Econ 131

Spring 2023

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Final Exam

May 12

Exam Instructions:

- **Explanation should be written using pens (we recommend black or blue ink, as these often scan the best).** No pencils, except for graphs.

- **You must submit your solutions using the exam packet provided.** If you need more room to write your answers or need to re-draw a graph use the extra pages at the end. Make sure to note it clearly and accurately if your solutions continue on a different page.

- **Do not write your solutions on pages that say "Do not write on this page".** Answers written on these pages will not be graded.

- **When time is called, STOP** writing, immediately **CLOSE** your exam packet and hold it up until it is collected by one of the GSIs.

- **Show your work**. Credit will only be awarded on the basis of what is written on the exam.

- **Sign the academic honesty pledge**. Cheating will be dealt with harshly.

Student Name:

Student ID Number:

Affirm the academic honesty pledge below. For those writing on a non-printed copy, please just write "Academic Honesty Pledge as on exam", and sign your name.
If you do not affirm this pledge, your exam will be marked invalid.

0. ACADEMIC HONESTY PLEDGE

I confirm that I have abided by all academic honesty rules for UC Berkeley and Economics 131. I confirm that I did not see this exam before my official exam start time. I confirm that I have not shared and will not share this exam with anyone else. I confirm that I haven't copied from anybody else's exam.

Signature: _____

1. True/False/Uncertain (20 points, 2 points per question.)

Explain your answer fully based on what was discussed in class, since all the credit is based on the explanation. Your grade depends entirely on the substance of your justification, not on whether you are correct in writing "True" or "False". Note that it is possible to answer each question for full credit with three sentences or fewer, and answers longer than ten lines long will not be graded.

(a) The spike of retirement hazard at age 62 in the United States is driven by the US social security system.

(b) Longer unemployment benefits lead to longer unemployment spells.

(c) The US time series of top 1% income shares estimated using (pre-tax) income reported on tax returns since 1913 shows that top incomes are very sensitive to the top marginal tax rate of the individual income tax.

(d) Absent social security, workers would simply save for their retirement themselves as predicted by the life-cycle model.

(e) A funded social security system is preferable to an unfunded social security system because it delivers bigger retirement benefits relative to taxes paid while working.

(f) Medicare health insurance in the United States saves lives.

(g) In the life-cycle model where people work and save when young and live off their savings and returns on savings when old, the government should not tax capital income.

(h) You decide to create a start-up company that offers insurance against spilling liquid on latpops, and you believe that the probability that an individual spills liquid on their laptop in any given year is 1%. Taking this into account, you decide to set the premium a $10 per year for all your clients. You find out that among your clients, the probability of this incident occurring is actually 10%. This is an example of adverse selection.

(i) Berkeley decides to purchase 500 bicycles to begin offering a bike share program that is free to the public. This is an example of a pure public good (Bike share programs offer bicycles that are parked in public spaces and can be used for transportation).

(j) A reduction in the tax rate on interest income will increase overall savings.

2. Local Public Goods (20 points)

The city of Berkeley has decided to build a new BART station near the Greek Theater to improve access to public transportation on the east side of the university campus. The city of Berkeley plans to fund the functioning of this new BART station, and notably improves the frequency of the BART trains going through the station, from the contributions of only two individuals: a UCB student (S) and a UCB professor (P). Each of the two individuals has a utility function over private goods (x_i) and total number of BART trains going through the new station everyday (B), of the form:

$$U_i(x_i, B) = (x_i - 3)(B - 4) \tag{1}$$

The total number of BART trains going through the station everyday B, is the sum of the number of trains paid for by each individual, the student and the professor: $B = b_s + b_p$. The student has an income of $5 and the professor has an income of $11. Both the private good and a BART train have a price of $1.

(a) How many BART trains will serve the new BART station everyday if the city of Berkeley does not intervene? How many are paid for by the student? By the professor? (4 points)

(b) What is the socially optimal number of BART trains? (4 points)

(c) Why do we observe a difference between (a) and (b) ? (2 points)

(d) Suppose the city of Berkeley is not happy with the private equilibrium and decides to pro-vide an additional BART train in addition to what the student and the professor choose to provide on their own. This extra train is paid for by imposing a $1 lump-sum tax on the professor only. What is the new total number of trains? How does your answer compare to (a)? Did the city of Berkeley achieve the social optimum with this plan? Why or why not? (4 points)

(e) Propose instead a mechanism the city of Berkeley could use to achieve the social optimum. (4 points)

(f) Does the BART system fit the characteristics of a pure public good? Why or why not? (2 points)

3. Unemployment Insurance (20 points)

A government is thinking about establishing an unemployment insurance system and has asked for an expert assessment. Everybody in the country makes a wage of **$100 when employed**, and earns **0 when unemployed**.

Individuals derive utility from **consumption** c, and have **probability** q **of becoming unemployed**. There are three types of individuals with different preferences and probability of becoming unemployed:

- **Type 1:** $q_1 = 50\%$ and $U(c) = \sqrt{c}$

- **Type 2:** $q_2 = 10\%$ and $U(c) = \sqrt{c}$

- **Type 3:** $q_3 = 10\%$ and $U(c) = c$

(Parts (f) and (g) are worth 3 points, all other exercises are worth 2 points)

  (a) What is the expected utility of each type **without insurance**?

  (b) Explain why **only** types 1 and 2 would benefit from insurance?

The government first considers leaving the provision of insurance to the **market**. Assume for the following exercises that **insurance companies make zero profits** (i.e. insurance premiums are actuarially fair). Insurances charge **premium** p (paid out whether employed or unemployed) and pay out **benefits** b in case of unemployment.

(c) Assuming q is fixed and does not depend on b, what is the **optimal level of benefits** b for types 1 and 2? How is this called?
(Hint: No calculation required.)

(d) **What prices** (p_1, p_2, p_3) will insurance companies charge to **each type** (we assume here companies can observe each individual's type)?

(e) How would your answer to (c) change **if** q **depended positively on** b (i.e. $\frac{\partial q}{\partial b} > 0$)? **What is the name** of this type of phenomenon?
(Hint: No calculation required.)

Assume for the remaining exercises that insurance companies and the government **cannot observe a given individual's type**. However, they do know there are **the same number of individuals of each type in the population** (and for each type, they know q and $U(c)$). Let us also assume for simplicity that the only benefit level b that can be offered by insurance contracts is \$100, i.e. full replacement of wages.

(f) How much is each **type willing to pay** for insurance?
    (Hint: What premium p makes each type indifferent between getting full insurance or no insurance at all? For reference: $5^2 = 25$ and $9^2 = 81$.)

(g) What is the **long term equilibrium price of insurance**? **Who gets insured** in equilibrium?

(h) **Should the government provide unemployment insurance** instead of leaving it to the market? **Why**?

(i) How would your answer to (g) and (h) change **if type 2 had utility** $U_2(c) = \log(c)$ instead? *(Hint: $\lim_{x \to 0} \log(x) = -\infty$)*

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