Impact of redistributive policies on wealth inequalities between 2004 and 2017 in OECD countries of the EU

Applied Econometrics Master 1 TSE

This paper studies the impact of redistributive policies on wealth inequalities in OECD countries of the European Union between 2004 and 2017. This is a much discussed problem as inequalities have grown since the financial crisis and many European citizens have been asking for more social justice for a long time. This analysis is essential to determine whether social policies allow to reduce wealth inequalities or if they just have impacts on income inequalities. Our econometric model reveals that more progressive income taxation is an effective policy to reduce wealth inequalities. It claims that government spendings on education is also reducing the wealth gap even if broader measures like this are less effective than income taxation.

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1 Introduction

The purpose of this paper is to study to what extent redistributive policies have an impact on inequalities in OECD (Organisation for Economic Co-operation and Development) countries of the European Union between 2004 and 2017. More precisely, we want to check whether social policies can help decrease wealth inequalities. Because it seems evident that progressive taxes reduce wage inequalities but it is way more difficult to redistribute wealth than to redistribute income.

A key factor to consider when examining people's standards of living is their wealth - the assets they own and control. We want to analyze if social policies are helping to fight imbalances in wealth distribution or if they are just redistributing wages which is only one source of wealth. We choose to focus on OECD countries of the EU and on this period because we did not find any paper treating the impact of redistribution on wealth on European countries; while those are interesting ones for this subject for social and economic reasons. Indeed, activists and organizations across Europe were demonstrating in favor of more social justice between 2002 and 2006 in Florence, London and Athens. These demonstrations have become known as the European social forum protests and are part of a global movement to reduce inequalities. At the beginning of our time period in 2004, the 10% richest citizens of the European Union were owning 57% of the total European wealth (WID, 2019).

In addition, seven countries from the former communist block joined the European Union in 2004. These countries were characterized by a relatively high level of wealth inequality. 10% of the Estonian population was owning 67% of the country's wealth while in Denmark 10% of the richest were owning only 50.8% of the country's total wealth for instance (Mihaylova, 2015). Inequalities in the European Union increased after the 2008 crisis. The Gini index for wealth rose by 0,02 points on average between 2008 and 2013 in countries of the European Union (WID, 2019).

Moreover, there are lots of disparities on tax progressivity within the European Union and only few countries are using a wealth tax. Finally, fighting inequalities has become a priority of the European Union especially since they planned the first phase of the European Union Research Facility on Inequalities in 2017, which aims to reduce inequalities (EU, 2025).

The importance of the inequality issues become evident looking at the amount of academic

literature analyzing this topic. The most recent contributions found that tax policies in the United States have less and less impact on reducing wealth inequality over time. These results highlight the limitations of the current tax system in correcting the wealth inequalities (Looney and Moore, 2016).

The other contributions that we found were only treating the impact of redistribution on income inequalities. Discussions on inequalities claimed that social spending is the most effective tool for reducing income inequality, with an approximate 0.3% reduction in the Gini coefficient for every 1% increase in public spending, as asserted by Doerrenberg and Peichl (2014). According to them, these effects far outweigh those of progressive taxes, which, although they directly reduce after-tax inequality, are held back by negative indirect impacts, such as reduced incentives to work or invest particularly for low-income households.

Moreover, the various welfare-state models do not share the same stance towards progressive taxation, as Wildowicz-Szumarska (2022) pointed out. Consequently, the social-democratic and conservative regimes with their universal and generous systems achieve the best performance in terms of redistribution. On the other hand, Mediterranean regimes, which rely more on targeted transfers and more limited social protection, have less impact. However, since the 1990s, the reduction in tax progressivity and the decline in social transfers for the working population have weakened overall redistributive efficiency in all OECD countries (Wildowicz-Szumarska, 2022) .

At the same time, Immervoll and Richardson (2011) describe the evolution of inequality before redistribution. Indeed their findings show that the polarization of the labor market, the rise of capital income and precarious forms of employment have exacerbated pre redistribution inequalities, which further complicates the task of tax and social systems. The results also highlight the role of institutions, such as high unionization rates, in reinforcing the redistributive impact of public policies (Immervoll and Richardson, 2011).

In this paper we estimate the impact of tax progressivity and social spendings on the Gini coefficient and on the wealth owned by the 10% richest people of European countries. To get our results, we used a regression with fixed effects because this is a common way of dealing with panel data and reducing endogeneity. In addition, the differences between the countries studied are correlated with our explanatory variables which further confirmed our choice (see

section 3). Our main result is that income tax progressivity can reduce the differences in wealth distribution, while broader measures for redistributive policies like government spending and social expenditure have weaker effects.

The following sections contain a presentation of the data we used, our econometric model, our results and finally the conclusion of our analysis.

2 Data and context

Our analysis is based on panel data covering 14 years, from 2004 to 2017, across 22 OECD countries in the EU. This period was marked by major economic and political changes that influenced inequality and redistribution policies. The 2004 EU enlargement brought seven post-communist countries into the EU, many of which had high wealth inequality (Mihaylova, 2015). The 2008 financial crisis further exacerbated inequality, increasing the Gini coefficient across many European countries (WID, 2019). Our sample provides a comparable economic and institutional framework, allowing us to analyze redistribution policies across high-income economies with advanced welfare systems.

The dataset consists of 10 key variables related to inequality, redistributive policies, and macroeconomic conditions, allowing us to analyze how government intervention affects wealth distribution. Data has been collected from three main sources. The first is the Quality of Government (QoG) OECD Dataset 2024, which compiles economic, political, and institutional variables from national sources and serves as the primary source for most of our variables (Teorell et al., 2024). The second source is the World Inequality Database (WID), which provides inequality measures such as the Gini coefficient on wealth and the wealth owned by the richest 10% of the population (WID, 2019). This database integrates data from national income and wealth accounts, household surveys, and fiscal records. Lastly, we use the OECD (2018) reports Taxing Wages (2011 and 2018), which offer detailed information on tax structures. Before data cleaning, the dataset contained approximately 3,000 observations across 1,100 variables.

Our analysis focuses on two dependent variables: the Gini coefficient and the wealth share of the richest 10% of the population, both of which serve as measures of inequality. The explanatory variables include macroeconomic indicators related to redistribution, such as government

social expenditures as % of GDP, government expenditures on education as % of GDP, and tax progressivity. We built this last variable by calculating the ratio between the tax rate of people earning 67% of the average income over the one for people earning 167% (see section A). Like this, we created an index for how progressive incomes are taxed in each country with the data of the OECD (2018). Due to the way the index is constructed, it has the favorable feature of ranging from 0 to 1. However, higher values of the index mean less progressive income taxation, while small values can be found in countries that tax very progressively. This has to be taken into account when interpreting the results table.

The model is subject to certain econometric challenges. One key issue is omitted variable bias, as highlighted by Besley and Case (2000). To mitigate this, we incorporate a set of control variables that could influence our results, including the percentage of the population aged 15–64, real GDP per capita, a liberal democracy index, the share of the labor force with advanced education (% of the working-age population), and a globalization index.

As part of this study, several economic and social indicators were analyzed to assess trends and disparities observed in the collected data (Table 1). Firstly, the variable social expenditure which is measured as percentage of GDP shows an average of 23.12 with a standard deviation of 4.17, ranging between 12.55 and 32.21. These figures highlight significant differences in government investment in social protection. Next, tax progressivity has an average of 0.51 with a standard deviation of 0.187. This reflects the diversity of fiscal policies applied, from highly progressive taxation to no progressivity in the taxation. Regarding education expenditures, the average is 5.28 with a standard deviation of 1.12. These values, ranging from 3.40 to 8.56, demonstrate variability in educational investment across different countries. These findings provide a comprehensive overview of the economic and social landscape, highlighting disparities that should be considered when developing targeted policy recommendations.

3 Model and Estimation

To find the results of our research question at hand, our baseline econometric model is a panel data regression with fixed effects, similar to the one used by Doerrenberg and Peichl (2014):

$$Y_{i,t} = \beta_1 x_{i,t-1} + \beta_2 C_{i,t-1} + \gamma_t + \mu_i + \varepsilon_{i,t}. \quad (1)$$

Using the variables described in section 2, we mainly estimated two models with different outcome variables. For the first one, the dependent variable $Y_{i,t}$ is the Gini-coefficient for country i and year t. For the second model, we regress the wealth owned by the richest 10 percent of the population on our explanatory variables $x_{i,t-1}$ and control variables $C_{i,t-1}$. The coefficient of interest is β_1.

The variables on the right-hand side are indexed by $t-1$ since we are using lagged variables in order to account for the risk of reverse causality (Doerrenberg and Peichl, 2014). Trying to find the effect of redistributive policies on inequality, there is the endogeneity risk that the estimators are biased due to the possibility that the amount of inequality in a country impacts the redistributive policies. For example, in order to tackle high levels of inequality, the government may decide to increase tax progressivity. This effect is the inverse of what we are trying to find with our regressions and so we use the explanatory variables of one year before the outcome variables, which reduces this reverse causality to the extent to which we can assume that countries try to tackle inequalities rather immediate than with several years of delay.

In the terms γ_t and μ_i we include country and time fixed effects in order to control for endogeneity that comes from unobserved shocks on all countries and time-invariant heterogeneity across countries (Wooldridge, 2010). $\varepsilon_{i,t}$ is the error term we included in the regression.

When running a panel data regression it should be evaluated whether fixed (also known as "within") effects is actually the better method than random effects. While it is common to simply run the Hausman test to see which model is more efficient, Wooldridge (2016) recommends to spend more thought on the implications of the Hausman test and the assumptions of fixed versus random effects. For us, the Hausman test failed to reject the Null-Hypothesis that Random Effects is the correct model with a p-value of 0.886. However, the p-value could also be high if the results of fixed and random effects are very close to each other, in which case it does not matter which method is used. When looking at the results of our regressions, this seems to be the case, as no sign and no level of statistical significance change and there is only neglectable differences in the different estimators (table 2 and 3). The main assumption of random effects is that the unobserved country fixed effects μ_i are completely uncorrelated

with all explanatory variables $x_{i,t-1}$ and $C_{i,t-1}$. This assumption is very unlikely to hold in our case, since explanatory variables like social spending or tax progressivity are certainly related to unobserved differences in country characteristics. That is, why fixed effects is the better model in our case, although the choice is not that important, as the differences between the models is very small in our case (Wooldridge, 2016).

Although the fixed effects method reduces the endogeneity in our model significantly, we also include control variables that may cause endogeneity, by varying over time within countries. This source of endogeneity is thus not captured by the fixed effects. The control variables we use are believed to confound the results by impacting both explanatory and outcome variables and are commonly used in related literature (Roine et al., 2009). For example, in a country with a higher amount of people with ages, at which they work and not go to school or are retired, the effects of redistributive policies that target income, might decrease inequality stronger than in countries with many retired or very young people.

Thanks to the careful choice of variables, the econometric model and the characteristics of a panel data regression with fixed effects, we are able to interpret the results we find as causal, considering the described assumptions.

4 Results

The results obtained are generally consistent with theoretical expectations and the literature. Several variables play a significant role in explaining wealth inequalities, measured by the Gini index and the wealth owned by the richest 10% of the population. However, some effects may seem counterintuitive and require further discussion. Among the specifications tested, the one including social expenditures, tax progressivity, government expenditure on education, the working-age population, GDP, the liberal democracy index, advanced education level, and globalization appears to be the most robust. It presents a good level of explanation with a high adjusted R-squared and significant results for most variables (table 2).

One of the most significant factors is tax progressivity, where a more progressive tax system leads to a reduction in wealth inequality. Specifically, tax progressivity effectively reduces differences in wealth distribution at 1% significance level, as when it increases, our dependent

variables decrease. This reinforces the idea that taxation, when structured effectively, can play a crucial role in redistributing wealth (Duncan and Sabirianova Peter, 2008).

Moreover, our findings show that government expenditures on education significantly reduce inequalities, which aligns with economic expectations. Increased investment in education helps promote equal opportunities which reduce wealth gaps (Doerrenberg and Peichl, 2014).

GDP has a very weak but significant effect on reducing inequalities, likely through economic growth and employment. This result reinforces the idea that overall prosperity can contribute to better wealth distribution, although the effect remains modest.

The share of the population aged 15-64 is negatively and significantly associated with inequality, highlighting the role of labor market participation in equalizing wealth. A larger workforce means a greater proportion of individuals generating income, which tends to homogenize wealth distribution.

The liberal democracy index is positively correlated with inequality as measured by the Gini index, suggesting that liberal democracy does not necessarily reduce inequalities. We can explain this by the fact that they don't always implement economic policies that effectively redistribute wealth, especially if market-oriented policies dominate.

Certain factors contribute to an increase of the dependent variable. Notably, higher social expenditure appears to be associated with greater inequality but with a very low effect and no significance, which may suggest that these expenditures are not sufficiently progressive or that they fail to effectively target lower-income groups.

The coefficients are interpreted considering their significance, and a non-significant coefficient doesn't imply the absence of an effect but rather a lack of statistical evidence for an effect different from zero.

In conclusion, these results provide valuable insights into the determinants of inequalities, although some relationships require further exploration, particularly regarding the effects of social expenditures.

5 Conclusion

In this paper we used panel data to run fixed effects regressions in order to find the effects of redistributive policies on inequality in OECD countries of the European Union between 2004 and 2017. We regressed the Gini coefficient and the Top-10-percent variable on our constructed tax progressivity index and other variables that should measure redistributive policies.

We find that besides effects on income inequality, which have already been shown by the literature, we also find strongly significant effects on wealth inequality. This lets us conclude that in order to fight wealth inequality, targeted redistributive policy changes like a more progressive income taxation, are effective, although this effect might not be obvious at first.

These findings are generally in line with results of related literature. Doerrenberg and Peichl (2014) and Wildowicz-Szumarska (2022) for example, find similar results for income inequality. Outside the EU, Looney and Moore (2016) find impacts like ours on wealth inequality. For the EU, we extend the literature with the significant impact of redistribution on wealth inequality as there is no recent research on this to our knowledge.

Regarding internal validity, as described in 3, we chose the model that fits the best for our panel data and the most important sources of endogeneity are accounted for. However, our set of control variables is limited and there might be some omitted variable bias left. Furthermore, while we try to reduce reverse causality with our lagged explanatory variables, the assumption that inequality levels do not affect redistributive policies two years later, may not always hold.

On top of these caveats, our estimates of redistributive policy may not be precise enough or complete. First, the tax progressivity variable that we built may leave out crucial information as it doesn't take into account tax rates paid by even richer people than those earning 167% of the average income. Obviously, the way countries are taxing ultra-rich people has a huge impact on the efficiency of their redistributions, and we couldn't include that in our variable because of a lack of data. In addition, governments have more ways of redistribution than the tax progressivity we looked at. Wealth or inheritance tax would be one important instrument to fight wealth inequality, which we did not include in our analysis.

Apart from these concerns about internal validity, our paper is limited geographically and in terms of time period. While the results are relevant for our countries of interest, the OECD countries of the European Union, all these countries are developed and we can not extend the

implications to other contexts and beyond our time period.

Researchers that work on the interplay of redistribution policy and wealth inequality may thus include more or other explanatory variables to account for other direct policy instruments. Also, as far as data is or becomes available, our research could be extended to other parts of the world and broader time periods.

Appendices

A Data and Code Protocol

Procedure for the 3 datasets:

Quality of Government (QoG) OECD Dataset 2024

We downloaded the full dataset from the indicated website (Teorell et al., 2024), cleaned the dataset and kept only relevant variables, countries and years, as described in the R-code in detail.

World Inequality Database

We selected the countries, years and variables in scope on the website (WID, 2019) as described in the data section (2) and downloaded the dataset to import it in R.

OECD report: Taxing Wages

In the pdf reports from 2011 and 2018 (OECD, 2018) we transferred the tables with the title "Income tax, single persons at 67% (resp. 167%) of average earnings" to excel and then imported them into R. Further calculations were made and explained in the R code.

Procedure and explanations to run the code:

1. Open R Studio.
2. Run lines 3 to 9 to have all the necessary packages and to import the QOG OECD database.
3. Run lines 12 to 40 to clean the database and to keep only the used variables in the database df1.
4. Run lines 43 to 51 to import and clean the WID database.
5. Run lines 55 to 68 to add portugal to the WID database and to merge the 2 databases in df4.
6. Run lines 71 to 72 to add 2 new variables from the QOG OECD database to df 4.

7. Run lines 75 to 101 to import a new database, to create the variable tax progressivity and to add it to df5 which is our final database.

8. Run lines 104 to 123 to remove Lithuania from the final database and to check the number of missing values in our variables.

9. Run lines 127 to export our final database.

10. Run lines 130 to 140 to get the graphs that give a first overview of our variables distribution.

11. Run lines 143 to 164 to get our first fixed effects regression and to see the results of the Hausman test.

12. Run lines 168 to 187 to see the other graphs that we have done.

13. Run lines 191 to 195 to compute the correlation matrix between our variables.

14. Run lines 198 to 249 to get our final regressions which are done with lagged variables this time and give our final results. The results of the fixed effects regression are given by lines 246 to 249 (Table 2), the results of the random effects regression are given by lines 234 to 243 (Table 3).

15. Run lines 251 to 264 to create the label of each variable.

B Tables

Table 1: Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Soc Expend	286	23.119	4.167	12.550	32.213
Tax Progr	286	0.510	0.187	0.000	1.000
Educ Expend	278	5.283	1.115	3.402	8.560
Work Age	286	66.818	2.132	62.115	72.120
GDP	286	38,918.270	15,786.880	13,897.540	107,525.200
Lib Dem Ind	286	0.810	0.063	0.443	0.898
Adv Edu	281	79.101	4.087	66.680	89.970
Globaliz	286	79.345	6.356	62.937	91.918

Table 2: Regression Fixed Effects

	Variable	*Dependent variable:*	
		Top10%	Gini
Government social expenditures	lag_oecd_socexpnd_t1a	−0.001	0.001
		(0.001)	(0.001)
Tax progressivity	lag_tpprop	0.034**	0.055***
		(0.014)	(0.016)
Government expenditures on education	lag_wdi_expedu	−0.008***	−0.010***
		(0.003)	(0.003)
Population (15-64)	lag_wdi_pop1564	−0.009***	−0.008***
		(0.001)	(0.002)
GDP	lag_oecd_sizegdp_t1	−0.00000***	−0.00000***
		(0.00000)	(0.00000)
Liberal democracy index	lag_vdem_libdem	0.036	0.088**
		(0.035)	(0.039)
Labor force with advanced education	lag_wdi_lfpedua	−0.003***	−0.004***
		(0.001)	(0.001)
Globalization index	lag_dr_eg	0.001	0.001
		(0.001)	(0.001)
Observations		273	273
R^2		0.356	0.369
Adjusted R^2		0.280	0.293
F Statistic		16.820***	17.736***
		(df = 8; 243)	(df = 8; 243)
Note:		*p<0.1; **p<0.05; ***p<0.01	

Table 3: Regression Random Effects

	Variable	*Dependent variable:*	
		Top10%	Gini
Government social expenditures	lag_oecd_socexpnd_t1a	−0.001	0.001
		(0.001)	(0.001)
Tax progressivity	lag_tpprop	0.035**	0.056***
		(0.014)	(0.016)
Government expenditures on education	lag_wdi_expedu	−0.008***	−0.010***
		(0.003)	(0.003)
Population (15-64)	lag_wdi_pop1564	−0.008***	−0.007***
		(0.001)	(0.002)
GDP	lag_oecd_sizegdp_t1	−0.00000***	−0.00000***
		(0.00000)	(0.00000)
Liberal democracy index	lag_vdem_libdem	0.034	0.087**
		(0.034)	(0.039)
Labor force with advanced education	lag_wdi_lfpedua	−0.003***	−0.004***
		(0.001)	(0.001)
Globalization index	lag_dr_eg	0.001	0.001*
		(0.001)	(0.001)
Constant		1.285***	1.373***
		(0.152)	(0.173)
Observations		273	273
R^2		0.377	0.391
Adjusted R^2		0.358	0.373
F Statistic		125.389***	132.526***
		(df = 8; 243)	(df = 8; 243)
Note:		*p<0.1; **p<0.05; ***p<0.01	

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