

UNIVERSITY OF OSLO
DEPARTMENT OF ECONOMICS

Exam: **ECON4240 – Equilibrium, welfare and information**

Date of exam: Friday, May 18, 2012

Grades will be given: June 8, 2012

Time for exam: 2:30 p.m. – 5:30 p.m.

The problem set covers two pages

Note: You can give your answer in English or Norwegian!

Resources allowed:

- No resources allowed

The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

The exam consists of three problems. They count as indicated. Start by reading through the whole exam, and make sure that you allocate time to answering questions you find easy. You can get a good grade even if there are parts of problems that you do not have time to solve.

Problem 1 (50 %)

We consider an economy with two goods. Good 1 is produced and sold by a profit maximizing monopolist; it is produced at a constant unit cost of 1. Good 2 represents "everything else". A typical consumer has an income denominated in units of good 2 and a utility function:

$$U(x_1, x_2) = \tau x_1 - \frac{1}{2} x_1^2 + x_2$$

The parameter τ varies among consumers. There are n^H high-demand consumers with parameter τ^H and n^L low-demand consumers with parameter τ^L , $\tau^H > \tau^L > 1$.

- (a) In a welfare optimum, how many units of the product does each high-demand and low-demand consumer consume?

The monopolist sells the product by offering a contract (F^H, x_1^H) to each of the high-demand consumers, meaning that the amount x_1^H of good 1 can be purchased for a total payment of F^H , and, similarly, a contract (F^L, x_1^L) to each of the low-demand consumers. It is not possible for consumers to resell the product to other consumers.

- (b) Assume first that information is symmetric, so that the monopolist can differentiate between the high-demand and the low-demand consumers. What is the profit-maximizing pair of contracts (F^H, x_1^H) and (F^L, x_1^L) , and what is the monopolist's total profit?

- (c) Then assume that τ is a hidden characteristic, that is, the monopolist cannot differentiate between the high-demand and low-demand consumers. Could it happen that the monopolist chooses only to offer one contract (F, x_1) ? If two contracts are offered, formulate the conditions that must be satisfied in order that the consumers choose the "right" contract.
- (d) Let $\tau^H = 5$, $\tau^L = 3$, $n^H = 50$ and $n^L = 100$. Compute the firm's profit under the conditions of (b), and the optimal contracts and the firm's profit under the conditions of (c).
- (e) Repeat (d) for $n^H = 100$, the other parameters being unchanged. How does the optimal contract under asymmetric information differ from case (d)?

Problem 2 (30 %)

Consider a pure exchange economy with two goods and two consumers, A and B . Their utility functions are:

$$u_A(x_1, x_2) = \frac{1}{4} \log x_1 + \frac{3}{4} \log x_2$$

$$u_B(x_1, x_2) = x_1 + 2x_2$$

There are 10 units of each good.

- (a) Find the set of Pareto-optimal allocations. You may illustrate the answer by means of an Edgeworth box.
- (b) Let the social welfare function be $\alpha u_A + u_B$, where $\alpha > 0$. What is the social optimum, for different values of α ?
- (c) Suppose that A initially owns all the units of good 1, while B initially owns all the units of good 2. Find prices and allocation in competitive equilibrium.

Problem 3 (20 %)

Define and explain the concept *public good*.

In an economy with only private goods and no externalities, Pareto efficiency is characterized by marginal rates of substitution (MRS) and marginal rates of transformation (MRT) being equal. How are these conditions affected by the existence of public goods? You can answer this verbally and informally, or - preferably - by formulating a model.