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Economics 410

The Maxwell School
Syracuse University

Exam 2

Spring 2010

VERSION P

Instructions

1. Write your SU ID NUMBER and the exam version letter above on your blue book. Please do NOT write your name.

2. Do not open the exam until you are told to do so.

3. Please turn off the ringer on your phone right now – before the exam begins.

4. SHOW ALL YOUR WORK. Numerical answers without supporting work will receive little or no credit.

5. You have 120 minutes to work on the exam. There are 90 points possible; please budget your time accordingly. Also note that many of the questions have (a), (b), etc., inserted into the text to help you avoid overlooking part of the answer.

6. YOU MAY NOT USE YOUR PHONE. *Any use of phones or other wireless devices during the exam will be presumed to be collaboration and therefore cheating.*

7. Cheating of any kind will result in an F on the exam and referral of the case to the Dean's office for further sanctions.

8. Calculators *may not* be shared.

9. Some handy formulas:

$$PV = \frac{B}{(1+r)^t} \qquad PV = \frac{B}{r}$$

Question 1: Pollution Control Under Uncertainty (15 points)

The marginal benefits of abating a pollutant are given by MBA = 360 – 2*Q. Two sources of the pollutant were recently regulated. Just before regulation, each source was emitting 100 tons of the pollutant (200 tons total). At the time of regulation, the sources were believed to have identical abatement costs given by: MCAi = 2*Qi. A tax policy was established that would have been efficient if those costs had been correct. However, the projected MCA for source 2 turned out to be wrong. Its true cost curve is MCA2 = 1*Q2.

Please calculate: (a) each firm's efficient amount of abatement had the original MCA2 had been correct; (b) the tax rate that would have been imposed assuming the original MCA2 was correct; (c) the amount of abatement that would be efficient for each firm given the true MCA2; (d) the actual amount of abatement done by each firm; and (e) the deadweight loss, if any, associated with the policy.

Question 2: Travel Cost (15 points)

A county government would like to determine the recreational value of a beach it maintains at a lake. No admission fee is charged and 11,400 people visit the lake each year. They come from five geographic zones labeled A through E. The cost of a round trip to the lake from each zone is shown in the table below, along with each zone's population and the number of people who visit from the zone.

Zone	Travel Cost	Population	Visitors
A	$10	1,000	1,000
B	$20	5,600	4,200
C	$30	8,000	4,000
D	$40	8,800	2,200
E	$50	10,000	0

The public's willingness to pay for visits to the park (including people from all zones) is known to be given by an equation of the form: W2P = A - B*Q, where Q is the number of visitors and A and B are constants.

Please compute: (a) the number of people who would visit the park if a $10 admission fee were charged, (b) the values of A and B, (c) the amount of consumer surplus currently produced by the park each year, and (d) the present value of keeping the land as a park forever when the interest rate is 10%.

Question 3: Option Value (15 points)

A company must comply with a new tradable permit program for its emissions. It currently owns one permit (to keep things simple) and is deciding whether or not to sell it. The permit entitles the owner to emit 1 ton of pollution in *each* of 2 periods: now (period 0) and one year in the future (period 1). If the company owns the permit in period 0, it can avoid $10,000 of abatement cost (paid at 0); if it owns the permit in period 1, it can avoid $30,000 of abatement cost (paid at 1); if it owns the permit in both periods, it avoids both costs. The company can sell the permit in period 0 for $40,000. The price of a permit in period 1 is unknown but it is believed that there is an 80% chance the price will be $20,000 and a 20% chance the price will be $90,000. The interest rate is 20%.

Please: (a) calculate the present value of the permit in period 0; (b) explain why your value is higher or lower than the $40,000 market value of the permit in period 0; and (c) indicate whether or not the firm should sell the permit in period 0.

Question 4: Nonrival Goods (15 points)

A state government is considering what should be done with public land along a 100 mile coastline. A study has shown that the marginal benefits received by visitors to the area are given by MBv = $10 million – $100,000*Q, where Q is the number of miles of public coastline. The area is not congested and its use is nonrival. The government knows that property developers are willing to buy the land for $3 million per mile. You may assume that all values in this problem are already in present value.

Please calculate: (a) how many miles, if any, the government should sell to developers given the information above. Now suppose that the government knows that there are 1 million state residents who do NOT visit the area but like knowing that it exists. Each of the non-visitors receives a marginal benefit, MBi, given by MBi = $5 – $0.01*Q. Please calculate (b) the number of miles, if any, the government should sell taking this additional information into account and explain your results briefly.

Question 5: Effect of a Backstop (15 points)

Consider the allocation of an exhaustible resource across three generations. The following information is available about demand and MEC in the three periods:

Period	Demand	MEC
0	$W2P_0 = 500 - 2Q_0$	40
1	$W2P_1 = 500 - 2Q_1$	30
2	$W2P_2 = 500 - 2Q_2$	20

Initially, there are 635 units of the resource available. The interest rate between generations is 100%.

Please calculate: (a) the equilibrium royalty, extraction cost, price and quantity that would occur in each period, and summarize your results in a table. Then suppose that a backstop is available at a marginal cost of $60. Please calculate: (b) the new equilibrium royalty, extraction cost, price and quantity in each period, summarizing your results in a second table. Finally, calculate (c) the total amount of the resource produced via the backstop.

Question 6: Exploration (15 points)

Suppose that a resource is to be allocated across two periods. The demand for the resource in period 0 is given by $W2P_0 = 1000 - (1/2)*Q_0$ and the demand for the resource in period 1 is given by $W2P_1 = 2000 - (1/2)*Q_1$. Initially, 5000 units of the resource are know to be available and can be extracted at MEC = $100 in either period. However, it is possible to find more of the resource via exploration. The cost of drilling an exploratory well is $60. In 85% of the wells, no new deposits will be found. However, in 10% of the wells, 1 unit will be found and in 5% of the wells 6 units will be found. The marginal cost of extracting any new units is the same as the existing deposits: $100. The interest rate is 100%.

Please calculate: (a) the minimum price that will induce exploration; (b) the market equilibrium price and quantity in each period without exploration (summarize in a table); (c) the equilibrium price and quantity in each period taking exploration into account (summarizing in a second table); (d) the amount of the resource that will be found via exploration; and (e) the expected number of wells that will be drilled.