These are solutions to the first Problem Set for the Public Finance course. Once we grade your answers, you will see your points in the section 'Study group roster' in the SIS. The maximum number of points you could obtain from this assignment is 10. In case you have questions about your grade or these solutions, do not hesitate to contact Tereza Palanská at tereza.palanska@fsv.cuni.cz.

Problem 1 (6 points)

In this exercise you will work with data on inequality. First, you need to download the data. Go to the website of the World Inequality Database to select a data table to download, using the menu on the left. In that menu, in Indicators, select "Top 10% income share". In Countries & Regions, choose any country whose name starts with the same letter as your last name (or, alternatively, your first name or your hometown). In addition, select three other countries of your choice and also "World". In Years, select the years 1980 to 2016. In the table that appears at the bottom of the page, make sure the countries you selected have at least some available data. Once you have all these attributes selected, use the three green buttons on the bottom of the page to choose the table structure and file format and then download the dataset.

Import the dataset into your favorite statistical software (you can use any software of your choice, including MS Excel, but for your benefit, I recommend you use R, Stata or Python). Then, go to the World Bank data page and download data on GDP (current USD) of your four chosen countries and also the world for at least the years 1980 to 2016. Merge this data to your dataset on inequality. The resulting dataset should be a panel dataset with four columns: 'Country/Region', 'Year', 'Top 10% income share', and 'GDP'. You should have a total of 185 observations (37 for each of the four countries and 37 for World).

a) (2 points) Create a line chart that shows the development of the top 10% income share in your four countries. Briefly comment on what you observe (max. 30 words).

b) (2 points) Create a horizontal bar chart that compares the top 10% income share in 2016 in your four countries and the world. Briefly comment on what you observe (max. 30 words).

c) (2 points) In light of the current cononavirus crisis, some economists are proposing that the budget deficits that will arise due to increased government spending should be repaid primarily by wealthy people. Imagine that the governments of your four chosen countries decided that the deficit, which amounts to 5% of GDP in each of these countries, will be financed by a one-time additional income tax on the top 10% of the income distribution. This tax will be a proportional tax. How high would the tax rate have to be to fully cover the deficit in each of the four countries? Show all the steps of your calculation.

Solution

My last name starts with 'P', so I choose Portugal. In addition, I will focus on Belgium, Czech Republic, and Norway. I download all necessary data, merge them, and produce the results using the Stata code which I attach below.

a) Figure 1 shows the development of our measure of inequality—the share of the top 10% of the income distribution on the total income—in each of the four countries between 1980 and 2016. We observe a generally upward trend in the 1990s and relatively stable levels of inequality since then, with Portugal showing more inequality than the remaining three countries.

Figure 1: Development of the top 10% of the income distribution on total income
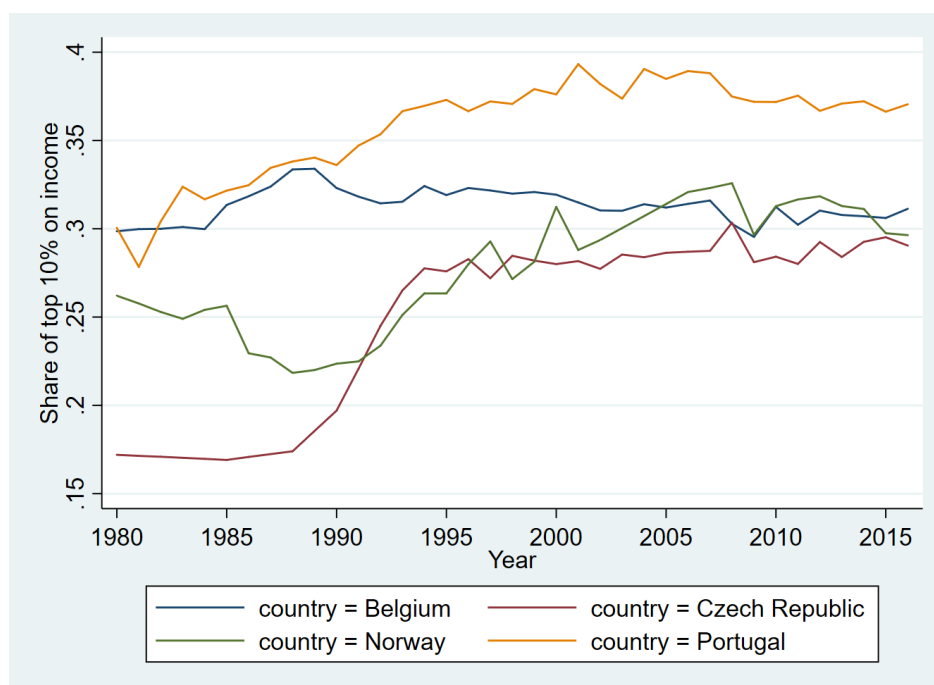
b) Figure 2 compares the top 10% income share in 2016 in our four countries and the world. We find that inequality is generally lower in the four European countries (with the top 10% making around 30% of income) than in the world in total (where over half of income is earned by the top 10%).

c) The calculation (for 2016 data) is summarized in Table 1. In column (D), we calculate the amount that is needed to be financed by the new tax $(0.05 * \text{GDP})$. The income of the top 10% (calculated as Share of top 10% $* \text{GDP}$) is presented in column (E). The rate of the proportional tax that would need to be raised is then calculated in column (F) by dividing the amount need to be financed (column D) by the income of the top 10% (column E).

Figure 2: Comparison of the top 10% income share in 2016 in our four countries and the world
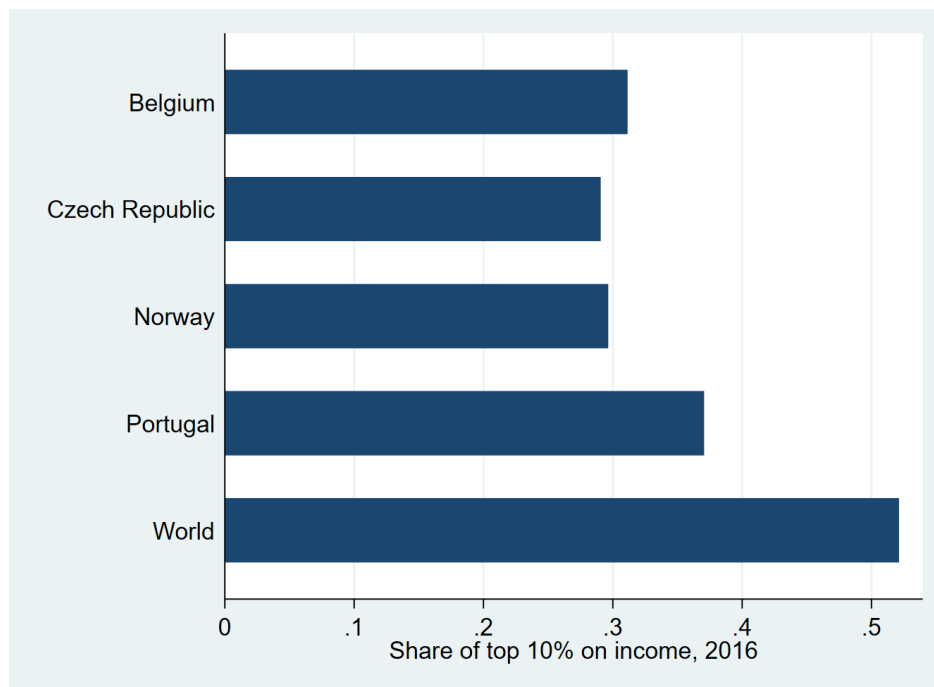

Table 1: Calculation of the tax rate for a proportional tax on the top 10% of people (by income) which would finance a loss of 5% of GDP

Country	(B) Share of income of top 10%	(C) GDP (USD billion)	(D)=0.05*(C) Amount needed to be financed (USD billion)	(E)=(B)*(C) Income of top 10% (USD billion)	(F)=(D)/(E) Tax rate
Belgium	0.3113	476.1	23.8	148	16.06%
Czech Republic	0.2905	195.1	9.75	56.7	17.21%
Norway	0.2964	368.8	18.4	109	16.87%
Portugal	0.3705	206.3	10.3	76.4	13.5%

Stata code:

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*Public Finance 2020 IES CUNI - Problem Set 1, Problem 1

global PS1 "C:\Users\miros\Desktop\Dropbox\Teaching\Public Finance\Problem Sets\2020\Problem
    Set 1"

*Import and prepare data
import excel "$PS1\wid.xlsx", sheet("Data") clear
```

```
rename A country
drop B C
rename D year
rename E top10share
save "$PS1\wid.dta", replace

import excel "$PS1\gdp_wb.xlsx", sheet("Data") firstrow clear
reshape long gdp_wb, i(country) j(year)
save "$PS1\gdp_wb.dta", replace

*Merge data
use "$PS1\wid.dta", clear
joinby country year using "$PS1\gdp_wb.dta", unmatched(master)
drop _merge
save "$PS1\PS1 data v1.dta", replace

*Problem 1a)
xtline top10share if country!="World", i(country) t(year) overlay ytitle("Share of top 10% on
    income") xtitle("Year") xlabel(1980(5)2015)
graph export "$PS1\PS1_fig1.png", replace

*Problem 1b)
graph hbar (asis) top10share if year==2016, over(country) ytitle("Share of top 10% on income,
    2016")
graph export "$PS1\PS1_fig2.png", replace

*Problem 1c)
keep if year==2016 & country!="World"
drop year
gen amount_to_finance=0.05*gdp_wb
gen income_top10=top10share*gdp_wb
gen taxRate=amount_to_finance/income_top10
```

Problem 2 (2 points)

Answer the following questions and tasks briefly:

a) (0.5 point) Explain why moral hazard increases the price of health insurance. Give an example of what might help reduce moral hazard.

b) (1 point) Consider you have no insurance and your utility function for next year is the following: $E(U) = P_0 \cdot U(CZK\ 400,000) + P_1 \cdot U(CZK\ 200,000)$. Where P_0 is your probability of being healthy and P_1 is your probability of being sick. When you're healthy, your income is CZK 400,000, coresponding to a level of utility of 100. When you're sick, your income is CZK 200,000 and your utility coresponds to 80. If the probability of being sick is 20%, would you be willing to pay CZK 40,000 for full insurance? Explain your answer and show the steps of your calculation.

c) (0.5 point) Explain the life-cycle model related to the retirement problem in your own words.

Solution

a) Moral hazard increases the amount of medical care consumed. Poeple tend to over-consume the health care when it is for free or if they pay only small part of its final cost. The overconsumption due to market inefficiency leads to deadweight Deductibles, co-pays, and increased time costs all might help reduce moral hazard.

b)
$$E(U) = P_0 \cdot U(CZK\ 400,000) + P_1 \cdot U(CZK\ 200,000) = P_0 \cdot 100 + P_1 \cdot 80$$

If $P_1 = 0.20 \longrightarrow E(U) = 0.80 \cdot 100 + 0.20 \cdot 80 = 96$ $E(Y) = 0.80 \cdot CZK\ 400,000 + 0.20 \cdot 200,000 = CZK\ 360,000$ Without insurance, the consumer has an expected loss of CZK 40,000. Hence, if the consumer is offered a full insurance for CZK 40,000, she is likely to accept it as it is less than the maximum of what she is willing to pay (please see the video of Lecture 5 for more detailed explanation).

c) The life-cycle model suggests that individuals plan their consumption and savings be-haviour over their life-cycle. They intend to even out their consumption in the best possible manner over their entire lifetimes, doing so by accumulating when they earn and dis-saving when they are retired. The key assumption is that all individuals choose to maintain stable lifestyles. This implies that they usually don't save up a lot in one period to spend furiously in the next period, but keep their consumption levels approximately the same in every period.

Problem 3 (2 points)

Elections to the European Parliament take place in all EU countries, however, some aspects of the voting system may differ from country to country. Choose your home country (or, if you are not from an EU country, choose the Czech Republic) and briefly answer the following questions about how the voting system for this particular election works there.

a) (0.5 point) What are the preferential vote rules (i.e. how many, if any, candidates can you give a preferential vote to)?

b) (0.5 point) Can citizens of your country who live abroad vote in this election? Under which conditions?

c) (0.5 point) Is there a threshold for party entry? If so, how large?

d) (0.5 point) Which method for distributing mandates to candidates is used in your country in the European Parliament election? Are there any modifications to the quotients that are used? If so, which are they?

Solution

a) In Czechia, voters can give their preferential votes to two candidates.

b) Czech citizens living abroad in the EU can register under the legislation of the country in which they live (if the legislation allows it) and vote for that country's candidates. However, they are not allowed to vote for Czech candidates from abroad. To vote for Czech candidates, they would have to return to Czechia for the election.

c) Yes. Similarly to other Czech elections, the party entry threshold is 5%.

d) In the elections to European Parliament, Czechia uses the d'Hondt method with natural numbers (1, 2, 3, 4, ...) as quotients. Find more details on how Czechia assigns mandates at the website of the Czech Statistical Office (Czech only, but you can use Google Translate).