

Economics 202

Final Examination

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Read and follow the following instructions carefully:

1. Please fill out the acknowledgment and acceptance of the honor code on the cover of each bluebook, *writing your Stanford Student ID number in place of your name*
2. You have three hours to complete this exam
3. Please answer each of question in a separate bluebook, writing the question number on the cover of the bluebook
4. You may not use any aids (e.g., notes, books, calculators, etc.)
5. Answering these questions may require you to make reasonable assumptions that are not explicitly stated in the problem; please try to be explicit whenever you do so

Good luck!

1. Revealed Preference (60 min)

Suppose we observe a consumer's purchases of two goods in each of two different years. Assume she consumes only these two goods in each year, that she has some monetary endowment in each period, and has no ability to save or borrow between periods. Her preferences are separable (in every sense) across periods, and identical in each period. (That is, her preferences over consumption in period $i = 1, 2$ do not depend on i or her consumption in the other period.) Finally, assume that her preferences are locally non-satiated.

We observe:

| | Year 1 | | Year 2 | |
|------------|--------|----------|--------|----------|
| | Price | Quantity | Price | Quantity |
| Saxophones | 10 | 10 | 10 | 12 |
| Telephones | 10 | 10 | 8 | t_2^* |

- a) What are the consumer's budget constraints in the two periods?
- b) For what values of t_2^* is the bundle chosen in Year 1 ($x_1^* \equiv (10, 10)$) strictly revealed preferred to that chosen in Year 2 ($x_2^* \equiv (12, t_2^*)$)?
- c) For what values of t_2^* is the bundle chosen in Year 2 strictly revealed preferred to that chosen in Year 1?
- d) What values of t_2^* make our observations rationalizable?

From now on, assume that the observations are rationalizable.

- e) For what values of t_2^* must saxophones be inferior (over some price change) for this consumer? [Hint: In answering this and the next question, it may be convenient to think of the wealth effect in terms of the expenditure minimization problem.]
- f) For what values of t_2^* must telephones be inferior (over some price change) for this consumer?

2. Decisions under Uncertainty (45 min)

Three decision makers have preferences over bounded nonnegative random variables (lotteries) X . Their preferences are described by the following utility functions:

Decision Maker 1: $U(X) = \mathbb{E}[X^2]$

Decision Maker 2: $U(X) = (\mathbb{E}[X])^2$

Decision Maker 3: $U(X) = \mathbb{E}[X] - \text{Var}(X)$.

For EACH of these Decision Makers, answer the following questions:

- a) Are her preferences consistent with von Neumann-Morgenstern's Expected Utility Theory?
- b) Is she Risk-Averse, Risk-Neutral, or Risk-Loving (regardless of the answer to part (a))?
- c) Does she have Decreasing, Constant, or Increasing Absolute Risk-Aversion (regardless of the answer to part (a))?

3. Insurance and Information (75 min)

Consider an economy with two consumers - A and B , one physical consumption good, and two states of the world: $s = 1, 2$. The ex ante probabilities of the two states are $p_1, p_2 \geq 0$ s.t. $p_1 + p_2 = 1$ are objective and commonly known. Both consumers are von Neumann-Morgenstern decision makers and they have Constant Relative Risk Aversion, with the same coefficient $\rho > 0$. The endowment of consumer $i \in \{A, B\}$ in state s is given by $e_s^i > 0$.

- a) Write the First-Order Condition for a feasible consumption allocation $(x_1^A, x_2^A, x_1^B, x_2^B) \in \mathbb{R}_+^4$ to be Pareto efficient.
- b) Characterize the set of all Pareto efficient allocations in this economy.
- c) Calculate Walrasian equilibrium prices and the allocation in this economy with complete markets for the contingent goods. How does the equilibrium depend on the coefficient of risk aversion and the endowments? Interpret.

Suppose now that after the ex ante trading but before the state of the world s is realized, a signal $\sigma \in (0, 1)$ is publicly observed. The conditional probability that $\sigma = 1$ given state of the world is $q_s \in [0, 1]$.

- d) Suppose first that in ex ante trading, the agents do not foresee the signal, and so the equilibrium allocation in part (c) results. Then the signal is observed and contingent markets reopen. What will be the competitive equilibrium following each realization of the signal?
- e) Now suppose instead that consumers foresee the signal and the possibility of future trading ex ante. Describe a competitive equilibrium of this dynamic economy. Show that it is unique.
- f) Finally, suppose that consumers are unable to trade ex ante, but can trade only after the signal is observed. Describe the competitive equilibrium of this economy for each realization of the signal.
- g) Compare the equilibrium allocations in part (c), (e), and (f). Discuss how the availability of the signal may affect the efficiency of equilibrium allocation.