

Example 1: Choice of insurance

Karl unexpectedly inherited \$100,000 from his uncle, and now considers an opportunity to invest this money in a new firm, Madison Fossils. He is uncertain about possible returns on this investment. He might earn \$ 20,000 over the next year with probability $4/5$, but there is also a $1/5$ chance that he loses all money. Karl's Bernoulli utility function is given by $U(W) = \log W$.

- Show the endowment point for no insurance case in the commodity space
- Wisconsin Small Business Insurance Company offers a business insurance policy that would pay x dollars in case of loss at a premium $0.2x$. Graph Karl's budget constraint
- Find optimal level of insurance and the level of wealth under two contingencies. Does Karl insure fully?
- Repeat the previous part with insurance premium $0.4x$

Example 2: Risk aversion and certainty equivalence

You are on the way to buy a lottery ticket that pays \$3,000 with probability $1/20$ and nothing otherwise. Your best friend, who is strongly opposing gambling, offers to give you \$ 150 so that you change your mind and promise not to buy the ticket.

- Plot your Bernoulli utility function that is given by $U(C) = C^2$. Are you risk averse, risk neutral or risk loving?
- Compute and show on a graph expected value of the lottery and expected utility from the lottery
- What is certainty equivalent of the lottery?
- Would you accept your friend's offer? Explain
- Now your younger brother (he always tries to imitate you), whose utility function is $U(C) = \sqrt{C}$, wants to buy a ticket as well. Upset with your bad influence on the junior, you offer him \$ 155 for changing his mind. Will he accept?

Example 3: General equilibrium and Edgeworth box

Ann and Beth live in the economy that consists of magnets and nuts. Ann is initially endowed with 5 magnets and 10 nuts, Beth has 10 magnets and 5 nuts. They both have the same utility function $U(m, n) = \log m + 2 \log n$.

- What are the total resources of this economy?
- Plot an Edgeworth box and mark the allocation corresponding to the initial endowment
- Describe Pareto efficient allocations. Is endowment allocation Pareto efficient?
- Find the equilibrium consumption and equilibrium prices for this economy

Econ 301
Intermediate Microeconomics
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Midterm 2 (Group A)

You have 70 minutes to complete the exam. The midterm consists of 4 questions (25,30,25 and 20 points)+Just For Fun question.

Problem 1. (25p) (Uncertainty)

Oscar is an owner of Lamborghini Veneno, one of the most expensive cars ever made. Its market value is estimated at 8 million dollars. In case of a car collision the value of the car drops to 4 million dollars. The probability of a collision is $\pi_c = 0.5$. In short, Lamborghini is a lottery (8, 4).

a) Oscar's Bernoulli utility function is given by $u(c) = 10 \ln c$. Write down his Von Neumann-Morgenstern (expected) utility function over lotteries $U(C_c, C_{nc})$ (give a formula). Is Oscar risk averse, risk neutral or risk loving (choose one)? Plot Oscar's indifference curves in the commodity space (C_c, C_{nc}) .

b) In Madison area insurance for ridiculously expensive cars is provided by State Farm. Derive Oscar's budget constraint if State Farm insurance premium is $\gamma = 0.5$ (give equation for C_c and C_{nc} in terms of coverage x , and then reduce the two equations to one budget constraint.) Plot the corresponding budget set in the commodity space.

c) Find the optimal level of wealth (C_c, C_{nc}) and the coverage x . (three numbers) Is Oscar fully insured (yes-no answer).

d) Demonstrate that if the premium is greater than the probability of flood, $\gamma > \pi_c$ Oscar will not purchase full insurance. (Use "MRS" secret of happiness to show that in optimum $C_c < C_{nc}$).

Problem 2. (30p) (Edgeworth box and equilibrium)

Consider an economy with two goods (apples and oranges) and two agents, Elisa and Bob. Elisa is initially endowed with $\omega^E = (5, 30)$ of apples and oranges respectively and Ben's endowment is $\omega^B = (20, 20)$. Elisa and Ben have the same utility given by

$$U(x_1, x_2) = 2 \ln x_1 + 2 \ln x_2$$

a) Plot an Edgeworth box and mark the initial endowments.

b) Give a definition of Pareto efficient allocation (one sentence). Using graph argue that the necessary and sufficient condition for Pareto efficiency of a (interior) feasible allocation is $MRS^E = MRS^B$.

c) Derive the contract curve (give formula) and depict it in the Edgeworth box.

d) Find the competitive equilibrium (give six numbers) and show it in the Edgeworth box.

e) Verify that the allocation in the competitive equilibrium is Pareto efficient.

f) Give two other prices that are consistent with a competitive equilibrium? (give two numbers without any calculations)