Econ 230B

Spring 2020

FINAL EXAM: Solutions

The average grade for the final exam is 49 (out of 70 points) The average grade (out of 100) including all assignments is 75. There are 4A+, 6A, 2A-, 2B+, 4B, 1B-

True/False Questions: 40 points

Answer briefly all 10 true/false questions (4 pts each). Explain your answer fully, since all the credit is based on the explanation. For the answers, base your answers on the substance of what was discussed in class (over and above what you can find in the slides).

1. Optimal tax theory relies on utilitarianism but people's intuitive sense of fairness is not utilitarian. Therefore, optimal tax theory is not relevant.

   Solution: False: It is true that people's intuitive sense of fairness is not utilitarian. See e.g., the simple survey by Saez-Stantcheva on consumer lover vs. frugal person. It is also true that optimal tax theory was initially based on utilitarianism. However, optimal tax formulas can be expressed as a function of social marginal welfare weights (and behavioral elasticities). The social marginal welfare weights do not need to come from straight utilitarianism and can be obtained from richer and more realistic social preferences (as we discussed in class).

2. Labor supply theory and changes in incentives do a pretty good job at explaining the labor force participation of single mothers in the US over the last four decades.

   Solution: Uncertain: it is true that the surge in labor force participation of single mothers in the US in the 1990s coincided with welfare reform and the expansion of the Earned Income Tax Credit. 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.

3. Series on pre-tax income shares are affected by tax evasion and avoidance so it is impossible to say much about the evolution of inequality.

   Solution: False: True that series based on reported income on tax returns (the Piketty-Saez 2003 series) are affected by tax evasion and avoidance. For example, top incomes excluding capital gains show a big jump from 1986 to 1988 due to the shift of corporate income to individual income (as C-corporations shifted to partnership and S-corporation form). However, additional evidence shows that the rise of top incomes is real: series adding capital gains also show a dramatic increase since 1980 (and capital gains have always been tax favored and were the main tax channel to shelter income before the 1980s); charitable giving by top earners increased dramatically (relative to average income). More generally, it is possible in principle to construct series that reflect the true economic incomes. This is what the Distributional National Accounts of Piketty-Saez-Zucman 2018 attempt to do. There is also evidence that tax evasion has been rising in the past decades (Zucman 2014) and concentrated at the top (Alstadsaeter et al 2019) so we can still assert that there has been a rise in inequality, which is, if anything, underestimated by official statistics.

4. Research of social security and retirement behavior shows that economic incentives are critical to keep elderly people working.

   Solution: Uncertain: it is certainly the case that retirement systems have a very large impact on retirement behavior. However, the best studies suggest that pure economic incentives probably play at best a fairly modest role. There is strong evidence that the early retirement age plays a big role (see the study by Manoli-Weber for Austria and descriptive evidence for the US of a retirement spike at age 62) and that focal norms also matter (see Siebold 2018 for Germany) but these are not standard "economic incentives". Pure economic incentives (in the sense of the implicit tax on continued work created by retirement systems) seem to have a fairly small effect: Manoli-Weber on very salient severance payment for Austria offer the cleanest evidence of a significant effect but quantitatively small. Siebold shows that kinks in the lifetime budget set created by the pension system have no effect (but possibly because they are not salient).

5. Denmark has a very progressive tax system but can still attract top talent from abroad by offering tax discounts on highly skilled immigrants. Therefore, mobility of top talent does not threaten tax progressivity.

   Solution: True that Denmark has a very progressive tax system but can still attract top talent from abroad by offering tax discounts on highly skilled immigrants (Landais et al. 2014 study). So it does not hinder overall tax progressivity in Denmark (as the number of foreign immigrants at the top is very small relative to the domestic population). However, from a multi-country perspective, such schemes do threaten tax progressivity in every country if they proliferate. E.g., high income Danes might move abroad if Sweden/Germany offer such schemes as well forcing Denmark to reduce its own tax progressivity. This is "tax competition". In principle, countries could fight such competition by taxing ex-pats as the US does (but the US is exceptional and no European country does this).

6. Tax competition is particularly severe between sub-national governments. Therefore it is impossible for local governments to tax corporate profits.

   Solution: True that tax competition is generally more severe at the sub-national level. However the US case shows that it's possible for states to tax corporate profits, by using apportionment formulas. The US experience suggests that with adequate base protection measures, sub-national corporate income taxation is feasible. See Clausing 2014.

7. If life expectancy rises, the annual flow of intergenerational wealth transmission necessarily becomes smaller.

   Solution: Wrong. The annual flow of intergenerational wealth transmission as a fraction of national income can be written $b = m \cdot \mu\beta$, where m is the mortality rate. Higher life expectancy pushes m down, but μ, the ratio of average wealht at death to average wealth in the population, can rise at the same time, so that in the end of the effect of higher life expectancy is ambiguous. And indeed b has risen in a country like France since the 1980s despite the rise in life expectancy (see Piketty, 2011).

8. International corporate tax competition would disappear if instead of having territorial corporate taxes, countries had worldwide corporate taxes.

   Solution: Generally speaking this is false: with worldwide taxation there would still be incentives for firms to move their headquarters to low-tax places. In practice however it is harder for a firm to change nationality (as opposed to changing the location of production) and so worldwide taxation may alleviate tax competition.

9. Although there is no compelling empirical evidence on this issue, theoretically the top marginal income tax rate has a positive effect on tax evasion.

   Solution: Wrong. In a nonlinear tax system, an increase in the marginal tax rate for a constant total tax liability can have a positive substitution effect on evasion, but this is true only under an endogenous audit probability and the result depends on the second-order derivative of the audit probability. In general, the substitution effect of the marginal tax rate on evasion is theoretically ambiguous and its sign is an open empirical question. See Kleven et al. (2011).

10. A progressive wealth tax serves no purpose if all wealth derives from life-cycle saving.

    Solution: This is true. However as we saw in class, standard life cycle saving models do not allow one to understand the existence of very large fortunes and thus are inadequate to think about the taxation of billionaires. If people accumulated wealth only for consumption, nobody would own $100 billion, as nobody can consume so much, even over decades or centuries. In the wealth-in-the-utility function model we studied, people care about wealth per se (because wealth confers prestige, power, etc.), so they dont simply accumulate wealth to consume more in the future.

PROBLEM (30 pts):

Consider an economy where the government sets a flat tax at rate τ on earnings to raise revenue. We assume that the economy is static: the total population remains constant and equal to N over years and there is no overall growth in earnings.

Individual i earns $z_i = z_i^0(1-\tau)^e$ where the tax rate is τ. z_i^0 is independent of taxation and is called potential income. e is a positive parameter equal for all individuals in the economy. The government wants to set τ so as to raise as much tax revenue as possible.

a) (4 pts) What is the parameter e? Show that the tax rate maximizing total tax revenue is equal to $\tau^* = 1/(1+e)$.

Solution:

e is the elasticity of income with respect to the net-of-tax rate $1-\tau$. There are no income effects, so this elasticity is both compensated and uncompensated.

Total tax $T = \tau \sum_i z_i = \tau(1-\tau)^e \sum_i z_i^0$.

FOC in τ gives $\tau^* = 1/(1+e)$.

b) (4 pts) The government does not know e perfectly and thus requests the help of an economist to estimate e. The government can provide individual data on earnings for two consecutive years: year 1 and year 2. In year 1, the tax rate is τ_1. In year 2, the tax rate is *decreased* to level τ_2. Suppose that the government can provide you with two cross-section random samples of earnings of the same size n for each year. This is *not* panel data.

How would you proceed to estimate e from this data? Provide a formula for your estimate $\hat{e}$ and a regression specification that would allow you to estimate e with standard errors.

Solution:

$$\hat{e} = \frac{(1/n)\sum_i \log(z_{i2}) - (1/n)\sum_i \log(z_{i1})}{\log(1-\tau_2) - \log(1-\tau_1)}$$

obtained by OLS regression $\log(z_{it}) = \alpha + e\log(1-\tau_t) + \epsilon_{it}$

c) (4 pts) Suppose now that the economy is experiencing exogenous economic growth from year to year at a constant rate $g > 0$. The population remains constant at N. How is the estimate $\hat{e}$ biased because of growth? Suppose you know g, how would you correct $\hat{e}$ to obtain a consistent estimate of e? (provide an exact formula of this new estimate).

Solution:

Assuming that incomes are multiplied by $e^g > 1$ because of growth from year 1 and year 2, previous $\hat{e}$ is biased upward. To get consistent estimate of e, need to subtract the growth rate from the numerator:

$$\hat{e} = \frac{(1/n)\sum_i \log(z_{i2}) - (1/n)\sum_i \log(z_{i1}) - g}{\log(1-\tau_2) - \log(1-\tau_1)}$$

d) (4 pts) Suppose now that you do not know g but that the government gives you a new cross-section of data for year 0 in which the tax rate was equal to τ_1 as in year 1. Using data on year 0 and year 1, provide an estimate of g and the corresponding regression specification.

Solution:

$$\hat{g} = (1/n)\sum_i \log(z_{i1}) - (1/n)\sum_i \log(z_{i0})$$

obtained by OLS regression $\log(z_{it}) = \alpha + g\,t + \epsilon_{it}$

e) (4 pts) We now assume again that there is no growth. Suppose that the parameter e differs across individuals and is equal to e_i for individual i. Assume that there are N individuals in the economy. Individual i earns $z_i = (1-\tau)^{e_i} z_i^0$. As above, z_i^0 is not affected by taxation.

As in question 1, express the tax rate maximizing tax revenue τ^{**} as a function of the e_i and the realized incomes z_i. Show that the tax rate τ^{**} can be expressed as $\tau^{**} = 1/(1+\bar{e})$ where $\bar{e}$ is an average of the e_i's with suitable weights. Give an analytic expression of these weights and provide an economic explanation.

Solution:

Total tax $T = \tau \sum_i z_i = \tau \sum_i (1-\tau)^{e_i} z_i^0$.

FOC: $\sum_i z_i - \tau \sum_i e_i (1-\tau)^{e_i - 1} z_i^0$

implies $\sum_i z_i = [\tau/(1-\tau)] \sum_i e_i (1-\tau)^{e_i} z_i^0$

that is, $\sum_i z_i = [\tau/(1-\tau)] \sum_i e_i z_i$

Let us note $\bar{e} = \sum_i e_i z_i / \sum_i z_i$ the average elasticity weighted by incomes (high incomes have a disproportionate effect on total elasticity), we have:

$\tau/(1-\tau) = 1/\bar{e}$, that is, $\tau = 1/(1+\bar{e})$.

f) (6 pts) Suppose now that the parameter e is the same for all individuals and that the government redistributes the tax collected as a lump-sum to all individuals. I note R this lump-sum which is equal to average taxes raised. Suppose that the level of this lump-sum R affects labor supply through income effects. More precisely, the earnings of individual i are given by $z_i = (1-\tau)^e z_i^0(R)$. The potential income $z_i^0(R)$ now depends (negatively) on the lump-sum R.

Calculate the compensated elasticity and show that it is larger than e.

Suppose that the government still wants to set τ so as to raise as much taxes as possible in order to make the lump-sum R as big as possible. Should the government set the tax rate τ higher or lower than $\tau^* = 1/(1+e)$ obtained in question a)?

Solution: The compensated elasticity e^c is given by the Slutsky equation $e^c = e^u - \eta$ where e^u is the uncompensated elasticity and η the income effect parameter. With $z_i = (1-\tau)^e z_i^0(R)$, it is easy to compute e^u (change $1-\tau$ keeping R constant) and η (change R keeping $1-\tau$ constant):

$e^u = ((1-\tau)/z_i) \cdot \partial z_i / \partial(1-\tau) = e$ is constant

$\eta = (1-\tau)\partial z_i/\partial R = (1-\tau)^{1+e} dz_i^0/dR < 0$

Hence $e^c = e - (1-\tau)^{1+e} dz_i^0/dR > e$

Total tax $T = \tau \sum_i z_i = \tau \sum_i (1-\tau)^{e_i} z_i^0(R)$.

FOC: $\sum_i z_i - [\tau/(1-\tau)]e \sum_i z_i + \tau \sum_i (1-\tau)^{e_i} (z_i^0)'(R) \partial R/\partial\tau = 0$

but last term is zero because at the optimum, R is maximized and thus $\partial R/\partial \tau = 0$. Therefore, the FOC is the same as in a) and $\tau = 1/(1+e)$ as in a).

g) (4 pts) Suppose now that the behavioral response to taxes comes entirely from tax avoidance and evasion, i.e., real earnings are z_i^0 no matter what the tax rate is but that individuals report only $z_i = z_i^0 \cdot (1-\tau)^e$ when the tax rate is τ. Is the revenue maximizing tax rate still $1/(1+e)$ (as in a)) under this scenario?

Solution: The revenue maximizing tax rate is still $1/(1+e)$ in a narrow sense (i.e., if tax avoidance/evasion is taken as given). In a broader sense however, the government can change tax design and enforcement to reduce the elasticity e and therefore increase the revenue maximizing rate.