Written Exam for the B.Sc. in Economics, Winter 2010/2011

Microeconomics B

Final Exam

17. January 2011

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title which was followed by “eksamen på dansk” in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students’ self-service system.

Question 1

Consider two monopolies. Monopoly i has the demand function $x_i = D_i(p_1, p_2)$ and the cost function $c(x_i), i = 1,2$, where x_i is the level of its output and p_i its price. Monopoly 1 is the public sector and monopoly 2 is the private sector profit-maximising firm.

The only policy instrument available to influence the behaviour of the private sector firm is the price charged for the output of the public sector firm. Assume that social welfare can be represented as the sum of consumer surplus and profits in the two industries.

a) Show that the optimal second-best price of the public sector firm satisfies

$$m_1 e_{11} + m_2 e_{22} r R_2 / R_1 = 0$$

where $m_i = (p_i - c'_i)/p_i$ is the proportionate deviation of the price from marginal costs in firm i, $e_{ii} = D_{ii} p_i / D_i$ is the own price elasticity of demand for firm i's output, $R_i = p_i D_i$ is expenditure on firms i's output and $r = (dp_2/dp_1)(p_1/p_2)$ is the response elasticity of firm 2's price to changes in the price set by the public firm. (*Hint*: compare the expression above with the optimised welfare function with respect to p_1).

b) Explain and interpret the optimal second best price equation given above.

Answers:

a) *When the expression is written out you end with* $(p_1 - c_1') \cdot \frac{dD_1}{dp_1} + (p_2 - c_2') \cdot \frac{dD_2}{dp_2}\frac{dp_2}{dp_1} = 0$, *which you also find from differentiating the social welfare function with respect to the price* p_1.

b) *The purpose of the second-best price is to take into account the effect on "the other markets". This means that you deviate from the first best price in the public sector to alleviate the market failure created by the monopoly profit maximising firm. It is only possible to influence this if there is some substitution between the two outputs such that the price of output 2 is influenced by the price on output 1. If not, then the optimal price on the public sector output is the normal marginal cost. The expression gives us that the "marginal loss" in the public sector market should be balanced by the marginal gain in the private sector market.*

Question 2

Comment on the following statement:

Short run economic costs must be lower than long run economic costs because long run economic costs include the cost of inputs that are fixed in the short run (and thus are not part of short run cost).

Answer:

Most of the statement is true – except for the first part. It is true that the expense on capital is not a cost in the short run. But suppose that capital was fixed at a relatively low level in the short run, and suppose that we considered the cost of producing a high level of output. It may be that the cost associated with all the labor that is needed (given the low level of capital) is higher than the long run cost of both labor and capital when capital can be adjusted to its optimal level (given the high level of output).

Question 3

Consider the "Microsoft approach" as a strategy to enter the market for PCs, where the Windows operating system is licensed to different PC makers, who then compete with each other, which drives down the price on the PCs.

a) Assume that the aggregate demand function for computers is given by $x = (AN^{1/2} - p)/\alpha$ where p is the price for a computer. The consumer side of the market is in equilibrium if the network size N is equal to the number of computers sold. Use this to derive the actual demand curve $P(x)$ that takes the network externality fully into account.
b) Suppose that A=100 and α=1. What is the shape of the demand curve from a)? Explain.
c) We say that an equilibrium is *stable* if it does not lie on an upward-sloping part of the demand curve. Explain why. (*Hint:* Suppose that x^* is the equilibrium quantity on the upward sloping part of the demand for some price p^*. Imagine what would happen if slightly more than x^* were bought and what would happen if slightly less than x^* would be bought).
d) Suppose that the supply curve is horizontal at p=2000. What are the equilibria in our model? Which equilibria are stable and which are unstable?
e) Now assume that we begin in an equilibrium where no computers are owned and where the marginal cost of producing computers is 2000. A strategy by the producer is a very aggressive strategy of giving away computers. Explain why this may be a good idea and how many computers should the producer give away?

Answers:

a) *Set* $x = (Ax^{1/2} - p)/\alpha$ *and find p as a function of x*
b) *It is a downward pointing parabellum, which indicates that the marginal willingness to pay for a PC is low when the number of PC is low. It is increasing the more people that have a PC. But if the number of PCs is large then we are left with those who have a low wtp, because those who had a higher wtp have already bought one.*
c) *When the demand curve is upward sloping, then a slight increase in the number of PCs will mean that the willingness to pay exceeds the price and thus that more people will buy a PC. On the other hand if less PCs are bought then the wtp decreases below the price and less people will buy a PC. This means that the equilibrium is unstable.*
d) *We have now two stable equilibria (x=0) and (x=X), which is on the downward sloping part of the demand curve. Finally we have an unstable equilibrium at the upwards sloping part of the demand curve.*
e) *This may be a very good strategy to bring the market beyond the low equilibrium since this will make the market expand towards the high equilibrium. He should give x=x (the number of PCs in the unstable equilibrium) away.*

Question 4

Consider a seller of "lucky chance baskets" (i.e. a closed bag with different "goodies") containing of a combination of quantities of the two products that he is selling. When offered for sale it is announced that the bag contains 25 items. The value of product one is 200 for the seller and 250 for the buyer; the value of product 2 is 100 for the seller and 150 for the buyer.

a) Describe what the potential problem here is and describe which condition that must be satisfied such that an (efficient) market condition is reached. Is it possible for the seller to ensure this?
b) In a slightly more general context than the case described in que. a), how may a seller of such a "hidden" product overcome the problem?

Answers:

a) The problem is if the expected price of the basket is less than the reservation price for good one for the seller and he will thus only put product two goods in the basket. This is realised by the buyer, who will then only offer up to 150 for the basket. Hence, only product two will be sold, while it is actually beneficial if both types of goods are sold since the buyer values them higher than the seller. This is a case of "Adverse selection". To ensure an efficient market equilibrium the expected value for the buyer must exceed 200, in which case also product one will be supplied in the basket. i.e. $q*250+(1-q)*150 \geq 200$ *giving* $q \geq 0.5$ *or that more than half of the items in the basket must be of product one. It may be difficult for the seller to ensure this, because how can the buyer be sure that he is telling the truth?*

b) In a general setting this adverse selection problem may be overcome if the seller can send a signal that convinces the buyer of the "quality" or "type" of good he is facing. In relation to que. a) this could be that the seller promises to take the basket back if there is less than 13 items of product one in the basket.

Question 5

a) What lies behind the "Tragedy of the Commons" story?

Let n denote the number hunts (*one hunt* is defined as one hunter going on one hunting trip) in a given hunting area. Each hunt is priced r per hunt, which must be paid irrespective of ownership to the hunting area. The number of ducks shot during a hunting season is $x=f(n)=An^{\alpha}$, where $A>0$ and $0<\alpha<1$ and a duck can be sold on the market for p.

b) Assume that you own the hunting area and you are the only one hunting in the area. How many ducks will you shoot during the season (assume that you are a profit maximiser)?
c) Assume instead that the hunting area is publicly owned and any hunter can hunt during the season. How many ducks will be shot during the season? Explain why the result differs from the answer in b)
d) What is the loss in revenue to any hunter if an additional hunt in the hunting area is undertaken? Assume that one hunter only go one hunt and that an additional hunt means that one more hunter enters.
e) What should an optimal Pigouvian tax per hunt be?

Answers:

a) The story arises because if everyone has access to a common resource and everyone is considering only their own benefits from it, then the resource will be overused. This arises because the individuals do not take the "externality" they impose on others into account when making their decision.

b) *You solve the max* $\pi = px - rn$ *using the "production function". This means that MP=MC. You therefore go hunting* $n = \left(\frac{r}{pA\alpha}\right)^{1/\alpha-1}$ *times giving a shoot of* $x = A\left(\frac{r}{pA\alpha}\right)^{\alpha/\alpha-1}$ *ducks.*

c) *Each hunter only considers his average "product" from hunting:* $\frac{pf(n)}{n} = r$ *giving* $n = \left(\frac{r}{pA}\right)^{\frac{1}{\alpha-1}}$ *and thus* $x = A\left(\frac{r}{pA}\right)^{\alpha/\alpha-1}$*, which is obviously bigger than the answer in b) since α<1. This is because the individual does not take into account the social costs he infers on the other hunters. So this is an example of the "tragedy of the commons".*

d) *The revenue per hunt when n hunts are undertaken is* $R(n)=pA(n)^{\alpha-1}$ *which is reduced to* $pA(n+1)^{\alpha}/n$

e) *The total loss in revenue for everyone else if one additional hunt is undertaken is equal to* $pA((n)^{\alpha}-(n+1)^{\alpha})$*. The Pigou tax must equal this loss in the optimum number of hunts from que b).*

Question 6

Describe how the theory of asymmetric information and adverse selection can explain why some young people voluntarily choose to spend five years at university (e.g. studying economics).

Answer

This is related to the model of signaling. If an employer cannot distinguish between two types of workers (of high and low productivity) he could require that the workers "send a signal" that they are of high productivity by taking a university degree, he will then pay a higher wage that compensates the high productivity workers for their education effort, whereas the low productivity workers will not be compensated for their effort to take this degree (and therefore choose not to go to university). This ensures that the employer will hire the right people at the right wage and we have an efficient result, although we have to pay an "information price", since the costs of taking the university degree is merely to ensure that you show who you are and not to increase your productivity.