Written Exam for the B.Sc. in Economics summer 2012-R

Mikroøkonomi B

14 August 2012

(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.

Problem 1

Jill has a von Neumann Morgenstern utility function U_J on money lotteries constructed by using probabilities and Bernoulli utility function $u_J(x) = x^{½}$, with x being a realized amount.
Jill is offered to enter a lottery which will give her the amount 9 \$ with probability 50 % and 25 \$ with probability 50 %.

- What is the maximum price Jill is willing to pay to enter this lottery?
- What is the risk premium for Jill?
- Answer the same two questions for Jill's sister, Kate, who has $u_K(x) = x$.
- Please compare and comment the results for the two sisters.

Problem 2

Al and Bill share a dorm room. Al loves to have music playing when he studies; Bill prefers silence. Let s designate the sound level of music playing, $0 \leq s \leq 1$.
Al's utility function is $u_A(x_A, s) = \ln(s) + ½ \cdot x_A$, with x_A being the amount of money available for other consumption. Bill's utility function is $u_B(x_B, s) = x_B - 4 \cdot s$. Both of them initially own 5 \$. The administrator of the dorm has heard of their conflict, and, having a good economic training, suggests that a perfectly competitive market is opened, such that permits for increasing/decreasing the sound level can be traded.

- Find the Walrasian equilibrium if Al is given the property rights regarding the sound level, i.e. Bill has to buy permits to decrease the sound level from level $s = 1$.
- Find the Walrasian equilibrium, if, conversely, Bill is given property rights regarding the music level, i.e. Al has to buy permits to increase the sound level from level $s = 0$.
- Compare the two equilibrium allocations in an Edgeworth box, and comment on the difference in sound level in the two cases.

Problem 3

Consider the case of a perfectly competitive, and risk-neutral, insurance firm facing two types of customers. There is a risky type (type 1) entailing (high) constant marginal costs, MC_1 for each "unit of insurance" the firm provides to such a customer. And there is type 2, who is safer, having lower marginal costs, $0 < MC_2 < MC_1$. For simplicity, assume that all customers have the same, risk-averse preferences.

- Show that in the case of perfect information, such that the company can identify the riskiness of a customer, the equilibrium will have the company offering insurance at prices $p_1 = MC_1$ and $p_2 = MC_2$, respectively, with all type 1 customers becoming fully insured at price p_1, and all type 2 customers becoming fully insured at price p_2.
- Now assume that the insurance company cannot identify which type a given customer is. Explain why it may, in some cases, happen, that the company sets prices MC_1 and MC_2, respectively, but will offer only partial insurance for customers choosing the low price contract.

Problem 4

A risk-neutral employer is hiring a risk-averse employee for a sales position. The employee's work effort influences the level of sales generated by her. However, chance also plays role, so there is a probability of selling little, even if she works hard, and a probability of selling much, even if she works less hard. A harder work effort costs the employee in terms of disutility.
The employer cannot control the employee's effort. The employer can offer her a contract in which the salary depends on the sales generated. Assume that the employer wants her to choose a high work effort.

- Should the contract offer her the same salary, regardless of sales; yes or no? Please substantiate your answer.
- Should the contract let her salary follow the sales level closely, letting the employer have a constant profit independent of the sales level; yes or no? Please substantiate your answer.

Problem 5

W.Mart, the local grocer, faces two types of customers, both of whom like to eat chocolate. Mr. A, who has a job, has the demand function $D_A(p) = \text{Max}\ \{10 - p, 0\}$ where p is the unit price (in \$) of chocolate, whereas the unemployed Mr. B has the demand function $D_B(p) = \text{Max}\ \{5 - p, 0\}$.
W.Mart has constant marginal costs of 1 \$ when selling one unit of chocolate. Assume for simplicity there are no fixed costs. There are no other shopping options around, so W.Mart has a monopoly position.

- If the shop has to set one price (per unit of chocolate), what should this price be, how much chocolate will be sold to each of the customers, and how much profit will be made?
- The daughter of the owner of W.Mart has studied microeconomics and suggests to her father that he should instead offer a discount to customers who are unemployed (Mr. B can do this by presenting a statement from his unemployment insurance company). Which prices should be set for the two customers, and how much profit will be made?

Problem 6

Alice and Bridget share an office, and both appreciate having fresh flowers in the vase standing in the window. These flowers constitute a public good. One unit of flowers can be financed by spending 1 \$. Let G be the quantity of flowers (for simplicity, treat this as a continuous variable, and let x be money available for other consumption, after having contributed to the flowers. Ann's preferences are represented by the utility function $u_A(x_A,G) = \ln(x_A) + \ln(G)$, while Bridget has utility function $u_B(x_B,G) = \ln(x_A) + 3\cdot\ln(G)$. Initially, Alice and Bridget have amounts e_A and e_B, respectively.
Now, assume that the quantity of flowers will be determined by voluntary donations.

- Show that Ann's best-response donation, taking Bridget's donation g_B as given, can be expressed by $R_A(g_B) = \text{Max}\ \{½(e_A - g_B), 0\}$, and comment on this expression.
- Identify Bridget's best-response donation function and predict the outcome (Nash equilibrium) for the special case when $e_A = e_B$.
- Will the resulting quantity of flowers be efficient?
- Is it possible, in the general case, that one of the agents free-rides completely?

Ref.: mtn, 25. april 2012