

UNIVERSITY OF OSLO

DEPARTMENT OF ECONOMICS

Postponed home exam: ECON5200/9200 – Advanced Microeconomics

Exam period: Tuesday 12 January at 09.00 to Friday 15 January at 15.00

Guidelines:

Submit your exam answer electronically to: submissions@econ.uio.no. Last day for submission is **Friday 15 January at 15.00**

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

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 the Department of Economics.

Further instructions:

- The questions are in English, and your answers must be given in English.
- Students on master's level are awarded on a descending scale using alphabetic grades from **A** to **E** for passes and **F** for fail. Students who would like to have the course approved as a part of our phd-program, must obtain the grade B or better. Students on phd-level are awarded either a passing or failing grade. The pass/fail scale is applied as a separate scale with only two possible results.
- Your answer must fill the formal requirements, found at <http://www.sv.uio.no/studier/ressurser/kildebruk/> (Norwegian) or at <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. You must not submit your paper to the course teacher.

*) The standard regulation 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.

Part 1 (40 points).

Exercise (15 points). Assume Nick has the following preferences over commodities 1 and 2:

$$(x_1, x_2) \succsim (z_1, z_2) \text{ iff } a(x_1)^2 + b(x_2)^2 \geq a(z_1)^2 + b(z_2)^2,$$

where $a, b > 0$.

- (4 points). After formalizing the properties studied in class, prove that these are/are not satisfied by Nick's preferences.
- (5 points). Determine the Walrasian and Hicksian demands.
- (6 points). Formalize a numerical example of pure exchange economy with (i) two individuals, Nick (choose a and b) and Mike (choose his preferences); (ii) two commodities 1 and 2 and positive endowments; and (iii) such that the Walrasian equilibrium does not exist. Discuss your example: why does the equilibrium not exist? what commodity exchange (if any) do you expect to arise between these two individuals? Why?

Papers (25 points). As in Blume, Brandenburger and Dekel (1991), ("Lexicographic Probabilities and Choice under Uncertainty," *Econometrica* **59**, 61-79) let Ω denote the set of states, C the set of (pure consequences) and \mathcal{P} the set of objective lotteries over C , while acts are mappings from Ω into \mathcal{P} . A constant act is an act such that $x(\omega) = x(\omega')$ for all $\omega, \omega' \in \Omega$. Consider I consumers with walrasian demand $x_i(p, w_i)$ where p are prices and w_i is individual wealth.

- (4 points) Suppose \succeq satisfies Axiom 1-4. Explain why the ranking of constant act determines the expected utility function? (Take the theorem of expected utility for objective probabilities for granted.)

Now, invoke Axiom 5 as well. Suppose that there are consequences $w, b \in C$ with $u(w) = 0$ and $u(b) = 1$.

- (6 points) Demonstrate how indifference with a constant act and the act

$$y = \begin{cases} b & \text{if } \omega \in E \\ w & \text{if } \omega \notin E \end{cases}$$

can be used to determine the subjective probability of an event $E \subset \Omega$

In "Microeconomic Theory," Mas-Colell et al. discuss the Ellsberg paradox (p. 207). This paradox has led to an extension of theories for choice under uncertainty, using non-additive probabilities. A seminal paper is Schmeidler (1989) ("Subjective Probability and Expected Utility Without Additivity," *Econometrica* **57**, 571-587).

A simple example non-additive probabilities with a state space $\{s_1, s_2\}$ is to assign non-additive subjective probabilities, v

$$\begin{aligned} v(\{s_1, s_2\}) &= 1 \\ v(\{s_1\}) &= v(\{s_2\}) = 0.1 \end{aligned}$$

The 10% allocated to each state represent the tiny knowledge we have, and the "missing" 80% represents genuine lack of knowledge, but $v(\{s_1, s_2\}) = 1$ as we know that one of the states for sure is the true state.

- (6 points) Show that with the extension to expected utility suggested by Schmeidler, expected utility for an act f with the probabilities above would be (this can be derived from the first equation of section 3):

$$Eu = 0.1u(f(s_1)) + 0.1u(f(s_2)) + 0.8 \min(u(f(s_1)), u(f(s_2))).$$

- (4 points) Why can this kind of preferences explain the Ellsberg paradox?

Schmeidler introduces the concept of comonotonic acts and limits the independence axiom to only apply to comonotonic acts. He then derives an expected utility representation with non-additive preferences.

- (5 points) Are the acts used to define probabilities in point (b) comonotonic?

Part 2 (20 points).

This question builds on the paper by Cramton, Gibbons, and Klemperer ("Dissolving a Partnership Efficiently," *Econometrica*, Vol. 55, No. 3, 615-632, 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. (4 points) 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. (4 points) Try to explain Theorem 1 using plain English. Include what you think is the pessimistic/optimistic messages of the theorem.
3. (4 points) What is the intuition for the difference between Proposition 1 and Proposition 2?
4. (4 points) 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. (4 points) 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?

Part 3 (40 points).

- (20 points) Paper. Read "The Swing Voter's Curse" by Feddersen and Pesendorfer (1996) in the *American Economic Review* 86(3), pp. 408-424 and answer the following questions.
 - (2 points) Define the elements that constitute the game for the basic model described at pp. 411-412.
 - (2 points) Define a symmetric Nash Equilibrium for this game.
 - (6 points) Show that uninformed independent agents strictly prefer to abstain when they are indifferent between voting for candidate 1 and voting for candidate 0. Discuss the result.
 - (5 points) Determine the fraction of uninformed independent agents who decide to abstain in a large electorate.
 - (5 points) Compare the idea of "winning curse" in auction (you may refer to the paper "A Theory of Auctions and Competitive Bidding" by Milgrom and Robert (1982) in *Econometrica* 50(5), 1089-122) with the concept of "swing voter's curse" presented in this paper.
- (20 points) Paper. Read "Regulation, Moral Hazard and Insurance of Environmental Risks" by Laffont (1995) in the *Journal of Public Economics* 58, pp. 319-336 and answer the following questions.
 - (5 points) Derive the objective function of a utilitarian regulator and find the optimal regulation under complete information. Discuss your results.
 - (5 points) In the incomplete information case, write the incentive constraints and the participation constraints for the agent and show that some of these constraints can be satisfied at no costs.
 - (4 points) Find the optimal regulation under incomplete information. Discuss your results.

- (6 points) Show how the optimal regulation under incomplete information modifies i) in the presence of limited liability and ii) when agents are risk-averse.