = 1000, producer surplus is (½)(20)(200) = 2000, so total net benefit in Canada is 3,000.

b. Suppose global warming shifts the temperate zone in the Northen hemisphere further northward, and as a result increases the marginal private cost of growing wheat in the U.S. to

$MPC_{US} = 10B$,

but decreases the marginal private cost of growing wheat in Canada to

$MPC_C = 5B$.

Compute the net social benefits from the wheat market in each country in this situation. Has global welfare increased or deceased?

In US, $MPB_{US} = 600 - 10B = MPC_{US} = 10B$ implies $20B = 600$, so quantity is $B = 30$ and price = 600–10(30) = 300.
Consumer surplus is (½)(30)(600–300) = 4500, producer surplus is (½)(30)(300) = 4500, so total net benefit in US is 9,000.

In Canada, $MPB_C = 300 - 5B = MPC_C = 5B$ implies $10B = 300$, quantity is $B = 30$ and price is 300–5(30) = 150.
Consumer surplus is (½)(30)(300–150) = 2250, producer surplus is (½)(30)(150) = 2250, so total net benefit in Canada is 4,500.

This shows is that global welfare in terms of the wheat market has decreased from 15,000 to 13,500. With this limited information, we cannot conclude anything else about global welfare - such as how individuals value the change in environment, or changes in other markets whose production might be affected by this northward shift in the temperate zone in the northern hemisphere, or any similar changes that might occur due to changes in the temperate zone in the southern hemisphere.