Econ 230B
Spring 2025
Professor Emmanuel Saez
Professor Mathilde Munoz
GSI: Akcan Balkir, akcan.balkir@berkeley.edu

Problem Set 1

DUE DATE: March 10 end of day on gradescope

1. Lorenz Curve and Gini Coefficient

The IRS posts online tabulations of the distribution of annual individual incomes based on Federal Individual Income Tax data. We will focus on statistics for year 2022 the latest year available online in Table 1.4 posted at (link here).

a) Use columns (1) and (2) of the excel Table 1.4 for year 2022 to draw the dots of the Lorenz curve for the Adjusted Gross Income (AGI) distribution for all returns (but excluding returns with no AGI). Feel free to use any software (such as excel, STATA, or R) for this. Connect the dots of the Lorenz curve to compute the Gini coefficient.

b) Using the interpolated Lorenz curve from a), compute the following inequality statistics: bottom 50% income share, next 40% income share, top 10% income share, and top 1% income share.

c) Redo a) and b) but using after-tax income defined as AGI minus "income tax minus credits" (the last column (148) of the table). Is after-tax income inequality higher or lower than before tax from a) and b)? Can we conclude that the US individual income tax is progressive?

d) Repeat the analysis of a) and b) using year 1993, the earliest year available on the IRS webpage.

e) Has inequality increased or decreased since 1993 by comparing d) and a-b)? Is this compelling or misleading evidence of the true trends in inequality in the United States over the last 30 years?

2. Chasing Natural Experiments within a Country

As seen in class, many of the best papers on labor supply responses to taxes and transfers exploit a policy change (a so-called "Natural Experiment") in order to obtain convincing estimates. This exercise asks you to find a Natural Experiment and propose an estimation methodology.

Download the pdf copy of the OECD annual publication *Taxing Wages* for years 2020 and 2024. Those publications are available online (2020 link here) and online (2024 link here) in pdf format (when connected through UC Berkeley). Part II of this publication describes the tax/benefits systems (including payroll taxes, income taxes, and various benefits) faced by wage income earners for each OECD country for the year prior. Note that recent changes in the tax/benefit system are explicitly described in Section 4 for each country.

a) Find one reform in one country which took place between the two publications that could be used to estimate labor supply responses to taxes or transfers for some group of interest in the population. Make sure the reform is large enough to be useable for compelling identification. Describe the reform you have picked.

b) Describe the methodology you would use to estimate such labor supply responses. In particular, make sure to be fully explicit about the assumptions you need to identify the labor supply response parameters. Try to explain whether your estimates capture participation versus intensive elasticities, uncompensated versus compensated elasticities, income effects, etc.

c) Describe the data you would need to carry out the analysis. Survey or administrative data, variables, realistic sample size, time period, panel or repeated cross section, etc. Search online to investigate whether such data exist and how they could be obtained for the research analysis you are proposing.

d) (FOR FUTURE WORK): If you find a really promising Natural Experiment, the next step is to look for the related literature (you want to be the first to analyze this change!) and then try and get the data to carry out the research project.

3. Optimal Top Income Tax Rate with Income Effects

Consider a population of individuals with individual i utility equal to $u^i(c, z)$ increasing in consumption c and decreasing in earnings z. We consider a nonlinear tax system $T(z)$ with a constant marginal tax rate τ above a fixed threshold z^* (the "top bracket"). The tax system below z^* is irrelevant in what follows and is kept constant. We assume that the government wants to choose τ to maximize tax revenue raised from top bracket earners.

a) We saw in class that the tax rate τ maximizing tax revenue takes the simple form $\tau^* = 1/(1 + a \cdot e)$ with $a = z^m/(z^m - z^*)$ the Pareto parameter (z^m is the average income in the top bracket) and e the elasticity of top bracket incomes. Explain intuitively why e is a mix of substitution effects and income effects.

b) Let $z^i(1 - \tau, R)$ be the earnings supply function obtained from solving the individual utility maximization problem under a linear tax:

$$\max_{c,z} u^i(c, z) \text{ st } c = (1 - \tau)z + R$$

We denote by e_u^i the uncompensated elasticity of z^i with respect to $1 - \tau$ and by $\eta^i = (1 - \tau)\partial z^i/\partial R$ the income effect parameter for individual i.

Considering the small tax reform $d\tau$ in the top bracket (keeping z^* fixed) as we saw in class, show that the response dz^i to the small reform can be expressed in terms of e_u^i and η^i.

c) Use b) to express e in function of the average of the uncompensated elasticities and income effect parameters among top bracket earners, along with the Pareto parameter $a = z^m/(z^m - z^*)$. Explain intuitively why uncompensated elasticities are weighted by incomes z^i while the income effect parameters are not.