Written Exam for the B.Sc. or M.Sc. in Economics winter 2014-15

Microeconomics B

Final Exam

19/02/2015

(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 4 pages in total

Exercise 1

Consider a population of workers, in total $N > 1$, looking for work. If hired they each supply an inelastic number of working hours with the same productivity.

Each individual decides how many hours to spend looking for work, and each hour spent searching costs him a. Each job pays a wage of w if occupied. When deciding how many hours to search for work, each seeks to maximize the individual wage income less the search costs.

If the total number of hours spend searching for a job by all the workers amount to h, then the total number of jobs occupied is given by $f(h) = 10\sqrt{h}$.

a) If each worker individually decides for himself how many hours to search for a job, how many jobs will be occupied?
b) How many hours should the workers spend if the total surplus should be maximized?
c) Do the individual optimizing hours of search coincide with the maximization of total surplus? Explain!
d) How does the individual worker react if there is imposed a tax rate of t on the wage earned? How is the welfare affected by the tax?

Exercise 2

Consider a house-owner who must finance the purchase of a house. The loan is in the amount of 1000dkk, and he can choose between two repayment scheme:

1) He pays 20% in interests as a fixed rate, or
2) A variable rate where he either pays 10% interest with a probability of 0.6 or 35% with a probability of 0.4.

The income of the house owner is 5000dkk.

a) If the house-owner is risk-neutral, which scheme would he prefer?
b) If the house-owner has a Bernoulli-function $u(c) = \sqrt{c}$, which one would he prefer? Which compensation could make him change his mind?

Exercise 3

The board of a dynamic International food company needs to hire a new CEO since the previous stepped down after 30 years of service.

The candidates can be divided into two types: either they can contribute with a low annual added value to the firm of v_L or a high added value v_H. The two types also differ in their annual reservation wage, denoted by ω_i, such that the types with a high added value also have a higher reservation wage.

The board cannot observe the type of an individual applicant, but they know the distribution of types, namely that there is a fraction μ of high added value types.

Assume that $v_H > \omega_H$ and $v_L < \omega_L$.

a) Determine the efficient hiring policy if the board could observe the type of an applicant (who should be hired and at which wage?)
b) Determine the optimal wage contract offered by the board. Interpret the conditions that determine which contract that should be offered.
c) Can you offer a possible remedy to better separate the H-types from the L-types?

Exercise 4

A monopolist sells a patented drug as a blood thinning medicine, each unit of drug is produced at a fixed cost, $MC = 2$.

Two types of consumers use the drug, patients with a blood clot in the heart, H-types, and patients with a blood clot in the leg(s), L-types. The demand by H-types is $D_H(p) = \max\{90 - 3p\}$ while for L-types $D_L(p) = \max\{10 - p, 0\}$.

The number of each type is of equal size, normalize to one.

a) Assume that the monopolist sells each unit at a fixed, uniform price, and then derive the optimal price and production.
b) Assume that the monopolist can observe if a costumer either suffers from blood clot in the heart or in the leg(s), then derive the optimal prices and sales for the monopolist.
c) Assume that the monopolist cannot observe the type, but wants to separate the two types. Derive the optimal packages for the monopolist.

Exercise 5

As a consequence of global rise in the temperature the water level increases, increasing the risk of storms and flooding. Along the coast line costal protection can be constructed_to dampen the expected costs. Denote by G the size of the coastal protection. The marginal cost of the public project is constant, $MC(G) = 1$.

The society consists of two agents, agent A has a stock of money of $\omega_A = 200$ and a utility function $u_A(x_A, G) = 10\sqrt{G} + x_A$, while agent B has a stock of money $\omega_B = 100$ with a utility function $u(x_B, G) = 10\sqrt{G} + x_B$.

a) How much costal protection should the society provide to obtain the efficient amount?
b) If each individual decides how much to contribute to the coastal protection, how much will there be invested?
c) Construct a Lindahl-equilibrium to implement the efficient amount of coastal protection.