Final exam - Economics of regulation

Winter semester 2010/2011
Prof. Dr. Georg Götz

Date: 8th March 2011   Time: 16:15-17:45

1. General information:

    a. Make sure that your final exam is complete. The final exam consists of 4 problems.

    b. Only use the provided sheet of paper. Write your matriculation number immediately and clearly on each page!

    c. Please do not remove the staples from the provided sheet of paper.

    d. Allowed items at your workplace: Student ID, writing utensils (no red pen, no ink eraser, no pencil case), ruler, set square, non programmable calculator, food and drinks.

    e. Use a permanent pen (no pencil).

    f. Mobile phones have to be turned off and removed from your place!

2. Hints about doing the exam:

    a. Read each task carefully and consider the distribution of points. The tasks could be extended over several pages.

    b. Please work on all tasks and state each on a new page. Please write your answers in a readable way.

    c. You may write your answers in English or in German.

    d. Label the axes of your illustrations.

    e. Each point equals approximately 1 minute of working time (rough guideline).

    f. The final exam lasts 90 minutes!

We wish you every success!

1 Social costs of public funds and second-best solution [18]

Consider a situation of regulation under complete information. Suppose there is a regulated firm, which faces demand $q = 100 - p$. The production technology of the firm gives rise to constant marginal costs $c = 10$ and fixed costs $f = 1701$.

Suppose transfers to the firm are possible, i.e., the firm can make losses which are covered by the transfers. However, transfers are costly in the sense that $1 \, €$ transfers leads to costs of $(1 + \Lambda) \, €$ for the taxpayer due to tax distortion.

a. Calculate the optimal price and transfer for the case that the social costs of public funds are $\Lambda = \frac{1}{3}$. What is the resulting welfare?

Suppose now that transfers are not available and that the regulator might only set the price p. The firm must satisfy a break-even constraint, i.e. realize non-negative profits.

b. Calculate the optimal price (*second-best price*) and total welfare.

c. Compare and discuss your results from subitems a. and b. What role play fixed costs in these regimes? (3-5 sentences).

2 Asymmetric information [34]

Suppose that the demand function is $q = 120 - p$ and common knowledge. The firm's rent has a weight of $\alpha = 0$ in the social welfare function. The firm's marginal costs c are not known to the regulator. However, the regulator knows that they are either $c_L = 25$ with probability $\phi = \frac{2}{3}$ or $c_H = 40$ with probability $(1 - \phi) = \frac{1}{3}$. The known fixed costs of the firm are $f = 500$.

a. Which constraints have to be satisfied to ensure truthful revelation? Give short explanations.

b. Determine the optimal menu of regulatory contracts (i.e. p_L, p_H, T_L, and T_H). Calculate the quantities, the consumer surplus, and the firms' rents for the different types. What is total welfare in this case?

Suppose now that the regulator appoints an auditor to find out the true costs of the firm. Unfortunately, the auditor reports the true type only with uncertainty. In case the firm has low marginal costs, the auditor correctly reports this type with probability $\frac{2}{3}$. In case the firm has high marginal costs, the auditor correctly reports this type with probability $\frac{3}{4}$. Hence, it applies

$$\Phi_L = Prob(s = s_L | c = c_L) = \frac{2}{3} \qquad (1 - \Phi_L) = Prob(s = s_H | c = c_L) = \frac{1}{3}$$

$$\Phi_H = Prob(s = s_L | c = c_H) = \frac{1}{4} \qquad (1 - \Phi_H) = Prob(s = s_H | c = c_H) = \frac{3}{4}.$$

Assume that the firm is risk neutral and there are no financial constraints.

c. Determine the (absolute minimal) transfers which allow the regulator to induce truthful revelation and marginal cost pricing. What is the change in welfare compared to your result from part b.? Interpret and discuss your results.

3 Access Regulation [15]

A vertically-integrated firm M supplies a network service (over which it holds a monopoly) to a possible entrant E. M can also supply service directly to consumers. Consumer demand for the final service is $q = 75 - p$, where p is the price that downstream firm(s) charge for the final service. E has a cost $c_E = 5$ for converting a unit of the network service into the final service, while M has a cost $c_M = 7$ for doing the same. Suppose that the network service has marginal cost $C = 2$.

a. Suppose first that M decides to sell its network service to E and not to sell its final service to consumers at all. M sets the access charge α per unit which E must pay for the input. Calculate E's profit maximizing price and demand for units of network access subject to the access fee. What is M's profit maximizing access fee? What are the firms' profits?

b. Next, suppose M chooses to sell only to final consumers. What price will M charge in optimum and what are its maximum profits in this case?

c. Now compare your answers to a. and b. Do you expect that the most efficient firm will supply consumers? Are consumers better off in scenario a. or b.? Should a regulator force M to sell its input to E? What regulatory policy might be implemented to increase social welfare?

4 Practical policy [18]

a. What is a natural monopoly? Discuss whether the existence of a natural monopoly inevitably leads to a situation with only one firm in the market.

b. Currently, there is a discussion about the implementation of a yardstick competition in the water supply industry. What is meant by this regulatory policy? Discuss the mechanism as well as the pros and cons of this type of regulation.