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 years 2004 and 2017 available online in Table 1.1 posted at [link here].

a) Using excel or STATA, draw the empirical Lorenz curve for the Adjusted Gross Income (AGI) distribution for all returns (but excluding returns with no AGI). For this, use columns (1) and (3) of the excel Table 1.1 for the two years 2004 and 2017.

Compute the Gini coefficient from the Lorenz curve. Has inequality increased or decreased from year 2004 to year 2017?

b) Using realistic interpolation, compute the following inequality statistics: top 10% income share, top 1% income share, percentile 90 to percentile 50 ratio (P90/P50). Has inequality increased or decreased from 2004 to 2017?

c) Use a Pareto interpolation to compute the top 10% income share, top 1% income share, percentile 90 to percentile 50 ratio (P90/P50). How different are your results compare to part (b)? (See Atkinson (2005) for a description of the Pareto interpolation procedure with tabulated data)

d) Table 1.1 also provides in column (14) in 2017 (find the same column in 2004) the income tax paid by bracket (non-taxable returns pay by definition zero tax). Assume that the ranking of individual tax filers is the same when using AGI (col. (3)) and after-tax income (col. (3)-(14)). Redo a) and b) for after-tax income. Can you conclusively say that the Federal income tax reduces inequality?

Has tax progressivity increased or decreased from 2004 to 2017?

e) In reality, the ranking of individuals by after-tax incomes is not strictly the same as the ranking by pre-tax income. In that case, did you over-estimate or under-estimate the Gini coefficients in question c)?
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 2011 and 2019. Those publications are available online [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. 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 2011 and 2019 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 Commodity Taxation with Linear Income Tax

Consider a population of individuals with the utility of individual $i$ given by $u^i(v(c_1, ..., c_K), z)$ where $v(c_1, ..., c_K)$ is a sub-utility of consumption for goods $c_1, ..., c_K$ and $z$ is earnings. Assume that $v(c_1, ..., c_K)$ is the same across all individuals and homogeneous of degree one, i.e. $v(\lambda c_1, ..., \lambda c_K) = \lambda v(c_1, ..., c_K)$ for any $\lambda > 0$. Let $p$ be the pre-tax vector of prices of goods $1, ..., K$ and $q = p + t$ the post-tax vector of prices of goods $1, ..., K$. We assume that the government uses a linear income tax on earnings with constant marginal tax rate $\tau$ and uniform lumpsum grant $R$. The individual budget constraint is $q \cdot c \leq (1 - \tau)z + R$.

a) Let us denote by

$$V(y, q) = \max_{c_1, ..., c_K} v(c_1, ..., c_K) \text{ st } q \cdot c \leq y$$

the indirect sub-utility of consumption. Show that $V(y, q)$ is linear in $y$, i.e., takes the form $\phi(q) \cdot y$ and that the demand for each good $c_k(y, q)$ is also linear in $y$.

b) Adapt the proof of the Atkinson-Stiglitz theorem to show that any joint commodity, linear earnings tax system $(t, \tau, R)$ can be replaced by a pure linear earnings tax system with no commodity taxation ($\bar{t} = 0, \bar{\tau}, \bar{R}$) that leaves all individuals indifferent and that raises at least as much government revenue.

c) If $v(c_1, ..., c_K)$ is not homogeneous of degree one, can commodity taxation be useful to increase social welfare when using a linear income tax? Explain intuitively why this is the case or not and how this relates to the Atkinson-Stiglitz theorem discussed in class.