Written Exam for the B.Sc. in Economics winter 2015-16

Microeconomics II (B)

Final Exam

19. January 2016

(3-hour closed book exam)

This exam question consists of 4 pages in total

Problem 1

In order to generate a revenue for the government you are asked to submit a proposal for imposing either a tax as a registration fee on vehicles or as taxation of land.

Consider a per unit tax and assume that the current annual sales of cars is equal to the number of acres of land taxable by a land tax. Assume also that the markets for cars and land are both characterized by competitive behavior both on the seller and buyer side.

Explain what determines the size of the revenue from taxing either car sales or land for a given per unit tax with respect to the price sensitivity of demand and supply. Which kind of tax is likely to yield the highest revenue? Why?

Problem 2

Consider a situation with two roommates; A is a smoker and B is a non-smoker. The two roommates have incomes as follows: A has $\$100$ and B has $\$200$. They have utility functions:

$$U_A(M_A, S_A) = M_A + \ln S_A$$

for roommate A and

$$U_B(M_B, S_B) = M_B + 3 \ln S_B$$

where M is money and S is related to the smoke intensity in the room. S_A is the quantity of smoke and in the case for B we interpret S_B as the non-existence of smoke. Smoke, S, is measured on a scale from 0 to 1, such that possible allocations must satisfy $S_A + S_B = 1$.

According to the dormitory rules no smoking is allowed. However, roommates can bribe each other and trade the right to air (smoke filled or clean).

a) Determine the Walrasian equilibrium if trade in smoke permits takes place.

b) What would happen if students were allowed to smoke as much as possible?

Problem 3

Consider a company, Medicals Ltd, that has been granted a patent for a pharmaceutical to alleviate pains following a surgical operation. There are two types of consumers, 1 and 2, and: $D_1(p) = \max\{100 - p, 0\}$ and $D_2(p) = \max\{50 - p, 0\}$ are the aggregate demands of the two types, measured as number of prescriptions demanded by customers.

The Medicals Ltd can produce each prescription at a constant cost of $10.

As a marketing expert, having your own marketing consultancy, you can carry out a survey to determine some objective characteristics that will allow Medical Ltd to discriminate perfectly between the two types of consumers, hence being able to act as a 3rd degree price discriminator.

Without your survey Medical Ltd must charge a uniform price to both types of consumers.

a) What will be the maximal amount that Medical Ltd would be willing to pay for your service?
b) What happens to the amount in a) if the demand of type 1 is $D_1(p) = \max\{200 - p, 0\}$?

Problem 4

Two producers of dairy products, Arly AS and Thoese ApS, sell milk facing the following demand functions, as these two companies are the only two operating in the milk market and hence constitute a duopoloy with milk products that are not completely homogenous

$$D_A(p_A, p_T) = 90 - 2p_A + p_T$$

and

$$D_T(p_A, p_T) = 90 + p_A - 2p_T$$

where p_A is the price that a consumer pays for an Arly milk and p_T the price of a Thoese milk. Both producers set a price per liter and will accordingly satisfy the resulting demand for their milk. Both producers can produce a liter of milk at a constant extra cost of $9.

a) Find the equilibrium price and demand for milk for both producers.
b) Compare with the competitive equilibrium.

The government now imposes a fat content tax of $6 on each liter of milk and which is paid by the producers.

c) Find and explain what happens to the equilibrium price, quantity and profits.
d) Compare with the change in a competitive equilibrium. In particular, in which case is the change in quantities strongest?

Problem 5

Svend is a hard working custodian at the national gallery, and he has an annual income of 300 thousand dkk after-tax. Due to expected government spending cuts on the culture budgets he expects to be unemployed in the next year with a probability of 10 pct. In the event of a year of unemployment he can only receive an income in the form of cash benefit from the government in total of 100 thousand dkk.

Svend has preferences on lotteries that satisfies the expected utility hypothesis and he has a bernoulli function $u(x) = \sqrt{x}$.

Coincidently, Svend receives a telephone call from an insurance company, that offers him an unemployment insurance. He is offered to pay an insurance premium of 30 thousand dkk in annual premium and in return the company pays him 250 thousand dkk in the case of unemployment. If he accepts the insurance, in the event of unemployment and receiving the insurance amount, the amount will be deducted from his cash benefits and he will receive no income from the government.

a) Does Svend accept the offer by the insurance company?
b) How much would Svend be willing to pay in annual premium for the insurance amount?

Problem 6

A bank is considering lending money to an entrepreneur who faces two possible projects, both of which demand an investment of 5 million $. The entrepreneur has nowhere else to go, so the bank is in a strong bargaining position, basically being able to extract all gains from trade.

In project A, there is an 80% chance of earning profits of 10 million, and a 20% chance of earning a zero profit. In project B, there is a 40% chance of earning 22 million, and a 60% chance of earning a zero profit.

The entrepreneur has no initial capital and needs to borrow the full amount of five million from the bank. The bank and the entrepreneur are both risk-neutral. There is limited liability, such that in the event of a failure of a project controlled by the entrepreneur, the bank must write off its claims.

a) If the bank can control the entrepreneur's choice of project, on which terms should the bank offer the entrepreneur to borrow the million?
b) If the bank cannot observe the choice of project, what is the maximal amount the bank can charge while making sure that the entrepreneur chooses the same project as the bank? How does the lack of control affect the bank's expected profits?