Written Exam for the B.Sc. in Economics 2010-I-RE

Microeconomics 2

Final Exam

XX February 2010

(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

The tele company *Totalk* is considering introducing *free talk* between its elite customers (e.g. customers that have been especially faithful). If the new service is launched the elite consumers will have a fundamental value $a_i n$ of this new service where n is the number of elite consumers signing on the new service and a_i varies uniformly between the 50 elite customer from 1 to 50. *Totalk* can produce the service at (constant) marginal costs c.

a) Find the optimal number of customers and the price of the new service when $c=225$. Discuss the result.
b) What will happen if the marginal costs are higher? And lower? Explain.

Answer
a) *This is a problem of network externalities. The value for the customers is increasing when more joins the service. The problem for Totalk is to find the stable number of customers. The marginal user has value $p=a_i v$. In optimum we have that $p=c$, which gives us that $c/n=50-q$ (where q is the number of users). $q=n$ In equilibrium hence we find that the number of customers is $q=5$ or $q=45$. Without dynamics we cannot say which of the two is optimal, but we know that the value for customers at $q=5$ is low and it is high at $q=45$. If we believe that the market will grow when the willingness to pay is higher than marginal costs then only 45 is stable. The answer should be accompanied with an illustration of this*
b) *A higher c will decrease the equilibrium number of customers. If c is equal to 625 the low and high equilibrium values coincide. When it is higher than 625 (the maximum of the polynomium) then there is no market at all since the price is too high to be interesting for anyone. When the costs reduce then the market increases until all 50 are buying the service. The problem for Totalk is that it needs to create a market. This can be done by boosting the market (giving quick sign-on discounts) such that the number of customers passes the low equilibrium.*

Question 2

There are 10 households living on *Union Street*. Each household lives in an individual house, but there are three different types of households. The first 4 are tenants, 4 are semi-detached house owners and the remaining 2 are detached house owners. The households are considering getting help to take care of the common green area in the centre of the street. The three types of households have preferences for the maintenance of the green area (G) and other consumption goods $(x_i, i=t,s,d)$ that can be described by the utility functions $u_i(x_i,G)=x_i+a_i ln(G)$. The maintenance can be acquired at the price 5 per unit.

a) What is the Pareto optimal amount of green maintenance? What are the Lindahl prices? Explain why the Lindahl equilibrium leads to the optimal quantity and relate the answer to the parameters a_i.

The landowner's association that regulates the entire area thinks that a lawn mover may be the right solution for the occupants of *Union Street*. The lawn mover can be bought for 5,000 Kr. Assume that the reservation prices for the three types of occupants are $r_t=200$, $r_s=600$, $r_d=1,600$. The chairman of the landowner's association is also a professor of economics and suggests using a Clarke mechanism to avoid potential *free riders*.

b) Should the lawn mover be bought?

c) Explain how a Clarke mechanism can be set up for this particular problem.
d) Find the payments from each type of household and explain why this is a truth revelation mechanism.

Answers
a) *The optimum amount is where the sum of MRS=MC. This implies that the $G^*=(a_1+a_2+a_3)/5$. Lindahl prices are individual prices such that the same amount of the public good is demanded. At these individual prices will the agents have incentives to demand the optimal amount. To find the Lindahl prices we must set $MC(G^*)=t_i$. This gives $t_i=5a_i/(a_1+a_2+a_3)$. The price is thus such that the individual with the higher utility from the green maintenance should also pay a higher price.*
b) *The reservation prices are the prices that make them indifferent between buying the lawn mover and not buying it. Yes the lawn mover should be bought since the sum of reservation prices exceeds the price of the lawn mover*
c) *The households should send a signal of their net reservation value. Each household pays a base tax that covers the costs of the lawn mover. When they split the total costs of the lawn mover, each has to pay 500 kr. Besides the base sum to be paid, each of the pivot households should pay a Clarke tax equal to the sum of the other households' net reservation prices.*
d) *Only the detached houseowners are pivotal hence, they are the only ones having to pay the Clarke tax of 300. Despite this additional payment they choose to reveal the true net reservation price since lying gives them a smaller utility. By reporting a low net price they risk that the lawn mover is not bought and thus they do not have to pay the Clarke tax. However this gives them less than telling the truth. For the two other types the argument is similar: they can reverse the decision by reporting a lower net reservation price and thereby become pivotal. In neither case will this be better than telling the truth. They could also report a net price higher than the true one, but this increases the risk of the lawn mover being bought in contradiction with their wish.*

Question 3
Pierre has a son that enjoys sitting on the couch and play Playstation. However, the son also likes to consume other goods. Pierre wants his son to take over growing tomatoes in the garden, which can be sold at the Saturday market at price *p* per kilo. If the son contributes to growing the tomatoes he is investing an effort, *e*, which leads to *f(e)* kilo tomatoes being produced, but also reduces how much Playstation the son can play which causes a loss in utility by *c(e)*. However, if he contributes to growing the tomatoes he receives a payment that can be described as *s(y)*. Hence, we assume that the son's utility function can be written as *u(y,e)=s(y)-c(e)*.
a) What can Pierre do to make his son make the desired effort. Assume that the effort can be controlled and verified. What is the optimal effort and which 'payments' can Pierre consider and why they lead to the optimum.
b) What if Pierre cannot control or verify the effort that his son is undertaking. What can Pierre then do?
c) Now we in addition have uncertainty about the amount of tomatoes that can be produced from the invested effort. How does that influence the proposal you gave in b)? What can Pierre now do?

Answer

a) *There is a moral hazard problem here. Pierre can give his son incentives. The offered contract should be such that his son is better of by accepting than not (an IR constraint) and also have incentive compatibility such that it is optimal for the son to choose the profit maximising effort* $s(f(e^*)) - c(e^*) \geq s(f(e)) - c(e)$. *Hence, Pierre is maximising*

$$\max_e f(e) - s(f(e))$$
$$s.t. s(f(e)) - c(e) \geq \underline{u}$$

where $\underline{u}$ is the utility his son gets from just playing Playstation. Pierre can pay a wage $w = \underline{u} + e^*$ which makes the son choose e^*.

b) *If the effort cannot be controlled there is a risk that his son will cheat, take the money and not do very much. Pierre can offer the son to rent the land and thus earn any profit that the land gets. He can pay a wage to the son or he can give him an all or nothing contract.*

c) *Most of them have inefficient allocations of risks. It is in this case a good idea to split the risk since Pierre is perhaps less risk averse or has a higher income than his son. Pierre can set up a payment combining a base wage (the insurance) and a provisional wage depending on the sales (the incentive).*

Question 4

Assume that the producer of electric vehicles *iThink* is the only purchaser of batteries for electric vehicles. Explain why there may be a good reason for the Energy authorities to intervene in the market for batteries for electric vehicles and explain what this intervention should do.

Answer

iThink has a monopsony. This means that the price it pays for the batteries is too low compared to the competitive equilibrium price. This means that there are gains of trade to achieved. There are producers of batteries that are willing to sell at a price that would leave iTHink with a higher profit, but since iThink optimises by one price per battery it has to take into account that paying a higher price also increases the costs on all existing batteries it buys. Setting a minimum price equal to the competitive price will thus lead to an efficient amount of batteries

Question 5

a) What are the reasons for regulating in economies with externalities and describe what the potential regulating instruments could be.

b) In some cases it is not possible to implement certain regulations. Is it thus always a good idea to implement the instruments you have described in a) in markets with externalities?

Answers

a) *Regulation can move the allocation from the inefficient laissez-faire to the Pareto optimal allocation and thus reduce the negative impacts caused by the externality. We can use Pigou taxes, quotas, direct regulation, tradable permits as regulation instruments. Each of these should be briefly described and the way they work should also be outlined.*

b) *This statement is not true since the cases where a policy maker is constrained in the use of instruments, he must use second best instruments. There may be cases, where it is better to move away from e.g. the first best Pigou tax if there are relations between markets such that an externality in another market can be reduced by lower than first best taxes in a competing market.*