Topics in Modern Economics

Exam Mai 7 2013

No document authorized

PLEASE USE TWO SEPARATE SET OF SHEETS FOR THE TWO PARTS

Problem 1 : Emmanuelle Auriol

Consider an industry where the demand function is $D(p) = 2 - \frac{p}{3}$. The cost function is $C(q) = cq + K$ where $K > 0$.

1) Compute the marginal and average costs. What are the returns to scale in this industry? Justify your answer. What does it imply?

2) Compute the price and the quantity that are going to be exchanged in equilibrium if there is an unregulated monopoly.

3) Compute the social surplus of trade associated with the unregulated monopoly.

4) To overcome the bad social outcome of questions 2 and 3, a regulator is appointed to oversight the industry. We first assume that the regulator can observe c. Write the objective function of the regulator integrating the fact that public funds are costly. The opportunity cost of public fund is denoted $\lambda > 0$.

5) Solve the regulator problem of question 4 (i.e., when she can observe c). What is the optimal quantity when $\lambda = 0$? What happens when λ increases? Explain this result (i.e., explain the regulator's tradeoff).

6) Now we turn to the more realistic case of asymmetric information. The regulator does not observe c. But the regulator has a prior on the distribution of c. We assume that c is drawn from $\{\underline{c}, \bar{c}\}$ according to the probability $Prob(c = \underline{c}) = \nu$ (and $Prob(c = \bar{c}) = 1 - \nu$).

By virtue of the revelation principle the regulator restricts herself to direct truthful mechanisms. Characterize this contracts (i.e. the constraints that asymmetric information impose on the regulator).

7) Write the optimization problem of the regulator under asymmetric information when $\lambda > 0$.

8) Solve the regulation problem under asymmetric information neglecting second order incentive compatibility constraint.

9) Check that the solution of question 7 satisfy the second order incentive compatibility constraint.

<div style="text-align:center; border:1px solid black;">

Topics in Modern Economics

L3 Exam

May 7 2013

</div>

Jean TIROLE

Short question. Please answer *concisely* and *precisely*. Pick <u>one</u> of the following three short questions, a), b), or c) (answering more than one won't bring you any extra points)

a) Explain how a market breakdown can occur under adverse selection.

b) Explain how a notion of "opportunity cost" applies in Lerner's (monopoly) pricing formula in two-sided markets.

c) How is an optimal layoff tax determined?

Longer question.

Pick <u>one </u>of the following two questions (answering more than one won't bring you any extra points):

(1)   Calvo model

There are two periods, $t = 0$ and 1. The country's utility is

$$u = Rb + \left[c_1 - x\Phi \right],$$

where $R > 1$, b is the amount borrowed (collected) at date 0, c_1 the date 1 consumption,

$x = 1$ if the country reneges on its liability at date 1 and $x = 0$ otherwise, and Φ is an exogenous cost of default. The foreign investors are risk neutral and don't discount the future (so they demand a return of 1 on average for a unit investment; i.e. the market interest rate is $r = 0$).

(i) Suppose that the country fixes at date 0 its date-1 reimbursement/debt d. How much does the country borrow if $R > 1$? [Hint: from risk neutrality, the solution is either 0 or the maximum credible reimbursement.]

(ii) Add a second country (the "European Community"), that suffers a cost ϕ in case of default. Show that the country may borrow even if $R < 1$ (namely, as long as $R > \Phi / (\Phi + \phi)$). Can you identify a desirable international agreement?

(iii) Suppose that, instead of fixing the amount to be reimbursed, the country tries to achieve some borrowing target $b < \Phi$. The market then determines the borrowing interest rate through a breakeven condition. Show that there are three rational-expectations equilibria. [Hint: there is a mixed-strategy one in which the market demands rate of interest r given by $b(1 + r) = \Phi$ and the country reimburses its debt with probability less than 1. What is this probability?]

(2)   Pigovian taxation

Consumers have a linear demand function for a good
$$q = D(p) = 1 - p,$$
where p is the consumer price and q is quantity.

This good is produced by a competitive industry with cost $C(q) = q^2 / 2$, and marginal cost q.

(i) Consider a unit tax τ on consumption of the good. Show that the equilibrium output and consumer price are equal to
$$q = \frac{1-\tau}{2} \text{ and } p = \frac{1+\tau}{2}$$
and that consumers' utility plus producer profit is
$$\frac{(1-\tau)^2}{4} + \frac{\tau(1-\tau)}{2}$$
where the last term is the tax proceeds rebated to the consumers.

(ii) Suppose that each unit of output generates a pollution with social cost e for the consumers. Assume that the social planner maximizes welfare (consumer net surplus plus producer profit). Demonstrate that the optimal tax is $\tau = e$.

(iii) Compare this Pigovian prescription with the optimal pollution tax when the planner cares only about consumer welfare (i.e., does not internalize the profits). Compute the latter tax and explain.