Econ 131
Spring 2017
Emmanuel Saez

Final

May 12th

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) 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).

False. Bicycles are a rival good.

(b) A large study is conducted to evaluate the effects of income taxation on workers. Individuals are randomized into two groups and faced with different tax rates. The study finds that individuals in both groups work exactly the same number of hours per week on average. The study concludes that taxation clearly does not distort workers' behavior. Do you agree with this conclusion?

False. As Feldstein (JPE 1995) and Saez et al (2012) explain, there are multiple dimensions of labor supply not necessarily captured by hours worked that may be affected by taxes. Thus, even though hours worked may not change with higher taxes, other dimensions of taxable income, such as deductions, may change so we cannot conclude that income taxes have no effects on workers' behavior.

(c) 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.

True/uncertain. While people who are more likely to spill liquid on their laptops are more willing to take up insurance, there may also be moral hazard effects.

(d) In theory, the EITC encourages all low-income individuals to work more.

False. While the EITC incentives individuals who were not previously working to work, on the upper part of the EITC budget set the income and susbtitution effects induce individuals to work less.

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

False. As shown in class with a simple two period model, a reduction in a the tax rate on interest income will have two offsetting effects so it is unclear what the effects on overall

savings would be. Specifically, the price effect makes second period consumption less expensive so individuals will substitute toward future consumption and increase saving. The wealth effect leads to an increase in present consumption and less savings since wealth has increased and period 2 consumption is a normal good.

(f) Educational degrees (at least Texas high school degrees) appear to be merely a screening device: a way for employers to distinguish among people who have better or worse intrinsic ability.

False. Clark-Martorell 2014 showed that students with a test score that barely earned them a high school degree in Texas earned no more than people with a test score that barely missed the degree cutoff. This shows that the degree itself means nothing. (Instead, education generally matters because of the human capital it imparts to students.)

(g) It is rational for someone to want the government to tax everyone in order to fund a public good and then for that person to try to evade paying the tax herself.

True. This is an example of the free-rider problem. If I enjoy a public good (e.g. national defense or the public radio), I should always want other people to pay for it.

(h) Flexibility in the timing of realizing capital gains (including exercising stock options) can make it hard to use basic difference-in-differences methods to estimate the long-run elasticity of high-earners income with respect to their net-of-tax rate.

True. As shown in lecture, high-earners can realize capital gains (i.e. sell assets that have appreciated in value) before an imminent tax increase in order to avoid future taxes. A basic DD analysis (between the year before and year after the tax change) will show that top incomes are extremely sensitive to tax rates. However, that DD estimate reflects a one-time change in tax revenue rather than a permanent ongoing change in tax revenue.

(i) When the government puts guardrails on roads (i.e. the sheets of metal sticking out of the ground that prevent cars from falling down mountains when the cars veer off the road), cars stop falling down mountains, but cars are more likely to get into minor accidents that don't affect others (e.g. cars skidding into trees) as people start to drive a little faster. This is an example of moral hazard and is a reason for the government to possibly not place guardrails on roads even if everyone prefers roads with guardrails and guardrails cost nothing.

False. Technically, this is not an example of moral hazard (moral hazard involves individuals taking private actions that make an insured bad state of the world more likely to happen). There is no insurance in this example. Substantively, if everyone prefers guardrails and guardrails are free, then it is a Pareto-improving policy (everyone is better off) and the government should implement them.

(j) The optimal linear tax rate is never above the revenue maximizing tax rate.

True. If the tax rate were above the maximizing revenue rate, decreasing the tax rate would make taxpayers happier and increase tax revenue, a win-win situation [a Pareto improvement].

2. Exercise - Externalities (12 points)

The 2016 United Nations Climate Change Conference met in Morocco in order to agree on policies to reduce climate-warming pollution like carbon dioxide. Suppose that the conference determined that the social marginal benefit from reducing each unit of carbon dioxide pollution equals \$200 no matter how much pollution is occurring. Suppose that the world has lots of identical firms and each firm faces a marginal cost of reducing one unit of carbon dioxide pollution equal to $\$100 \times q$, where q is the number of units of pollution the firm reduces (i.e. the number of units of pollution the firm avoids emitting). There are no other costs to pollution reduction (so the firm's marginal cost equals the social marginal cost).

(a) [2 points] What is the socially optimal subsidy to pollution reduction (equivalent to the socially optimal tax on pollution) in terms of dollars per unit of pollution reduced? (Assume there is no quantity regulation.)

(b) [2 points] What is the socially optimal quantity regulation (the number of units of pollution reduction that every firm is required to do)? (Assume there is no subsidy/tax.)

Now the conference learns that $\$100 \times q$ was just the *expected* marginal cost that each firm will face to reducing a unit of pollution. In reality, either all firms will face a marginal cost equal to $100q - 50$ (because a cheap pollution-reducing technology gets invented, call this possible future "the good future"), or all firms will face a marginal cost equal to $100q + 50$ (because no cheap pollution-reducing technology gets invented, call this possible future "the bad future"). The good future and the bad future each have a 50% chance of happening.

(c) [2 points] Draw a graph of the social marginal benefit curve and the possible social marginal cost curves as a function of pollution reduction q. Label your axes and the optimal socially optimal amounts of pollution under each of the two scenarios.

(d) [2 points] Calculate expected DWL from the subsidy in part (a). The expected DWL is defined as [50% times the DWL in the good future] + [50% times the DWL in the bad future].

(e) [2 points] Calculate expected DWL from the quantity regulation in part (b).

(f) [2 points] By comparing the expected DWL calculated in parts (d) and (e), which of the two policies would you recommend to the conference leaders? Plot out **and** explain a change to the social marginal benefit curve that would make your recommendation different. [Note: There is no math required here, and you can answer this question if you understand the concepts but were unable to answer parts (d) and (e).]

Solution:

(a) The socially optimal subsidy to pollution equals the social marginal benefit: \$200 per unit of pollution reduced.

(b) At the social optimum, social marginal cost equals social marginal benefit: $200 = 100 \cdot q$ so $q = 2$. So the socially optimal quantity regulation is $q = 2$.

(c) (Standard graph)

(d) Expected DWL is zero since in both the good future and the bad future, the \$1 subsidy achieves the socially optimal amount of pollution reduction. [See graph.]

(e) Expected DWL is positive since in both the good future and the bad future, the actual quantity of pollution reduced at each firm ($q = 2$) differs from the socially optimal quantities $100q + 50 = 200 \implies q^* = 1.5$ in the bad future and $100q - 50 = 200 \implies q = 2.5$ in the good future. That tells you that each DWL triangle has a width of 0.5. The height of each DWL triangle is 50, based on computing the SMC at $q = 2$ under each possible future. $.5^2 * 50 = 12.5$, so expected DWL equals 12.5 ($= 50\% \cdot 12.5 + 50\% \cdot 12.5$).

(f) The subsidy regulation minimizes expected DWL. If the social marginal benefit curve were very downward-sloping (steep)—i.e. if the benefit to reducing a unit of pollution is much larger at high pollution levels than at low pollution levels—then a quantity regulation would minimize expected DWL (since it's extremely valuable for society to reduce pollution a fair bit, even when pollution is costly to reduce).

3. Social Insurance (13 Points)

Pam is a single mother with two kids. If she applies for welfare and does not work at all, she receives **welfare benefits** of $5,000 a year and health insurance for her family through **Medicaid** that she values at $2,000 a year. If she works, she earns $10 per hour and can work up to 2000 hours per year. She loses $1 in welfare benefits for every $2 she earns. She loses her Medicaid coverage if she earns enough so that she is no longer eligible for welfare benefits (i.e. she loses Medicaid when welfare benefits = $0). Her job does not provide health insurance. Pam's income is low enough that she does not pay income taxes (also assume that she does not pay Social Security taxes).

(a) [4 points] Graph Pam's opportunity set in the space consumption-hours (carefully labeling the slope of the budget constraint, intercept points, and any discontinuities). Is there any hours range that she definitely won't choose? Why or why not?

(b) [3 points] Suppose that there is a Medicaid expansion so that single mothers earning less than $25,000 per year and their children are now covered. How does this change Pam's opportunity set (draw a new graph). How might her new choice of hours of work compare to her choice in part (a)? Show graphically and explain.

Assume the Medicaid expansion stays in place for the remainder of the problem (i.e. assume Pam is eligible for Medicaid if she earns less than $25,000)

(c) [3 points] Congress is concerned that there is too high a tax on work for welfare recipients and passes a new law. Under the new law, Pam loses $1 in benefits for every $3 she earns. How does this change Pam's opportunity set (draw a new graph)? How might her new choice of hours of work compare to her choice in part (b)? Show graphically and explain. How might this law affect the total number of people on welfare?

(d) [3 points] The law from part (c) is vetoed, so Pam once again loses $1 in benefits for every $2 she earns. Congress passes a new law that allows the IRS to take child support directly out of the wages of "deadbeat dads" and give it to the mothers. As a result of the new law, Pam receives $5,000 per year in child support. However, she loses $1 of welfare benefits for every $2 of child support she receives. How does this change Pam's opportunity set (draw a new graph)? How might her new choice of hours of work compare to her choice in part (b)? Show graphically and explain.

Solution:

(a) See figure 1 below. Pam will not work between 1000 and 1200 hours because whatever she can consume while working in that range she can consume as much while working less.

(b) The discontinuity at h=1000 disappears. As can be seen from the indifference curves drawn below, for certain preferences Pam will work more since the change in policy allows her to reach a higher indifference curve (Ua instead of Ub), going from working at the point of discontinuity (1000 hours) before the policy change to the number of hours determined by the tangency of Ua and the line with a slope of 10.

(c) For certain preferences, Pam may choose to work given the policy change in c whereas she wouldn't have in part b. See the depiction of such a scenario below, as represented by the two indifference curves, one with tangency at 0 hours of work, the other with a tangency with positive hours of work. In such a scenario, Pam relies on welfare benefits less under policy c than policy b. A similar depiction can be drawn further to the right on the graph (you should do this yourself), moving Pam from a point where she still receives some welfare benefits under policy b to a higher indifference curve at which she is receiving no welfare benefits under policy c.

(d) For certain preferences, such as those represented by the indifference curves below, Pam may now choose not to work under policy d while she would have worked under policy b. Intuitively, she can now enjoy greater consumption without working than before due to the additional child support benefits, so may decide to forgo the work she would have done and enjoy the extra labor-free income.

Figure 1: Part (a)

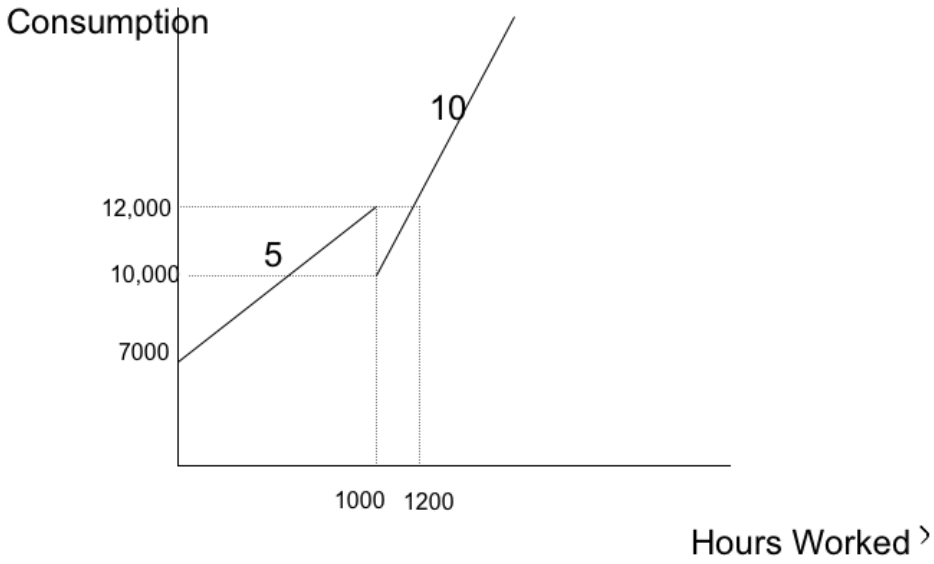


Figure 2: Part (b)

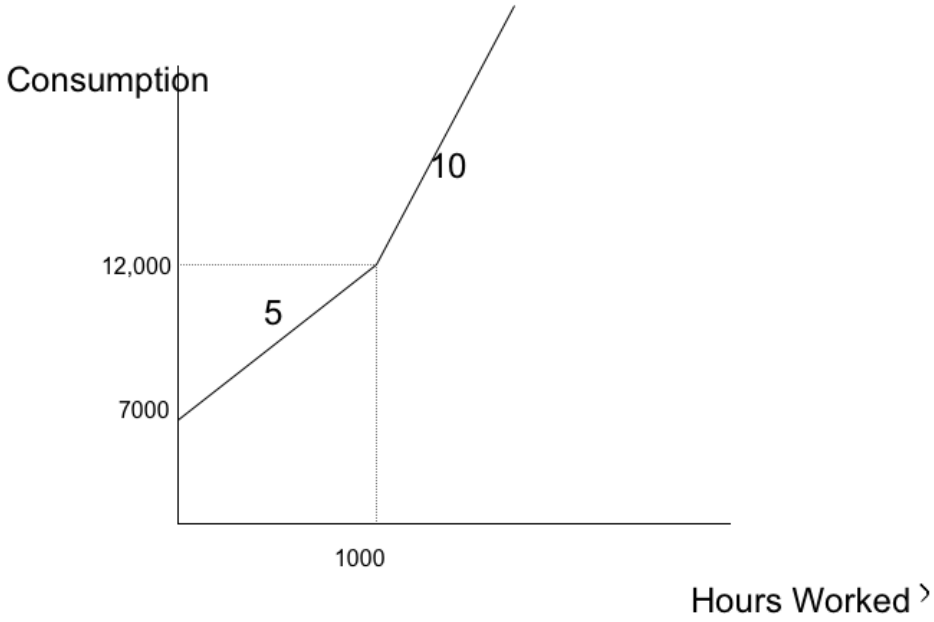


Figure 3: Part (c)

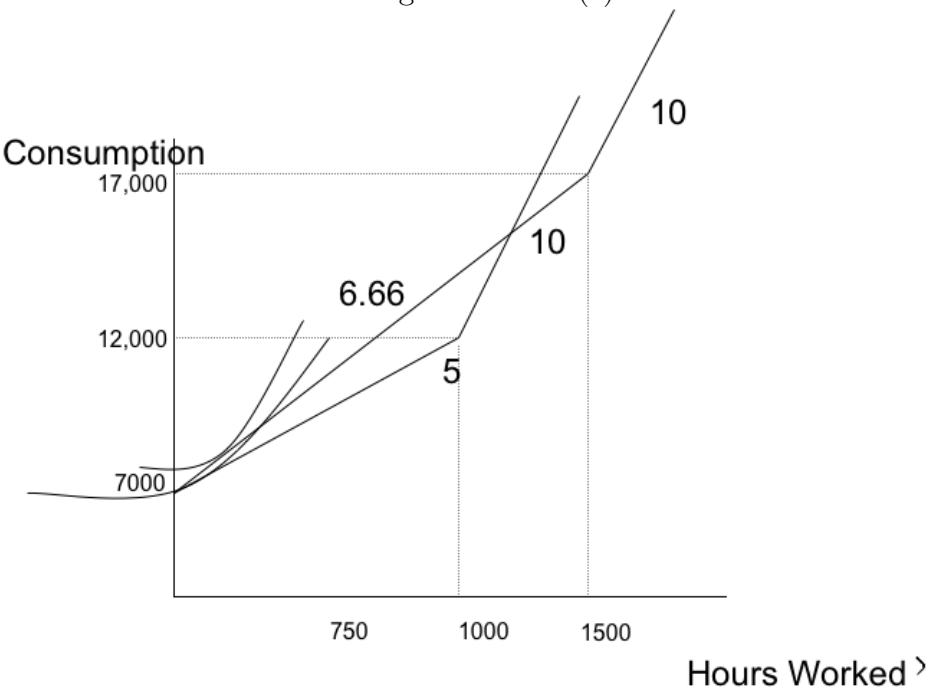
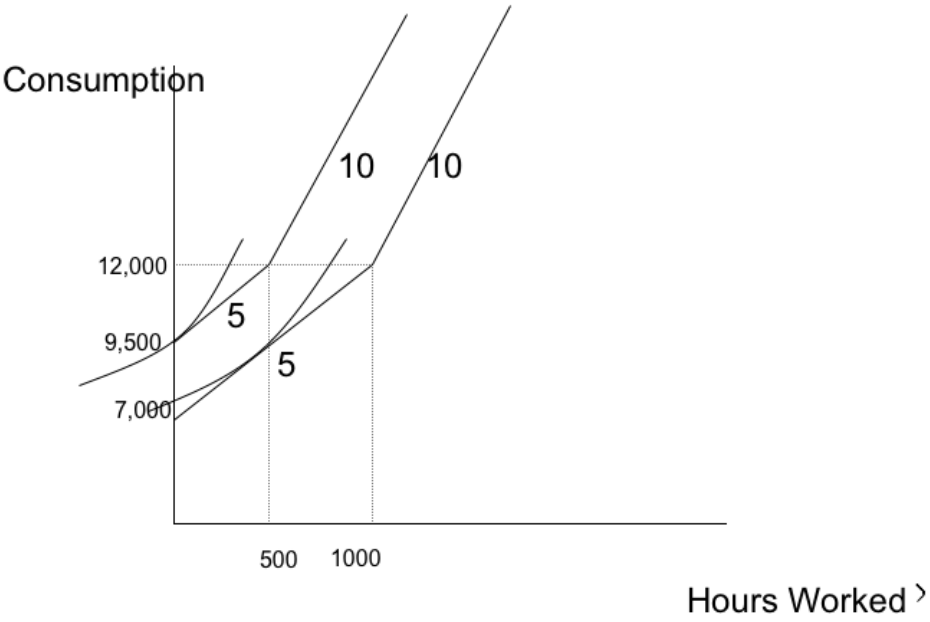


Figure 4: Part (d)



[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..