**Econ 131**
**Spring 2019**
**Emmanuel Saez**

**Final**

**May 17th**

Student Name:

Student ID:

GSI Name:

**Exam Instructions**

- **Closed book/notes exam.** No computer, calculator, or any electronic device allowed.
- **No phones.** Turn them off and put them in your bag.
- **Explanation should be written using pens.** 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.
- This exam contains a total of 50 points.

**Do NOT open this test until instructed to do so.**

[Do not write on this page.]

**1. True/False/Uncertain (questions 1a-j) (25 points, 2.5 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) It is desirable to concentrate taxes on goods whose demand is inelastic with the price.

*True/false. On pure efficiency grounds, this is true as the deadweight burden of taxes is zero for goods whose demand is inelastic. So, if the goal is minimize efficiency costs of taxation, then taxing inelastic goods more is desirable. However, if you take into account equity, taxing inelastic goods is not necessarily desirable if such goods are necessities consumed disproportionately by low income individuals.*

(b) Empirical evidence shows that Medicare and Medicaid save lives.

*True. For Medicare, the Card-Dobkin-Maestas QJE'09 shows that people are more likely to survive an emergency room event after they cross the age 65 threshold when everybody qualifies for Medicare. For Medicaid, papers by Currie and Gruber use the Medicaid expansions of the 1980s and 1990s to show that Medicaid reduces infant mortality.*

(c) The elimination of the Obamacare individual mandate will lead to a death spiral on Obamacare exchanges.

*Uncertain. Generally, a mandate is required to avoid adverse selection (with no mandate, only the sickest people would purchase insurance and drive prices up leading to fewer customers and a death spiral of the market). This has happened for example in the case of Washington State as we saw in problem set 3. However, in the case of Obamacare, low income families (slightly above the poverty rate) receive a large subsidy from the government and hence are protected from price increases due to adverse selection. This mitigates the adverse selection. However, higher income families (above 400% of the poverty rate) do not receive any subsidy and hence will be subject to adverse selection. Hence, it's possible that there will be a death spiral in this segment of the market.*

(d) The main reason behind the surge in labor force participation of single mothers in the US in the 1990s is the expansion of the Earned Income Tax Credit.

*Uncertain: it is true that the surge in labor force participation of single mothers in the US in the 1990s coincided with the expansion of the Earned Income Tax Credit. But welfare reform also happened at the same time. The old literature believed that the EITC was the key element but recent work by Kleven (2019) has cast doubt on this: other EITC expansions did not increase LFP of single mothers. Hence, it is likely that a combination*

*of EITC, welfare reform, and changes in social norms explain the surge in the LFP of single mothers.*

(e) The spike in retirement hazard at the Early Retirement Age of the Social Security system is evidence that many individuals do not follow the rational model of life-cycle savings.

*True: There is indeed a spike in retirement hazard at the ERA of 62. A rational person is not affected by the ERA because somebody who wants to retire earlier than the ERA would save in advance and live off savings before getting the benefits at ERA.*

(f) Preferential tax systems for highly skilled foreign immigrants have a large positive effect on immigration and hence are desirable even if society cares about redistribution.

*True/False: True that preferential tax systems can sometimes have a large effect (study on Denmark by Kleven et al.) so they are desirable for tax revenue reasons from a 1 country perspective. However, from a multi-country perspective, they create harmful tax competition as the gains in tax revenue come at the expense of tax revenue losses in other countries.*

(g) Disability insurance in the United States does not discourage labor supply because rejected applicants are very unlikely to work.

*True: This is the analysis by Bound AER89 which provides an upper bound on the labor supply looking at rejected applicants. 1/3 of rejected applicants work so the upper bound is not zero. Most recently, Maestas-Mullen-Strand AER13 obtain causal effect of DI on LFP using natural variation in DI examiners stringency and large SSA admin data linking DI applicants and examiners and find relatively small but significant effects.*

(h) Because US top 1% pre-tax income shares are strongly negatively correlated with top marginal tax rates, high top tax rates are not desirable.

*True/False: Piketty-Saez-Stantcheva AEJ 2014 show strong negative correlation between top 1% income shares and top marginal tax rates. Note that correlation may not necessarily imply causation. Even if its causation, the policy implications depend on the mechanism (supply side, tax avoidance/evasion, rent-seeking). Only in supply side scenario, low top tax rates are desirable (see Piketty-Saez-Stantcheva AEJ 2014 and lecture notes for details).*

(i) The corporate income tax is a progressive tax because profits from corporations accrue mostly to high income individuals.

*True/false: It is true that ownership of corporate stock is highly concentrated (Piketty-Saez) so the corporate income tax is progressive if its incidence falls on capital owners. However, this is not necessarily the case. If capital is perfectly mobile internationally, then*

*corporate tax is borne mostly by labor. If capital is not very mobile then firms' owners will bear a large fraction of the corporate income tax.*

(j) For higher education, the role of the government should be limited to guaranteeing loans so that talented but poor students can borrow against their future earnings to fund their education.

*True/False. True if individuals are fully rational and informed and make education decisions based on costs/benefits. False, if individuals are not fully rational or fully informed. Substantial empirical evidence shows that individuals do not make fully informed decisions on higher education. Decisions to go to college are sensitive tuition subsidies and grants (see e.g., the Fack-Grenet study in the case of France), many low income talented students do not apply to the best colleges (Hoxby-Avery).*

**1. Public Goods**

San Francisco is preparing for the Golden State Warriors' move by building a new basketball arena. Assume the city has two residents: Curry and Durant. SF will fund the new arena solely from the individual contributions of these residents. Each of the two residents has a utility function over private goods ($x_i$) and total arena size ($S$), of the form:

$$U_i(x_i, S) = \ln(x_i - 3) + \ln(S - 6)$$

The total size of the arena is determined by the total number of seats built, $S$, and is the sum of the number of seats paid for by Curry and Durant: $S = s_c + s_d$. Curry has an income of \$36 and Durant has an income of \$24. Both the private good and an arena seat have a price of \$1. *Note: For any fraction or decimal answers, you may choose to round off or keep as is.*

(a) How many seats will be built if the government does not intervene? How many are paid for by Curry? By Durant?

*For Curry, we can substitute $x_c = 36 - s_c$ and $S = s_c + s_d$, so $U_c = \ln(36 - s_c - 3) + \ln(s_c + s_d - 6)$. Now we can attempt to maximize Curry's utility to find an interior solution:*

$$\begin{aligned} \frac{\partial U_c}{\partial s_c} = 0 &= -\frac{1}{33 - s_c} + \frac{1}{s_c + s_d - 6} \\ \Rightarrow \quad 33 - s_c &= s_c + s_d - 6 \\ \Rightarrow \quad s_c^* &= \frac{39 - s_d}{2} \end{aligned}$$

*This is Curry's best response function for $s_c$ when Durant spends $s_d$ on the public good. We can similarly find Durant's best response function: $s_d^* = \frac{27 - s_c}{2}$. Since their incomes are different, the best response functions are not symmetric.*

*By solving this system of two equations, we have: $s_c^* = 17$, $s_d^* = 5$, so $S^* = s_c^* + s_d^* = 22$.*

(b) What is the socially optimal number of seats? If your answer differs from (a), explain why.

*Using $MRS_c + MRS_d = MRT$, we see that $MRS_c = \dfrac{\partial U_c / \partial s_c}{\partial U_c / \partial x_c} = \dfrac{x_c - 3}{S - 6}$ and $MRS_d = \dfrac{\partial U_d / \partial s_d}{\partial U_d / \partial x_d} = \dfrac{x_d - 3}{S - 6}$. In addition, $MRT = 1$, because the price of the private good and a seat are both equal to \$1. When we also substitute $x_c = 36 - s_c$ and $x_d = 24 - s_d$, and solve for $S$, we have $S_{opt}^* = 30$.*

(c) Suppose the city of San Francisco is not happy with the private equilibrium and decides to provide 6 seats in addition to what Curry and Durant choose to provide on their own. Durant and Curry each pay a \$3 lump-sum tax to pay for the 6 seats. What is the new

total number of seats? How does your answer compare to (a)? Did San Francisco achieve the social optimum with this plan? Why or why not?

*If we take into account the tax and the added seats, Curry's utility function is now:* $U_c = \ln(33 - s_c - 3) + \ln(s_c + s_d + 6 - 6)$. *Doing the same with Durant, and taking similar steps as in part (a), we have:* $s_c^* = 14$, $s_d^* = 2$, *so* $S^* = s_c^* + s_d^* + 30 = 22$, *same as in (a). The lump-sum tax is fully applied to the public good, so Curry and Durant decrease their contributions to the arena by the same amounts.*

(d) Suppose instead, starting from the situation in part (a), an anonymous fan pays for 6 seats. What is the new total number of seats? How many are provided by Curry? By Durant? How does this compare to the level of provision in (c)? If there are any similarities or differences, explain why.

*The anonymous gift increases the utility from the arena, and there is no tax to change Curry or Durant's budget constraint. For example, Durant's utility function would be:* $U_d = \ln(36 - s_d - 3) + \ln(s_c + s_d + 6 - 6)$. *Solving again like in part (a) above, we have:* $s_c^* = 15$, $s_d^* = 3$, *and* $S^* = s_c^* + s_d^* + 6 = 24$. *While the gift results in Curry and Durant increasing their private consumption and reducing their arena contributions, the total* $S$ *is now closer to the optimum shown in (b).*

(e) Propose a mechanism the government could use to achieve the social optimum.

*One possibility is for the government to provide 30 seats, and tax Curry and Durant accordingly, paying a 3/5ths share and a 2/5ths share respectively. Although there would be no private provision of seats, the number of seats will now equal the social optimum.*

(f) Does a basketball arena fit the characteristics of a pure public good? Why or why not?

*Seats are excludable and somewhat rival, but they are only rival after a very large number of individuals buy the good. Building a stadium allows many residents to benefit from watching the game at once, but calling a stadium a pure public good is a stretch*

**2. Insurance (25 points)**

Assume that everybody earns a wage of \$400. Individuals face a probability $q$ of getting disabled. If they are disabled their wage becomes \$0. Individuals can purchase insurance from private firms. It provides them with \$400 if they get disabled. The price of insurance is $p$ and is paid regardless of whether the person becomes disabled or not. In this problem (and in contrast to the model seen in class), we assume that individuals either buy no insurance at all or buy full insurance. Assume that there are three types of people that can differ in the probability of getting disabled, $q$, and/or their utility function over consumption $c$:

- Type 1: $q_1 = 40\%$ and $U(c) = \sqrt{c}$
- Type 2: $q_2 = 10\%$ and $U(c) = \sqrt{c}$
- Type 3: $q_3 = 5\%$ and $U(c) = c$

There are 10 people of each type.

(a) Explain why only type I and type II would benefit from insurance.

*Type I and II have a concave utility function which means they are risk averse and would benefit from insurance. Type III is risk neutral.*

**Assume in the remaining questions that the market for insurance is perfectly competitive. Assume in questions (b), (c) and (d) ONLY that firms know the type of each consumer and charge each type of consumer a different price** $(p_1, p_2, p_3)$

(b) Write down the profit function of firms for each type of individual:

$\pi_i = 10 \cdot (p_i - q_i \cdot 400)$

(c) Explain why in equilibrium, insurance providers earn zero profits.

*Because the market is perfectly competitive*

(d) Calculate the prices $(p_1, p_2, p_3)$ that firms will charge each type.

$p_1 = 0.4(400) = 160$, $p_2 = 0.10(400) = 40$, $p_3 = 0.05(400) = 20$

**Assume for the rest of the problem that firms cannot observe types.**

(e) Calculate how much each type is willing to pay for insurance. Willingness to pay is defined as the price of insurance that makes the individual indifferent between getting full insurance at this price and not being insured at all.

*Type 1 and 2 are solving for their willingness to pay $w$ such that:*

$\sqrt{400 - wtp_i} = (1 - q_i)\sqrt{400} + q_i\sqrt{0}$

*Then*

$wtp_i = 400 - (1 - q_i)^2 400$

*This yields that type 1 is willing to pay \$256 and type 2 is willing to pay \$76. Type 3 is indifferent.*

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

*The market is perfectly competitive which means that firms set price equal to expected cost:*

$$p = \frac{0.4(400) + 0.1(400)}{2} = 100$$

*This price is too high for type 2 who will drop out of the market. This means that only type 1 remain and they should be charged a price of \$160*

(g) Give a reason for why the government should intervene in this market.

*There is under provision of insurance which can be solved by government intervention*

(h) Should the government be worried about moral hazard in this scenario?

*No, because the probability of being disabled is not a function of the benefits*

**Assume now that type 1 and 2 have different utility functions but their probabilities of getting disabled are the same as before:**

- Type 1: $q_1 = 40\%$ and $U(c) = \sqrt{c}$
- Type 2: $q_2 = 10\%$ and $U(c) = c^{\frac{1}{4}}$
- Type 3: $q_3 = 5\%$ and $U(c) = c$

(i) Calculate the new equilibrium price. Who gets insurance now?

*Type 1's willingness to pay is the same as before, but type 2 are more risk averse which implies that they are willing to pay more. Their willingness to pay now is \$137.6. Both types are willing to buy the insurance at this price.*

(j) Explain the intuition for this result.

*The fact that risk-averse individuals are also the ones who are not very risky reduces adverse selection. This is called advantageous selection.*

[Do not write on this page.]

*Use this page for calculations, scratch work, etc..*

*Use this page for calculations, scratch work, etc..*

*Use this page for calculations, scratch work, etc..*

*Use this page for calculations, scratch work, etc..*