Written Exam for the B.Sc. in Economics summer 2014

Mikro B

Final Exam

11 June 2014

(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.

This exam question consists of 3 pages in total

Problem 1

Consider a von Neumann-Morgenstern agent with the Bernoulli utility function u(x), where x is realized income, and consider income lotteries with two possible outcomes, x_L and x_H, $0 < x_L < x_H$, each of them having probability 50 %. We assume u is continuous and strictly increasing.

- a) Give a formal expression for the concept "certainty equivalent" for such a lottery, and illustrate in a diagram for a risk-averse agent
- b) Calculate the risk premium for an agent with $u(x) = x^2$, and with $x_L = 0$ and $x_H = 10$

Problem 2

In central Copenhagen, the market for lunch sandwiches has a supply side with the supply function $S(p) = 10 \cdot p$, p being the price of one sandwich, measured in DKK.
People working have the demand function $D_w(p) = \text{Max}\{600 - 5 \cdot p, 0\}$, and students have the demand function $D_s(p) = \text{Max}\{400 - 5 \cdot p, 0\}$. The market is characterized by perfect competition.

- a) Find the equilibrium price in this market, and the number of sandwiches consumed in equilibrium by workers and students, respectively.
- b) Calculate Producers' Surplus, as well as Consumers' Surplus for workers and students, respectively.
- c) The Minister of Education succeeds in introducing a subsidy of 20 DKK for each sandwich purchased by a student. Answer questions from a) and b) after the introduction of this subsidy.
- d) Comment on this statement from the minister: "This is obviously a good initiative, as students will receive more nutrition, and sandwich sellers will have better business conditions"

Problem 3

Consider the market for car insurance in a country with 1 million drivers, half of them good drivers, the other half bad. A good driver will incur a marginal cost of 1,000 $ for the insurance company with whom the driver becomes a customer; a bad driver will incur a marginal cost of 2,000 $. An insurance company is assumed to have no fixed costs.

The number of good drivers, x_g, wanting to buy the insurance depends on p, the price of insurance, with $x_g = D_g(p) = \text{Max}\{500{,}000 - 200 \cdot p, 0\}$, and similarly $x_b = D_b(p) = \text{Max}\{500{,}000 - 200 \cdot p, 0\}$ for the bad drivers.

The supply side is characterized by fierce competition, allowing only zero profits.

- a) What will the market outcome be if it is obvious to insurance companies which drivers are good and which are bad?
- b) What will the market outcome be if it is impossible for insurance companies to see who is a good driver and who is a bad driver? Compare to a) from a welfare economic point of view
- c) What will happen if insurance companies can, at a certain cost per driver, perform a test and conclude with certainty whether the driver is good or bad?

Problem 4

- a) Please present the economic problem "Tragedy of the Commons"; please do so formally, with diagrams, and provide economic intuition as well as some perspective as to the relevance of this case to our present economic society.

Problem 5

Consider the market for ice-cream. On the production side, this product can be produced at constant marginal and average costs of 10 per ice-cream, with no fixed costs. On the customer side, the demand is given by the function $D(p) = \text{Max}\{110 - p, 0\}$.

Suppose that the supply side has a monopoly producer.

- a) Find, in equilibrium, the quantity sold, the market price, customers' surplus (CS), producer's surplus (PS), and dead-weight loss (DWL).
- b) Let the government introduce a tax of 10 per unit of ice-cream. Find, in equilibrium, the quantity sold, the price paid by customers and the price received by the monopoly, respectively. Also identify customers' surplus (CS), producer's surplus (PS), tax-revenue (R), and dead-weight loss (DWL)

Problem 6

Arthur and Bill each sell drinks on campus on Friday nights. The market demand for drinks is given by the function $D(p) = \text{Max}\ \{60 - p, 0\}$. When each of the producers has chosen a quantity of drinks to produce and supply to the market, the price of drinks will be determined as the market-clearing level, given the total quantity supplied by Arthur and Bill. Assume, for simplicity, that both of them have constant marginal costs which are zero, $MC = 0$.

Assume that Arthur can act as a Stackelberg leader, having the advantage of being able to enter the market and determine his quantity prior to Bill.

Please determine the outcome, in terms of the following seven variables:

- The quantity produced and sold by each producer
- The market price
- Producer's surplus for each producer
- Consumers' surplus
- Deadweight loss.

Do so in in each of the following three cases.

- a) Both producers have fixed costs being zero.
- b) Now, suppose that both producers have fixed costs of 25 (in the sense that entering the market and starting production and sales takes an investment of 25).
- c) Finally, suppose that both producers have fixed costs of 250.

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