UNIVERSITÉ TOULOUSE 1 CAPITOLE

TSE

Toulouse School of Economics
École d'économie de Toulouse

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SESSION 1

Semestre 6
LICENCE 3 mention ÉCONOMIE

TOPICS IN MODERN ECONOMICS
(durée 1h30)

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Jeudi 24 mai 2012 ~ 13h30 – 15h00

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PLEASE USE TWO SEPARATE SET OF SHEETS FOR THE TWO PARTS

Part 1: Auriol

A regulator oversights a non competitive industry. The demand function for the commodity is denoted $D(p) > 0$ with $D'(p) < 0$ (i.e., normal good) $\forall p > 0$. The gross surplus of consumer is denoted $S(p) = \int_p^{+\infty} D(x)dx + pD(p)$.

The cost function to produce the commodity is $C(c, q, K) = cq + K$ with $K > 0$. The fixed cost level K is common knowledge.

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. Explain why this outcome is socially inefficient.

3) To overcome the bad social outcome of question 2, 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 that public funds are costly. The opportunity cost of public fund is denoted $\lambda > 0$.

4) Solve the regulator problem of question 3 (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).

5) Now we turn to the more realistic case of asymmetric information. The regulator does not observe c but she 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).

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

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

8) (optional: for bonus) Check that the solution of question 7 satisfy the second order incentive compatibility constraint.

Part 2: Tirole

Solve either question 2.1 or question 2.2.

2.1. An innovator can at fixed cost I invent a new good/technology, whose marginal cost of production is 0 and demand is

$$q = D(p) = \frac{\sigma}{2m}(2m - p)]$$

(q is the quantity and p is the price; σ is a"size parameter" and m is a "quality parameter").

(i) Consider a *patent system* (the innovator receives a monopoly right on, and can freely exploit her innovation).

- Compute the monopoly price.

- Use a diagram to show that, under a patent system and ignoring the investment cost I, the surplus created by the good is $3\sigma m/4$, of which consumers receive $\sigma m/4$ as net consumer surplus.

(ii) Consider now a *prize system* (the innovation is then in the public domain). Still using the diagram, show that the surplus created by the innovation under a prize system, again ignoring the investment cost I, is σm.

Suppose that the social planner does not know the parameter m (under the prize system, he can learn the parameter σ from observing $D(0)$). The social planner only knows that for each σ, m is distributed on $[0, 1/\sigma]$ according to the density $f(m) = 2\sigma^2(\frac{1}{\sigma} - m)$. [For future usage, one will take for granted that $\int_0^{1/\sigma} mf(m)dm = 1/3\sigma$].

Show that if $I > 1/3$, the social planner never wants to reward innovations if he is constrained to use a prize system.

Show also that there would be a strictly positive expected social surplus under a patent system provided that $I < 1/2$.
[Showoffs: why did we choose a decreasing density (think in terms of screening out bad innovations)?]

2.2. An entrepreneur has a project which costs I and yields π. (Let $\Delta \equiv \pi - I > 0$, so the project is worthwhile. Also assume that $\Delta \leq 1/2$.) None of π is pledgeable to investors, so the entrepreneur has to finance I himself. He has no cash, but he owns some "legacy asset", whose value is θ. The entrepreneur knows the value θ, but potential buyers of the asset only know that θ is drawn from the *uniform distribution* on $[0, 1]$.

Show that the equilibrium market price for the asset is $p = \Delta$ provided that $\Delta \geq I$, and $p = 0$ if $\Delta < I$
(hint: for what values of θ is the entrepreneur willing to sell his asset?)

Would the asset resale market function better if the entrepreneur could pledge a known fraction $\alpha > 0$ of the profit π to investors?