

UNIVERSITY OF OSLO

DEPARTMENT OF ECONOMICS

Home exam: ECON5200/9200 – Advanced Microeconomics

Exam period: Monday, November 25 at 09:00 a.m. to Friday, November 29 at 02:00 p.m.

Guidelines:

Submit your exam answer electronically to: submissions@econ.uio.no or on paper to the Department office on 12th floor. Last day for submission is Friday, November 29 at 2.00 p.m.

Written text should be in pdf format. Please remember to also submit *Delcaration Form for Portfolio assessment/take home exam* which you will find on the course web page. This must be submitted as a separate document.

Use your candidate number, both as the name of the file you submit, and as the author name in the file. Do NOT use your name! You will find your candidate number on your StudentWeb. If you have problems, please contact Tone Enger.

Further instructions:

- The questions are in English, but you can give your answers in English, Norwegian, Swedish or Danish.
- The home assignment will be marked and the scale for the mark will be **A** (best) through **E** for passes, and **F** for fail.
- Your answer must fill the formal requirements, found at <http://www.sv.uio.no/studier/ressurser/kildebruk/> (Norwegian) or <http://www.sv.uio.no/english/studies/resources/sources-and-references/> (English).
- It is of importance that your paper is submitted by the deadline (see above). Papers submitted after the deadline, **will not be corrected.***)
- All papers must be submitted electronically to the address given above, or on paper to the Department office. You must not submit your paper to the course teacher.

*) The rules for illness during exam also applies for the home exams. Please see <http://www.sv.uio.no/english/studies/admin/exams/postponed-exam/index.html> for further details.

Question 1.

1. Why does the reasoning used in the proof of the First Welfare Theorem collapse in the presence of externalities?
2. Suppose that (X, \underline{p}) is a market equilibrium for the pure exchange economy with endowment E . Can there exist an endowment point E' and a price vector $\underline{p}' \neq \underline{p}$ such that (X, \underline{p}') is a market equilibrium for the pure exchange economy with endowment E' ? What is the set of endowment points E' such that (X, \underline{p}) is a market equilibrium for the pure exchange economy with endowment E' ? Illustrate your answer graphically.

Question 2.

Consider a consumer living for 2 time periods only, today and tomorrow. Tomorrow may be Bad (B), Mediocre (M), or Good (G). The consumer has no income today, and contingent income tomorrow. The consumer receives 0 income in the Bad state, 400 NOK in the Mediocre state, and 800 NOK in the Good state. In addition, the consumer has access to financial markets. There are 3 tradable assets in this economy. Tradable asset 1 delivers 2 NOK in states B and M and 0 NOK in state G. Tradable asset 2 delivers 2 NOK in states M and G and 0 NOK in state B. Tradable asset 3 delivers 2 NOK in states B and G and 0 NOK in state M. The asset structure of the economy is thus given by A , where

$$A = \begin{pmatrix} 2 & 0 & 2 \\ 2 & 2 & 0 \\ 0 & 2 & 2 \end{pmatrix} \quad (1)$$

Each tradable asset is traded today at the price of 1 NOK.

You are also being told that

$$A^{-1} = \frac{1}{4} \begin{pmatrix} 1 & 1 & -1 \\ -1 & 1 & 1 \\ 1 & -1 & 1 \end{pmatrix} \quad (2)$$

Finally, you are reminded that a portfolio is a combination of tradable assets so that, for

example,

$$\underline{\varphi} = \begin{pmatrix} \varphi_1 \\ \varphi_2 \\ \varphi_3 \end{pmatrix} \quad (3)$$

represents a portfolio comprising φ_1 units of tradable asset 1, φ_2 units of tradable asset 2, and φ_3 units of tradable asset 3.

1. What is the price of portfolio $\underline{\varphi}_0$, where

$$\underline{\varphi}_0 = \begin{pmatrix} 200 \\ -200 \\ 0 \end{pmatrix} \quad (4)$$

2. Suppose that the consumer purchases portfolio $\underline{\varphi}_0$ today. How many NOK will the consumer dispose of tomorrow, taking into account his own income?
3. What do we mean by the bond of an economy with a single future time period? Let \underline{b} denote the bond of the economy described here. Express \underline{b} . What is the interest rate in this economy?
4. What probability does the market assign to each state of the world occurring?
5. Now assume that there are two goods in this world, apples and oranges. The price of an orange is 1 NOK in all states of the world, and that of an apple is 2 NOK in all states of the world. The consumer derives no utility from consuming today, but derives positive utility from consumption tomorrow. Specifically, we suppose that the consumer has Cobb-Douglas preferences such that, if x_i^w represents consumption of good i in state of the world $w \in \{B, M, G\}$, then:

$$u(\underline{x}) = \prod_{i,w} x_i^w \quad (5)$$

What portfolio should the consumer hold in order to maximize his utility?

Question 3.

Let consider a model of credit rationing. There is a continuum of entrepreneurs, $i \in E$. Each of them has cash-in-advanced for an amount equal to $A_i = A$ and wants to finance a project. The project requires an investment of I and has a high return, \bar{R} , in the case of success, or a low return, \underline{R} , in the case of failure. The probability of success and failure depends on the entrepreneur's ability, which is unobservable. Let denote by p_i the probability that the entrepreneur i is successful in his own project. The distribution of success probability is $G(\cdot)$ and the corresponding density is $g(\cdot)$. Each entrepreneur can decide whether to use the cash-in-advanced to buy a risk-free asset, whose risk-free interest rate is ρ , or to entirely invest it in his own project. In the latter case, he must raise additional finance signing a debt contract with a bank at the interest rate r_i . Both borrowers and lenders are risk-neutral and banks operate in a perfect competitive credit market.

1. Discuss the main implications of the assumption of perfect competitive credit market for the equilibrium characterization;
2. Explain the difference between equity and debt contract from the perspective of the entrepreneur;
3. Characterize the first best allocation;
4. Show why, as in Stiglitz and Weiss (1981), a separating equilibrium does not exist;
5. Discuss why in a similar environment Meza and Webb (1987) find that the equilibrium results in overinvestment compared to the socially efficient level, whereas in Stiglitz and Weiss (1981) the opposite result holds;
6. Introduce the possibility of contracting on collateral. How would the adverse selection problem be affected?
7. Assume now that all borrowers are risk-averse. Characterize the equilibrium with collateral.

Question 4.

1. Discuss the trade-off between risk-sharing and incentives in moral hazard problems. Build a simple parametric example with moral hazard and risk-averse agents, whose utility is of the log-type, $u(c) = \log c$, and quantify the risk-premium;

The questions here are based on the paper by Persson and Tabellini (1996).

2. What are the sources of trade-off between moral-hazard and risk-sharing in a fiscal federalism context?
3. What are the types of risk faced by the agents? Discuss the implications of these modelling assumptions for the equilibrium characterization;
4. How do national policies and confederative policies deal with moral hazard issues? On the light of this discussion, is the European Monetary Union an optimal institution to mitigate moral hazard problems?

Question 5.

This question builds on the paper by Cramton, Gibbons, and Klemperer (1987). This paper, in turn, builds on the Myerson-Satterthwaite theorem. It should thus be useful to carefully review Sections 23.D and 23.E in our book.

1. The authors propose a mechanism $\langle s, t \rangle$. Are they studying (i) a dominant strategy equilibrium or (ii) a Bayesian Nash equilibrium of the corresponding game? Briefly explain why, and whether you think the main results of the paper hinges on the authors' choice between (i) and (ii).
2. Try to explain Theorem 1 using plain English. Include what you think is the pessimistic/optimistic messages of the theorem.
3. What is the intuition for the difference between Proposition 1 and Proposition 2?
4. Take the example we used in class: Player S has a value of the car which is 0 or 5, each with probability 1/2. Player B's value is either 1 or 6, each with probability 1/2. We (essentially) showed in class that when S owns the car, there is no ex post efficient mechanism satisfying participation constraints and budget balance. (Hint: remember that this game was analogous to the bridge example we emphasized.) However, suppose now that the ownership of the car is shared between B and S, and initially S's share is $r_S \in [0, 1]$ while B's share is $r_B = 1 - r_S$. Derive the values of r_S such that there is an ex post efficient mechanism satisfying participation constraints and budget balance. Derive the mechanism.

5. Continue to consider the example with the car. Based on the suggestions in the paper (for example Theorem 2 and Section 6), can you propose a bidding game (type of auction) which dissolves the partnership efficiently?

References

- [1] Cramton, P., Gibbons, R. and P. Klemperer, 1987, "Dissolving a Partnership Efficiently," *Econometrica*, Vol. 55, No. 3, 615-632.
- [2] De Meza, D., and D., C., Webb, 1987, Too Much Investment: A Problem of Asymmetric Information, *The Quarterly Journal of Economics*, 102(2), 281-292.
- [3] Persson, T., and G., Tabellini, 1996, Federal Fiscal Constitutions: Risk-Aversion and Moral Hazard, 64(3), 623-646.
- [4] Stiglitz, J., E., and A., Weiss, 1981, Credit Rationing in Markets with Imperfect Information, *The American Economic Review*, 71(3), 393-410.