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# Four profiles of inequality and tax redistribution in Europe

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The rise of economic inequality in the past few decades is one of the most relevant phenomena in western countries recent history. Market income distribution pushed inequality up and challenged welfare state capacity to deal with economic gaps. Market inequality or gross income inequality are considerably higher than disposable income inequality. This has to do with redistributive state policies. This paper analyses gross income inequality in the EU countries and measure the impact of personal taxes on income distribution. Several measures of redistributive tax impact on income inequality will be explored. Having in consideration both the level of gross income inequality and the impact of personal taxes on top shares, a typology of income distribution and redistribution in Europe will be drawn.

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## Introduction: inequality, here and now

Income inequality in most western countries has been rising in the last decades. The OECD report *Growing Unequal* (2008) was a tipping point in political and academic awareness about it, because it showed that the benefits of economic growth since the 1980s were unevenly distributed within the most developed countries. In the 1980s, the richest 10% earned about seven times more than the bottom 10%, in the mid-2010s this gap was close to 10 (OECD, 2015). These conclusions rely on survey data. If we look at fiscal data, the rise of inequality is also impressive. In the 1980s, the top 10% in European countries earned about 30–35% of total income, in 2016 their share increased to 35–40%. Inequality rose much more sharply in the EUA: the top 10% share went up from 30–35% to about 45–50% of total income (Alvaredo et al., 2017).

Several studies highlighted that economic inequality is not a statistical curiosity, but rather a phenomenon that have multi-dimensional negative impacts. For instance, on social mobility (OECD, 2018; Dubet, 2010; Esping-Andersen, 2005), financial stability (Galbraith, 2012; Kumhof and Rancière, 2010), or on subjective well-being (Alois, 2014). Inequality can warm the way societies function (Wilkinson and Pickett, 2009) and have negative effects on life trajectories and opportunities. In this sense, growing inequality must be addressed both as a normative problem that challenges distributive justice, but also as a social, economic, and political risk.

This paper will focus on income inequality in European countries and the redistributive impact personal taxation has on inequality. Its most innovative contributions consist in analysing income redistribution at the European level looking at narrow top quantiles, namely the top 5%, and to propose a typology of income (re)distribution. The next section is devoted to develop a theoretical background regarding the causes behind the upward trend of income inequality; thereafter, explanations about the methodological background that support the data analysis will be given; then, the impact of personal tax on income inequality is quantified using three measures of income redistribution; in section "Inequality and taxes: a typology", a typology of inequality and redistribution in Europe will be proposed; finally, critical issues on tax policy will be addressed.

## Economic and institutional drivers

As wages represent about 70–80% of disposable household income (ILO, 2015; OECD, 2011), income inequality is strongly determined by wage inequality. The most influential theory explaining wage inequality is probably the race between technology and skills. According to this theory, technology increases the productivity gap between highly skilled workers and low skill workers. If the number of highly skilled workers does not keep up with their demand, their pay premium will rise above average earnings and pay inequality widens. This theory has a "nuanced view" (Kierzenkowski and Koske, 2012), according to which globalisation fosters the opposition between the highly qualified workforce and the routine manual workers, because the tasks performed by the later can be done in low wage countries. In this sense, globalisation and technology-driven inequality are two interdependent phenomena (Milanovic, 2016).

Although this race might be a relevant aspect pushing wage inequality up, institutional changes that took place in the labour market in last decades play a decisive role explaining market income inequality. The reduction of union density and collective bargaining foster inequality (Vaughan-Whitehead and Vazquez-Alvarez, 2018; Jaumotte and Buitron, 2015; OECD, 2011). Denk (2015) demonstrates that countries where collective bargaining is higher have lower concentration of wages in the top 1%. The growth of precariousness, facilitated by the fallback of unions and labour deregulation, has also impacted on wage distribution. The proliferation of non-standard labour relations promotes earning inequalities between precarious workers and employees who have permanent contracts (Cohen and Ladaique, 2018).

These analytical approaches have only the distribution of wages in mind. There are of course other drivers that have an impact on income distribution. Piketty's $r > g$ formula is amongst the most influential proposals. It states that the gap between the rate of return to capital and economic growth has been rising since de 1980s. This means that wealth inequality, in a context of globalisation and financial deregulation (Piketty and Cantante, 2018), is pushing income inequality up. Another driver of income inequality is factor inequality. Atkinson (2015) highlights the fact that the wage share has been decreasing since the 1970s in most western countries. Both institutional and technological explanations used to address wage inequality growth are prominent when it comes to analysing factor inequality.

Inequality of market income is determined by economic dynamics and institutional settings. The later tend to have an impact on the former. For instance, labour market institutions influence both the distribution of wages and factor distribution. Minimum wage or collective bargaining have an impact on primary distribution of income. Additionally, the redistribution of income is set after the distribution of primary/market income. Social transfers and personal taxes are the main mechanisms of monetary income redistribution. Immervoll and Richardson (2011) showed that until the 1990s the growth of income inequality was mainly fuelled by market inequality. In the following decade, rising inequality was explained by the reduction of redistributive efficacy. That is, the impact of social transfers and taxes in reducing primary inequality got lower.

The reduction of tax impact on inequality in the last decades is due to two main facts: on the one hand, cuts in top income tax rates; on the other hand, the dissemination of semi-dual tax systems since the 1980s. In these systems, capital income is taxed at flat and more favourable rates (Förster et al., 2014; Piketty, 2013; Brys et al., 2011). Income aggregation was a tax principle applied in every European or OECD country until the 1980s. Nowadays, progressive taxation applies only to wage and pensions. Capital income is taxed at flat and autonomous rates. The main reasons why states adopted this policy has to do with investment attraction and to avoid capital drain.

## Methodology

The following analysis is based on European Union Statistics on Income and Living Conditions (EU-SILC), an instrument aiming to collect timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion and living conditions. Although the data refers to the individual distribution of income, the unit of analysis that serves as reference for the calculation of individual income is the household. To consider the impact of differences in household size and composition household income is "equivalised". The equivalised income attributed to each member of the household is calculated by dividing the total income of the household by the equivalisation factor. Eurostat uses the OECD-modified scale, which gives a weight of 1.0 to the first person aged 14 or more, a weight of 0.5 to other persons aged 14 or more and a weight of 0.3 to persons aged 0–13.

Gross income is composed by several types of income, namely wages, income from self-employment, pensions, social transfers

and interfamily transfers received. The adjusted gross income consists of gross income plus interfamily transfers payed, which enables to analyse gross income without nontax deductions.

Tax redistribution will be measured using a variable which considers both personal income tax and social security contributions. EU-SILC data does not allow to differentiate income deductions that are typically progressive (personal income taxes) from deductions that are usually proportional (social security contributions). In this sense, the concept of personal tax used in this analysis aggregates these two kinds of income deductions.

Net income is computed by deducting income taxes from the adjusted gross income.

Survey data like the EU-SILC have limitation when it comes to focus on restrict top quantiles, namely the top 1% and top fractiles (Atkinson, 2015; Piketty, 2013). Sample sizes do not allow to make an accurate analysis of restrict groups and people from the very top tend to be underrepresented in surveys on income or wealth. Nevertheless, EU-SILC is sufficiently robust to allow analysis on broader top quantiles, such as the top decile or ventile. These two income groups are the empirical references used in this paper to analyse inequality and the impact of tax redistribution.

Data for about half of the countries refers to 2014 (Austria, Bulgaria, Denmark, Greece, Finland, Hungary, Iceland, Latvia, Netherlands, Norway, Portugal, Serbia, Slovenia and Spain); for the other countries, data refers to 2013.

## The impact of tax redistribution in Europe

The redistribution of income by the state is done by means of public services, social transfers and taxes. Taxes have an indirect redistributive effect, because they are an important revenue source of social transfers (particularly, non-contributory social transfers) and public services. Personal taxation has a direct redistributive role, because the level of taxation depends on the level of income.

There are profound differences among European countries regarding the impact taxes have on income redistribution. In this paper, three measures of tax income redistribution were used: the relative weight taxes have on top quantiles adjusted gross income; the proportion of total taxes revenue paid by top quantiles; and the effect taxes have on top shares. Tax impact on income inequality in European countries has been measured in the past looking at pretax and disposable income shares of the top 20% and 10% (Alves, 2012; Atta-Darkua and Barnard, 2010). More recently, Bozio et al. (2018) combined several data sources in order to study the redistributive impact taxes have on the income shares of restrict income groups, namely the top 1% and within the top 1%, in France.

This paper aims to address the issue of tax redistribution at a larger scale (Europe), by having the top 10% and 5% as references.

Table 1 shows the tax rate paid by the top 10% and 5% in European countries and the average tax rate in each country. Looking at the countries where the top 10% and 5% pay higher tax rates, we do not find a clear geographical pattern. The Netherlands have the highest figures for these indicators: 40.5% and 41.6%, respectively. Portugal, the Nordic countries, Ireland, Slovenia, Greece and Italy also show comparatively high figures. Countries where top income groups pay the lowest tax rates are from Eastern Europe—according to this data, taxation in Bulgaria is regressive. In Portugal, Greece, Ireland and the UK, where top shares of adjusted gross income are comparatively high, tax rates paid by top income groups are much higher than the national mean tax rate (11–14 percentage points higher). In Eastern and Baltic countries this gap is typically <5 percentage points.

**Table 1 Tax rate paid by the top 10%, 5% and national average, European countries (2013–2014) (%).**

| | Top 10% | Top 5% | Average |
|---|---|---|---|
| Netherlands | 40.5 | 41.6 | 31.8 |
| Denmark | 36.9 | 37.4 | 31.5 |
| Iceland | 37.0 | 37.8 | 29.3 |
| Switzerland | 29.7 | 30.2 | 27.6 |
| Norway | 35.2 | 36.8 | 26.4 |
| Germany | 31.7 | 32.0 | 26.2 |
| Austria | 32.7 | 33.7 | 25.2 |
| Portugal | 37.1 | 38.8 | 25.1 |
| Sweden | 32.9 | 35.0 | 25.0 |
| Italy | 33.0 | 34.6 | 24.8 |
| Finland | 32.7 | 33.6 | 24.7 |
| Serbia | 29.4 | 29.5 | 24.2 |
| Greece | 33.1 | 36.2 | 24.2 |
| Belgium | 32.2 | 32.9 | 23.9 |
| Ireland | 35.6 | 36.6 | 23.3 |
| Luxembourg | 30.9 | 31.3 | 22.6 |
| Eslovenia | 33.9 | 36.5 | 22.4 |
| Poland | 24.4 | 24.5 | 21.9 |
| Romania | 25.5 | 25.4 | 19.9 |
| France | 23.7 | 24.3 | 19.4 |
| Croatia | 28.4 | 30.5 | 19.2 |
| Hungary | 22.1 | 21.3 | 19.1 |
| UK | 30.4 | 32.8 | 18.6 |
| Latvia | 22.2 | 22.4 | 17.6 |
| Malta | 25.5 | 27.0 | 17.5 |
| Spain | 25.0 | 27.2 | 16.5 |
| Estonia | 19.6 | 20.5 | 15.3 |
| Lithuania | 16.6 | 15.7 | 14.1 |
| Czech R. | 20.8 | 21.4 | 14.0 |
| Bulgaria | 12.5 | 11.3 | 13.2 |
| Slovakia | 16.7 | 16.9 | 12.9 |
| Cyprus | 15.1 | 13.3 | 11.5 |

Source: EU-SILC microdata 2014 and 2015.

When we look at the share of total taxes paid by the top income groups, there are interesting differences comparing to the previous figures (Fig. 1). Although Dutch top groups pay the higher tax rates among the countries under analysis, their contribution to total personal tax revenue is close to the average in most European countries. The share of income taxes paid by the top 10% and 5% is higher in Southern European countries, in the UK and Ireland. In Portugal, the top 10% and 5% pay 46% and 31% of total personal tax revenue, respectively. The share of personal tax revenue paid by top quantiles is smaller in Eastern and Northern European countries. In the first case, this is explained by the low level of tax progressivity; regarding the Nordic countries, it has to do with an even distribution of adjusted gross income.

Portugal, UK and Ireland are the European countries where personal taxes reduce the most top income shares (see Fig. 2), which is coherent with the former indicator (income redistribution is higher in countries where top groups pay a higher share of the income tax revenues). In Portugal, post-tax income concentration at the top decile and ventile is 15.4% and 17.5% lower comparing to pre-tax shares. This overlapping does not apply to all countries. For instance, in Northern Europe the share of personal tax revenue paid by top income groups is comparatively low but the impact of taxes reducing the concentration of adjusted gross income at the top tends to be high. As we shall see in the next section, it corresponds to a structural profile regarding inequality and tax redistribution.

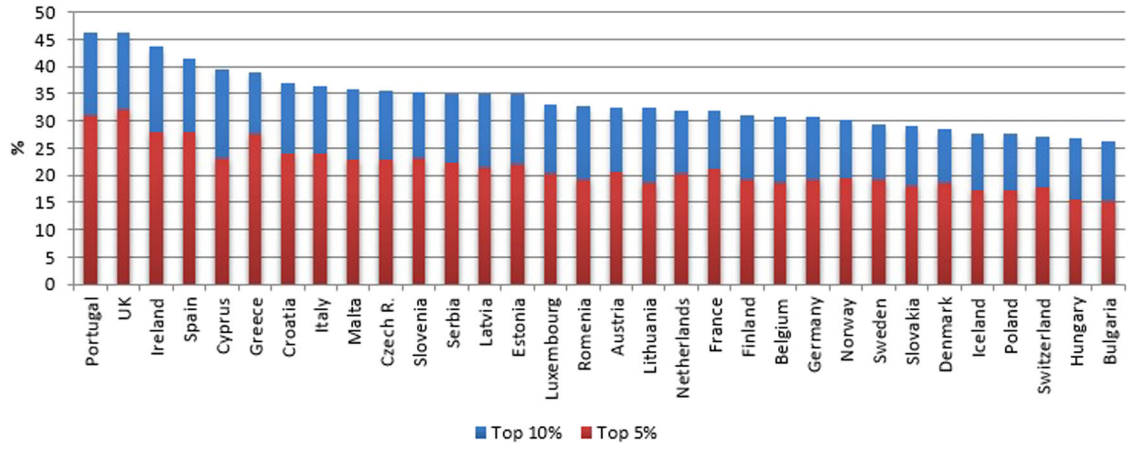


**Fig. 1 Share of personal taxes paid by the top 10% and 5%, European countries (2013–2014) (%).** Source: EU-SILC microdata 2014 and 2015.

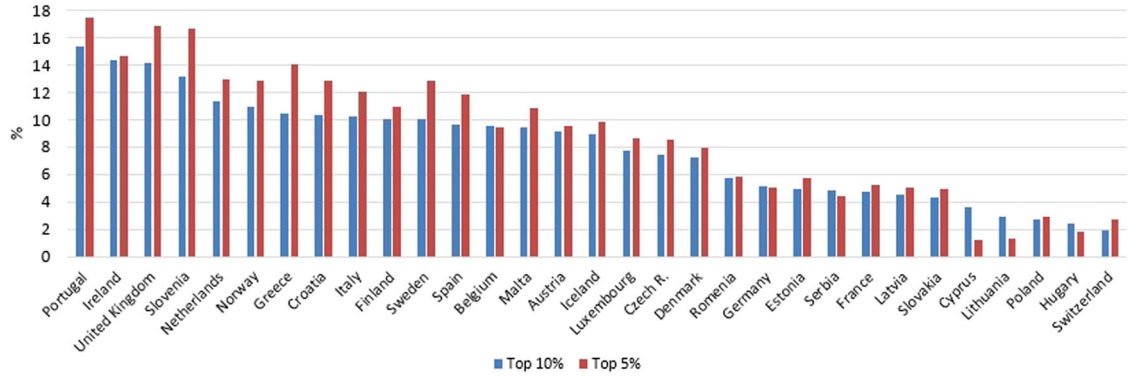


**Fig. 2 Redistributive impact of taxes in top 10% and 5% income shares, European countries (2013–2014) (%).** Source: EU-SILC microdata 2014 and 2015.

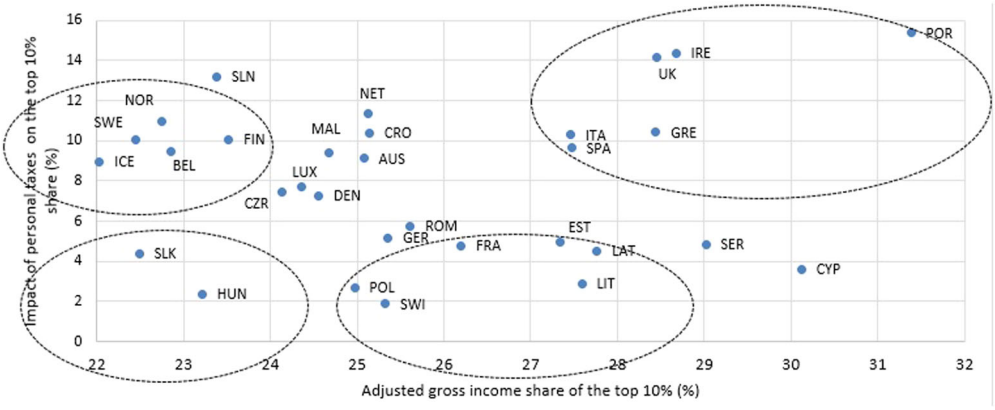


**Fig. 3 Correlation between pre-tax income inequality and redistributive impact of taxes (top 10% shares), European countries (2013–2014) (%).** Source: EU-SILC microdata 2014 and 2015.

## Inequality and taxes: a typology

The classification of countries according to a set of indicators is a well-grounded tradition in Sociology and Political Science. The most influential example is probably the welfare state regimes typology introduced by Esping-Andersen (1990). In this typology and in other analytical proposals inequality is typically addressed as a result of specific institutional arrangements and/or economic settings.

In this section, a typology of income distribution and tax redistribution will be proposed. It is not our goal to understand neither the market foundations of inequality nor the overall impact redistributive policies. The scope is narrower: what is the relation between adjusted gross income (total income before taxes) and the impact of personal taxes on income inequality? That is, what profiles do emerge when we plot income distribution before taxes (but after social transfers) and the extend of tax redistribution?

Looking at Figs 3 and 4 it is apparent that there are four distinct (re)distributive profiles in Europe: the "unequal redistributive" countries; the "unequal reproductive" countries; the "even redistributive" countries; and the "even reproductive" countries. The level of pre-tax inequality is determined both by

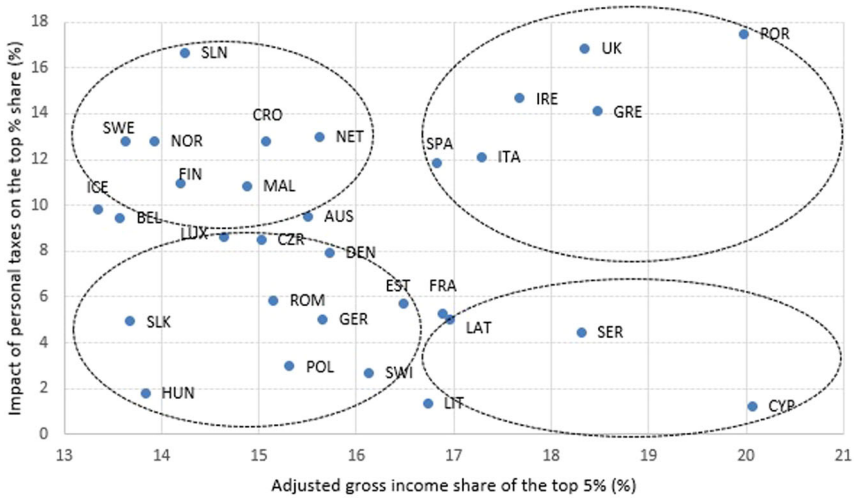


**Fig. 4 Correlation between pre-tax income inequality and redistributive impact of taxes (top 5% shares), European countries (2013–2014) (%).** Source: EU-SILC microdata 2014 and 2015.

market inequality and the impact that social transfers have on the distribution of income.

The first cluster is characterised by having both high levels of adjusted gross income inequality and tax redistribution. It is composed mainly by Mediterranean countries, the UK and Ireland.

In the second cluster we find high inequality countries where the impact of personal taxation reducing economic disparities is low. This group is composed by the Baltic countries, Serbia and Cyprus.

The third profile is mainly composed by the Nordic countries, but also featuring Slovenia, the Netherlands, Malta or Croatia. They all feature both comparatively even distributions of pre-tax income and high levels of tax redistribution. There is a set of countries, such as Austria, Luxembourg and Belgium, whose structural profile is hard to differentiate between clusters 3 and 4.

The last cluster regards low inequality countries where taxes have a weak redistributive effect. Most countries that fit in this profile come from Eastern Europe, but its membership is geographically diverse.

Bulgaria stands as an outlier, because top shares increase when we go from pre-tax income to after-tax income distribution. That is, Bulgaria's personal tax system is regressive.

We found quite heterogeneous profiles of income re(distribution) in Europe. There are strong geographical patterns, but they are far from being linear. Both Mediterranean and the Anglo-Saxon countries tend to have high levels of pre-tax inequality and high levels of redistribution. Nordic countries, where pre-tax inequality is low, redistribute as much as the "unequal redistributive" cluster. On the other side of the spectre, there are high unequal societies, such as Serbia and the Baltic countries, whose tax policy is not effective tackling inequality. In this sense, the overall impact of taxation is not determined by the level of pre-tax inequality.

It is interesting to compare the institutional settings and outcomes of welfare states typologies and the patterns found in this paper. For instance, when we look at the Nordic countries, labour market institutions and social policies oriented towards equality are reinforced by taxation. There is a continuity between these three dimensions. On the contrary, in the Southern European and Anglo-Saxon countries progressive taxation is a redistributive instrument of last resort aiming to mitigate market and gross income inequality. It was shown that the impact of taxes reducing income concentration at the top is comparatively high in this set of countries. Nevertheless, ex post tax redistribution is not enough to take them away from the upper side of the tail of inequality in Europe (see annexes, Tables 2 and 3). In this sense, the scope of tax policy has some limitations tackling prior economic inequality, particularly market income inequality.

**Table 2 Top 10% share of adjusted gross and net income, European countries (2013–2014) (%).**

| | Top 10% adjusted gross income | Top 10% net income | Redistributive impact |
|---|---|---|---|
| Portugal | 31.3 | 26.5 | 15.4 |
| Ireland | 28.6 | 24.5 | 14.4 |
| UK | 28.3 | 24.3 | 14.1 |
| Eslovenia | 23.3 | 20.2 | 13.2 |
| Netherlands | 25.0 | 22.2 | 11.4 |
| Norway | 22.6 | 20.2 | 11.0 |
| Greece | 28.3 | 25.4 | 10.4 |
| Croatia | 25.0 | 22.4 | 10.4 |
| Italy | 27.4 | 24.5 | 10.3 |
| Finland | 23.4 | 21.1 | 10.1 |
| Sweden | 22.3 | 20.1 | 10.0 |
| Spain | 27.4 | 24.7 | 9.6 |
| Belgium | 22.8 | 20.6 | 9.5 |
| Malta | 24.6 | 22.3 | 9.4 |
| Austria | 25.0 | 22.7 | 9.1 |
| Iceland | 21.9 | 20.0 | 9.0 |
| Luxembourg | 24.3 | 22.4 | 7.7 |
| Czech R. | 24.0 | 22.2 | 7.5 |
| Denmark | 24.5 | 22.7 | 7.3 |
| Romania | 25.5 | 24.0 | 5.7 |
| Germany | 25.3 | 24.0 | 5.1 |
| Estonia | 27.2 | 25.9 | 5.0 |
| Serbia | 28.9 | 27.5 | 4.8 |
| France | 26.1 | 24.9 | 4.8 |
| Latvia | 27.7 | 26.4 | 4.5 |
| Slovakia | 22.4 | 21.4 | 4.4 |
| Cyprus | 30.0 | 28.9 | 3.6 |
| Lithuania | 27.5 | 26.7 | 2.9 |
| Poland | 24.9 | 24.2 | 2.7 |
| Hungary | 23.1 | 22.6 | 2.4 |
| Switzerland | 25.2 | 24.8 | 1.9 |
| Bulgaria | 27.9 | 28.4 | −1.8 |

Source: EU-SILC microdata 2014 and 2015.

**Table 3 Top 5% share of adjusted gross and net income, European countries (2013–2014) (%).**

| | Top 5% adjusted gross income | Top 5% net income | Redistributive impact |
|---|---|---|---|
| Portugal | 20.0 | 16.5 | 17.5 |
| UK | 18.3 | 15.3 | 16.9 |
| Slovenia | 14.2 | 11.9 | 16.6 |
| Ireland | 17.7 | 15.1 | 14.7 |
| Greece | 18.5 | 15.9 | 14.1 |
| Netherlands | 15.6 | 13.6 | 13.0 |
| Sweden | 13.6 | 11.9 | 12.8 |
| Norway | 13.9 | 12.1 | 12.8 |
| Croatia | 15.1 | 13.1 | 12.8 |
| Italy | 17.3 | 15.2 | 12.1 |
| Spain | 16.8 | 14.8 | 11.8 |
| Finland | 14.2 | 12.6 | 11.0 |
| Malta | 14.9 | 13.3 | 10.8 |
| Iceland | 13.3 | 12.0 | 9.8 |
| Austria | 15.5 | 14.0 | 9.5 |
| Belgium | 13.6 | 12.3 | 9.4 |
| Luxembourg | 14.6 | 13.4 | 8.6 |
| Czech R. | 15.0 | 13.7 | 8.5 |
| Denmark | 15.7 | 14.5 | 7.9 |
| Romania | 15.1 | 14.3 | 5.8 |
| Estonia | 16.5 | 15.5 | 5.7 |
| France | 16.9 | 16.0 | 5.2 |
| Latvia | 17.0 | 16.1 | 5.0 |
| Germany | 15.7 | 14.9 | 5.0 |
| Slovakia | 13.7 | 13.0 | 4.9 |
| Serbia | 18.3 | 17.5 | 4.4 |
| Poland | 15.3 | 14.9 | 3.0 |
| Switzerland | 16.1 | 15.7 | 2.7 |
| Hungary | 13.8 | 13.6 | 1.8 |
| Lithuania | 16.7 | 16.5 | 1.3 |
| Cyprus | 20.1 | 19.8 | 1.2 |
| Bulgaria | 18.0 | 18.5 | −2.8 |

Source: EU-SILC microdata 2014 and 2015.

## Conclusion

Taxation is the most important redistributive instrument of income. This paper shed light in three measures of income redistribution having the top 10% and 5% of European countries as references. Tax rates on top income groups, the proportion of total personal tax revenue paid by the top income groups, and the impact of taxes in top shares vary significantly among European countries. Regarding this last issue, Mediterranean and Nordic countries, UK and Ireland have higher levels of tax redistribution, whereas Eastern and Baltic countries tend to have the lowest results.

We did not find linear correlations between the level of pre-tax inequality and the impact of personal taxation reducing top shares. There are different profiles regarding the intersection of these dimensions. Although taxation can reduce inequality, namely top shares, significantly, its range faces some limitations. That is why "unequal redistributive" countries, characterised by having high pre-tax disparities and a strong impact of taxation, sit in the upper tail of disposable income inequality in Europe.

Market inequality, particularly labour income inequality, is a heavy burden on tax systems. That is why equality-oriented policies must focus on labour market institutions and in addressing educational inequalities. Nevertheless, the evenness of pre-tax distribution does not mean that equality-oriented tax policy should be put aside, as Nordic countries illustrate.

The impact of personal taxation on inequality relies in tax progressivity. One of the most important challenges faced by national tax systems is the flat taxation of capital/property income. Most tax systems are semi-dualist. Progressive taxation applies to labour and pension income, whereas taxes on capital/property income are flat rated. Globalisation, the risk of capital drain and tax evasion are typically used as arguments to stand for semi-dual taxation.

Coming back to progressive tax regimes that tax aggregate income would be the fairest and most effective way to tackle income inequality. An alternative to this solution is to introduce some level of progressivity in capital/property income taxation. There are some examples of this kind of regime, namely in Denmark and in the UK. It would be important to put this issue in the core of tax policies in European countries and to ensure its implementation would have some level of political coordination.

## Data availability

The datasets analysed during this study are available in the Dataverse repository: https://doi.org/10.7910/DVN/2TAQIO.

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## Competing interests

The author declares no competing interests.

## Additional information

**Supplementary information** The online version of this article (https://doi.org/10.1057/s41599-020-0514-4) contains supplementary material, which is available to authorized users.

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