

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

Microeconomics B (II)

Final Exam

18. February 2016

(3-hour closed book exam)

This exam question consists of 4 pages in total

Problem 1

Consider Henning who has a wealth of W dkk to be invested in either a government bond yielding an interest rate of $r > 0$ or a mutual fund yielding either a yield rate of $a > r$ with a probability π or a rate $b < r$ with a probability of $1 - \pi$.

Henning decides upon uncertain alternatives using expected utility with a bernoulli function $u(x)$, which is a strictly increasing and concave function.

- a) If $r > \pi a + (1 - \pi)b$ will Henning invest any amount in the mutual fund?
- b) Show that if $r < \pi a + (1 - \pi)b$ Henning will always invest a positive amount in the mutual fund.

Problem 2

The population consists of two types of labour: L-types and H-types, that among many differences differ in their probability of being unemployed. The L-types have an annual probability of being unemployed of π_L , while the H-types have a larger probability $\pi_H > \pi_L$. Assume, however, that they are similar in their income, their bernoulli utility function and their loss in income when being unemployed.

The share of L-types in the population is $\alpha > 0$. An insurance contract is a specification of: K the insurance amount and $P = \gamma K$ the insurance premium.

- a) Define an actuarial fair insurance contract. How should the premium rate γ be set if an actuarial fair contract should cover both types?

The government offers an unemployment insurance that covers both types: both pays the same premium and receives the same amount in the event of unemployment. The insurance benefit offered is the optimal amount that the L-types would choose with the rate $\gamma = \alpha\pi_L + (1 - \alpha)\pi_H$.

Assume that neither the government nor any private company can observe the type of a labour type.

- b) Illustrate the actuarial fair pooled insurance contracts, the government offered insurance contract and the types' indifference curves through this contract in a (P, K) -diagram
- c) Could a private insurance company offer an insurance contract that makes a positive profit and only attract the L-types? What would this imply for the government sponsored program?

Problem 3

Consider two car manufacturers producing the same quality car and targeting the same consumers. The consumer demand for the car is represented by the inverse demand function

$$P(Q) = \max\{900 - 2Q, 0\}$$

where Q is the total production of cars.

The car manufacturers produce with a constant marginal cost of 36 dkk. They choose their production levels and then sell at the price that clears the market.

- a) Find the number of cars produced and the price of a car in equilibrium.

Due to an increase in the households' income, the demand changes to $P(Q) = \max\{1200 - 2Q, 0\}$.

- b) How does the increased demand affect the equilibrium and the profits of the car manufacturers?
- c) Illustrate the impact and a possible adjustment process to the new equilibrium.

Problem 4

Consider a community of individual fishermen who during the year catch fish from the same fishing area. Each kilo of fish can be sold at a price of 20 dkk while the fisherman must endure a cost of 50 dkk in terms of gasoline, wear and tear etc., if he sets out to sea. If n fishermen went to the sea the total amount of fish all n fishermen catch is $25\sqrt{n}$.

- a) If 25 fishermen have sent out their boats, what will the profit of the 26th fisherman be? What will the effect on the fishermen who have already sent out their boat be?
- b) Find the number of fishermen that go to the sea. (Hint: Assume that the number of fishermen is continuous and there are sufficiently many potential fishermen, no matter what solution you find)
- c) What is the socially optimal number of boats?
- d) Explain why the inefficiency in the number of boats arises.

Problem 5

Consider a small community that has decided to purchase a new statue to be located in front of the local Netto. However, they have not yet decided upon the amount to use on purchasing the statue. Denote by S the amount to be spent on the statue.

There are two individuals: A and B. The individual A has an utility of the statue and own money given by $u_A(x, G) = x + \ln G$, where G is denotes the size and/or the quality of the statue. and he owns a money stock of 10, while individual B has an utility $u_B(x, G) = x + 3 \ln G$, and own a money stock of 50.

The costs of the statue are $C(G) = G$ such that G is the amount to be spent on the statue.

- a) Find the Pareto efficient amount to be spent on the statue.
- b) What is the amount actually spent if each individual voluntarily submits contributions?
- c) Explain why the total amount of the public collected with voluntary contributions differs from the efficient amount.
- d) Derive the Lindahl equilibrium of this economy