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Economics 437

The Maxwell School
Syracuse University

Exam 1

Spring 2014

VERSION M

Instructions

1. Write your **SUID NUMBER** on your bluebook and DO NOT write your name.
2. Write the **EXAM VERSION** from the box above on your bluebook.
3. Do not open the exam until you are told to do so.
4. Please turn off the ringer on your phone right now – before the exam begins.
5. If you are wearing a baseball cap, please remove it or turn it backward.
6. SHOW ALL YOUR WORK. Numerical answers without supporting work will receive little or no credit.
7. You have 80 minutes to work on the exam. There are 75 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.
8. Collaboration of any kind on the exam is not allowed. *Use of phones or other wireless devices at any time during the exam will be presumed to be collaboration – so don't do it.* 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.
9. Calculators *may not* be shared.
10. Some handy formulas:

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

Areas: Triangle $= \frac{bh}{2}$ $\qquad$ Trapezoid $= \left(\frac{b_1 + b_2}{2}\right)h$

Question 1 (15 points)

A government agency is considering what to do about an abandoned site previously used to dispose of hazardous waste. If it does nothing, the site will cause $10,000 of damages in water pollution and lost tax revenue per year forever. Two proposals are being considered. Under plan A, the agency would spend $50,000 in each of the next three years (years 1, 2 and 3) to clean up the site. Damages would be eliminated beginning in year 4. Under plan B, the agency would leave the waste in place but install a $50,000 barrier to stop it from creating the water pollution problem. The barrier could be installed right away (in year 0) and damages would decrease to $5,000 per year beginning in year 1. The agency uses an interest of 5% in present value calculations.

Please calculate the net present values of the two plans and indicate what the agency should do.

Question 2 (15 points)

A city government is concerned that future changes in the climate will harm its water supply. It believes there is a 75% chance the change will be mild ("scenario M") and a 25% chance the change will be severe ("scenario S"). To address the problem, it is considering two options, A and B, for a new reservoir. Under both options, the reservoir would be paid for in year 0 and would produce annual benefits forever starting in year 11. Plan A would cost $100 million and its annual benefits would be $10 million under either climate scenario. Plan B would cost $200 million and would produce $10 million per year under scenario M and $40 million per year under scenario S. The city uses an interest rate of 5% in present value calculations.

Please compute the expected net present value of each plan and indicate which one, if any, the city would adopt.

Question 3 (15 points)

Production of a good creates a positive externality. The market willingness to pay for the good is WTP = 300 – 2*Q. Two firms, A and B, are capable of producing the good. Firm A has a marginal cost curve given by MCa=1*Qa while firm 2 has a marginal cost curve given by MCb=200. The external marginal benefits on Qt total goods are given by Mbext = 1*Qt.

Please compute: (a), (b) the price and quantity at the market equilibrium, (c), (d) the efficient quantity and subsidized price, (e) the efficient subsidy per unit; (f) the total cost of the subsidy to the government; and (g) the net welfare gain from moving from the market equilibrium to efficiency.

Exam continues on the next page….

Question 4 (15 points)

Consider a good purchased by two types of buyers, S (small) and L (large). There 200 type-S buyers and 10 type-L buyers. The WTP equations for individual *i* of each type are shown below. The marginal cost curve for suppliers as a group (that is, the market supply) is also given.

Type S individual:	WTPsi = 200 – 20*Qsi
Type L individual:	WTPli = 200 – Qli
Market supply:	MC = Q/20

In addition, it is known that the good produces a negative externality. The damages from the externality are subject to diminishing returns: each additional unit of the good causes more damage, but the amount of additional damage gradually decreases. In other words, the first unit of emissions in a clean environment does more harm than the an additional unit in a dirty environment. The MCext curve is shown below:

Externality:	MCext = 150 – Q/20

Please determine: (a) the market equilibrium and the efficient level of output given the externality; (b) the tax rate that would move the market to the efficient level of output; (c) the change in overall consumer surplus, (d) the change in producer surplus, (e) the change in government revenue; and (f) the change in externality costs. What is (g) the overall gain from the policy?

Question 5 (15 points)

A government is concerned about two goods, E and D. Consumption of good E creates a positive externality with MBext=1. Consumption of good D, on the other hand, creates a negative externality with MCext=20. Initially, there are no taxes or subsidies, the supply of E is perfectly elastic at MCe=10, the supply of D is perfectly elastic at MCd=100, Qe=1000 and Qd=100. Finally, the elasticity of demand for E is known to be -2 and the elasticity of D is known to be -1.

The government is would like to impose a set of taxes and subsidies that would bring both markets to efficiency. It is also hoping that the policy will pay for itself in the sense that the tax revenue will be at least as large as the subsidy.

Using the information above, please calculate: (a), (b) the new price and quantity in each market if the policy were imposed; (c), (d) the total revenue the market with the tax and the total subsidy that will be paid in the market with the subsidy and indicate whether the policy will, in fact, pay for itself; and (e), the total gain in social surplus.