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DO PRE-FISCALLY MORE UNEQUAL COUNTRIES REDISTRIBUTE MORE?

An empirical analysis of the inequality-reducing effects of taxes and transfers across OECD countries

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Ai miei nonni, per avermi trasmesso l'amore per la cultura.

Ai miei genitori, per avermi permesso di coltivarlo.

Foreword

The real meaning and the sort of equality the welfare state is supposed to serve is much disputed among egalitarians; some of them regard the ideal as being concerned primarily with equality of social status, as a matter of equal concern and equal consideration, some interpret it in terms of opportunity and resources, others argue for equal outcomes, claiming that it should first and foremost be concerned with equality in the distribution of material goods and services.

Nevertheless, the fact that almost everybody agrees about the importance of the treatment as equals, even though there are several disagreements about how this claim should be interpreted and its redistributive implications, means that almost everybody believes in equality in some sense. To care that people have equal amounts, independently of what it is referred to as "amounts" - i.e. resources, opportunity, outcomes etc -, is to care that they have amounts equal of those of one another. But why does it matter at all how much people have relative to one another? Why should it be of any concern?

Before introducing the topic of my thesis I would like to tease the reader with a straightforward but in my opinion very powerful example, that allows to critically address the much controversial and highly debated question of if, and most importantly why, we should "mind the gap". My intention is to provide an intuition about the motive that underlies my work in the hope that such perspective will guide the reader throughout the whole discussion.

Consider the following scenario where two societies, named X and Y, are both made up of two classes of individuals, A and B, whose members have some arbitrary amounts.

	A	*B*
X	*10*	*10*
Y	*15*	*25*

Everybody is clearly better off in society Y compared to society X since both members of A and B improve their position: if what we all cared about were amounts in absolute terms, society Y would surely had to be preferred to society X. However, even if members of A are not worse off in Y than what they would be in X in terms of amounts, they still could be worse off in some other ways. This way of reasoning is the point of departure for reflecting upon whether we should be looking at the absolute improvement in the position of the relatively disadvantaged, or we should instead "mind the gap'' between rich and poor for the very fact that inequality in the income distribution makes things worse in other ways for those at the wrong end of it.

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INTRODUCTION

Why should we care about Inequality?

Over the last two decades there has been a moderate but significant increase in income inequality at the global level. Despite the severity, the deepness, the timing and even the direction of such trend vary both within and across countries, widening economic disparity is considered a major challenge of our times, and its implications are at the core of policy debates in all OECD countries. How far we should go in the equalization of income is perhaps one of the most controversial and divisive question faced by policy makers, since it is in part grounded on economics, in part permeated with ethics.

Even though fervent egalitarians would probably support the argument in favour of a complete equality, a society in which income is equally distributed among its members would not be a desirable place either. Such condition would in fact have adverse effects on economic motives and it would yield unpleasant consequences in terms of work disincentives and welfare dependency. If from one side it is true that a given amount of inequality is necessary to rewards talent, hard-working and risk-taking, and it is also true that some degree of inequality may increase efficiency by strengthening incentives to excel and compete both at the individual and at the country level, from the other side there are several supported reasons for being concerned about income inequality.

First of all, inequality matters for growth. There is increasing evidence that countries with high levels of inequality, and in particular of income inequality, achieve on average lower and less sustainable growth rates in the medium run. Secondly, it is argued that inequality undermines economic, financial and political stability. Several studies suggest that prolonged periods of high income inequality increase the risk of economic crisis due to the intensification of leverage and the overextension of credit, that global imbalances resulting from financial liberalization fuel macroeconomic instability, and that inequality provides scope for unfair policy-making processes and for an unequal distribution of power within institutions. Moreover, income inequality hampers poverty reduction by underpinning intergenerational mobility, access to education and health care, and due to its detrimental effect on trust and community cohesion it is often a significant factor behind social unrest, violence, crime and social exclusion. In addition, inequality not only matters for the material and relational well-being but also for the subjective human well-being, because of its influence on one's perception about self-worth, self-esteem, dignity and aspirations. This relates to the egalitarian ideal for which inequality

matters in its own right, because the ultimate moral concern is a society where people are entitled to equal respect and equal consideration and in which distributional outcomes embody the principle of justice as fairness.

Even though different welfare systems tackle income inequality with different emphasis and by implementing different schemes and programmes, redistributive strategies based on government taxes and transfers are the most direct and effective policy instruments to shrink economic disparities. In this respect the two major objective of the welfare state, even if the priority assigned to them varies significantly between countries, are to redistribute across individuals and across the lifecycle through the design of an appropriate tax-benefit system.
In this context of widening income gaps, in the OECD area taxes and transfers are found to have become, on average, more redistributive during the last decades, and even if they were not able to entirely offset the rise in income inequality their equalizing effect strengthened. Intuitively one could expected that pre-fiscally more unequal countries redistribute more simply because the potential and the scope for redistribution is greater; however, since empirical analysis conducted so far has lead to inconsistent and often contradictory results, the issue is still the subject of an ongoing debate. Collecting data on income inequality for 34 OECD member countries over the period 1980-2013, the aim of this work is to sort out, for what it is possible, the question of whether or not it is true that the effects of taxes and transfers on income inequality are stronger in countries that exhibit higher level of market income inequality.

The paper is structured as follows: The first chapter presents the main drivers of inequality and briefly analyses the nature of their contribution in order to provide a rough understanding of the different dimension and dynamics that the phenomena under study encompasses. The second chapter is involved with measurements and definitions, introducing the prevalent measures of inequality and redistribution. Chapter three reviews the relevant literature and the main theories of redistribution providing a theoretical framework of the redistributive role of the welfare state. The last chapter illustrates the empirical work, from the research method and a preliminary evaluation of data to the empirical results from the regression analysis. The conclusive section summarizes the main findings.

1. MAIN DRIVERS AND FACTORS AFFECTING INCOME INEQUALITY

Inequality is driven by a wide range of interrelated factors and great effort has been expended to unearth the causal pathways and the transmission mechanism through which economic, demographic and political components impact inequality by strengthening existing patterns and intergenerational transfers.

Even though it must be recognized that determinants which may appear autonomous are often the outcome of past policy and political decisions, the main drivers of income inequality can be classified into exogenous and endogenous, with the former definition including those factors affecting income distribution that are outside the preview of domestic policy and the latter referring to those that are mainly shaped by domestic policy. Globalization, technological change, changes in demography and living arrangements, and intergenerational mobility fall in the first classification while political systems, labour market institutions, return to education, and social policies belong to the second definition.

1.1 Exogenous Drivers of Income Inequality

1.1.1 Globalization

The growing interdependence of countries resulting from the increasing flow and integration of trade, finance, people and ideas have a significant impact on the global marketplace, but whether Globalization is to be imputed for the widening of income disparities is a matter of controversy in the economic literature. The difficulties in assessing the overall effect of Globalization on income differentials arises from the fact that the underlying mechanism results form the interplay between different but interdependent aspects of this phenomenon, which in some cases are found to make opposite contributions. Despite the large body of researches devoted to disentangle the abovementioned issue, results on the distributional effects of globalization are generally conflicting and supported by two antithetical schools of thought. One view endorses Kuznets hypothesis that, as an economy develops, economic inequality might be raised by market forces in the initial phase, but eventually it will decline as the transition to industrialization is completed. Advocates of this position argue that globalization leads to a rising tide of income at all levels, thus benefiting, in absolute terms, also low-income groups. The opposing school supports a way less encouraging view, objecting that the

improvement in overall income is not shared equally, neither within nor across countries, and neither is the exploitation of opportunities and outcomes produced by globalization, which indeed exacerbates existing disparities.

Among all, the combined effect of trade globalization, financial globalization and technological change is alleged to hold a crucial role in shaping the distributional consequences of globalization: these aspects will be explained in more details in the following sections to provide a brief intuition about the nature of their contribution.

1.1.1.a Trade Globalization

The main theoretical framework, provided by the neoclassical economic theory, to express the analytical link between trade openness and inequality is the Hecksher-Ohlin Theorem, according to which the effect of openness depends on the relative factor abundance and productivity differences across countries. The prediction is that international trade liberalization increases the returns of the relatively abundant factor of production and decreases the return of the relatively scarce one, thus leading to a decrease in inequality in labour-rich countries and an increase in inequality in the capital-abundant ones.

Stopler and Samuelson, expanding on the O-H Theorem, present a simple two-country two-factor scenario where low-skilled labour and high-skilled labour are taken as the factors of production of both a developing country and an advanced economy, where they differ in abundance. The model predicts that an increase in trade openness will lead to an increase in the price of the (exportable) low-skill-intensive good and to a subsequent rise in the compensation of low-skilled workers in the country where low-skilled labour is the abundant factor. At the same time a decrease in the price of the (importable) high-skill-intensive good and in the wage of scarce high-skilled workers is expected, resulting in a reduction in economic inequality in the developing country. The reverse holds for the advanced economy, whose comparative advantage lies in high-skilled labour.

Nevertheless, it is important to notice that existing studies on the impact of trade globalization on income inequality often discard some of the implications derived from the standard trade theory, in particular those regarding the ameliorating effects of trade openness on inequality in developing countries, which are largely contradicted by evidence of rising income inequality during globalization processes. In this respect the main concern has been the increase in the skill premium, unexpectedly observed not only in advanced economies but also in developing countries, which is driven by exogenous technology shocks. This brings to the conclusion that the simple models of trade are only in part capable of providing an explanation to the complex

relation between globalization and inequality and that there are other factors that need to be taken into account to asses the magnitude, the strength and even the direction of its driving force.

1.1.1.b Financial Globalization

Standard theory typically suggests that financial globalization, by facilitating the efficient allocation of capital and risk sharing at the international level, should provide with greater access to financial resources to previously credit constrained individuals. There are however a number of studies that recognize the equalizing effects of financial liberalization only in principle but admit its deficiency when it comes to observed real-world outcomes. Indeed, capital openness has been shown to aggravate income inequality in both advanced and emerging economies, providing one possible justification for the conflicting evidence that trade openness theories fail to explain.

The main channel through which financial globalization affects distribution of income is the increased foreign direct investment from advanced to developing economies, which is often directed to high skilled sectors in the host economy, hence increasing the demand for skilled labour in both countries. In a developed country, the concentration of foreign assets and liabilities in the relatively more skill-intensive and technology-intensive sectors rises the demand for high-skilled labour and the compensation for high-skilled workers. On the other side, inward low-skilled foreign financial investments from advanced economies might have the same consequences in a developing country, since, in such context, it may likewise be considered relatively high-skilled directed.

In addition, financial deregulation in developed countries has been blamed in some cases for having had a destabilizing effect on less advanced economies, because of its adverse influence on economics fundamentals and financial markets stability.

1.1.2 Technological Change

The effect of technology on the labour market has always been a core concern for economists, and it is the subject of a growing body of research also because of its relationship with income inequality. Although new technology has lead to improvements in productivity and well being and has advanced growth opportunities and efficiency both in rich and poor countries, technological change is though to be one of the main drivers of recent trends in income

inequality, mostly because it influences the distribution of income through its effect on different factor of production.

From one side technological change affects income distribution by rising the productivity of capital and the returns to capital relative to labour; as a consequence, capital incomes are less equally distributed and accrue to the upper income deciles of households.

From the other side, the adverse impact on inequality may reflect the fact that technological change drives up the skill premium by disproportionately raising the demand for skilled labour compared to unskilled labour. Even though traditionally technological progress was assumed to be factor-neutral, which means that the ratio of the marginal productivities of the factors of production were supposed to remain unaffected by changes in production technology, the observed increase in the wage of skilled workers relative to low-skilled and unskilled, in conjunction with an upward trend in their relative supply, suggests that recent technological change has been skill-biased. Automation has upgraded the required skill level for those tasks for which workers are harder to be replaced, and has decreased the demand for those workers whose competences are limited to less skill-intensive functions. This has lead to a growing earning gap between high and low-skilled workers, outpacing the rise in educational attainment that results as a direct consequence of the the increased demand for highly qualified workers.

1.1.3 Changes in Demography and Living Arrangements

The radical change in demographic factors and and living arrangements that all OECD countries have been experiencing over the last few decades have a bearing for the distribution of income, principally because these changes alter the size of different demographic groups and the way in which income is distributed within and across household types.

Household structures are experiencing major transformations that translate into a gradual movement away from the archetypical family structure: parenthood is starting at a later average age, a growing proportion of men and women are remaining childless, marriages are less stable and divorces more frequent as well as cohabitation without marriage, single-parent households and step-parenting. Changes in living arrangements of this kind, accompanied by population aging, have repercussion on the form and extent of income inequality mainly because of the combined effect of their implications in terms of household type and household size.

First of all, the aforesaid shifts have translated into a decline in the size of average household with the consequence that a higher income is needed to assure the same standard of living. This is due to the fact that, as household size shrinks, members can no longer co-operate in household production, take advantage of economies of scale in consumption and benefit from income

pooling. Furthermore, the growing proportion of smaller family groups is expected to increase income inequality also because of the type and the characteristics of the individuals that generally live in a single-adult household, such as young, elderly pensioners, migrants and unemployed, which are the categories subject to the higher poverty risk.

Secondly, income inequality may be further endured by the increasing phenomenon of assortative mating among high-earners and highly-educated individuals, which tend to marry either partners within the same income bracket or with an equal educational attainment, often delaying childbearing or remaining voluntarily childless. This sort of "marital homogamy" increases the wealth of highly-educated dual-earners households relative to other household structures, in particular those with a greater number of dependent children and a sole breadwinner, creating a stronger discrepancy in earnings between household types.

1.1.4 Intergenerational Mobility

Intergenerational mobility refers to the transmission of the advantage or disadvantage across generations, which is to say, the extent to which the life chances of children are either positively or adversely affected by the socio-economic status, the circumstances and other important social characteristics of parents and how this determines the status offspring will attain as adults. Undoubtedly, the burden of such intergenerational transmission processes, in particular that of income mobility, in terms of the strengthening and deepening of income inequality is self-evident and straightforward. This relationship is described by the "Great Gatsby Curve", which captures the positive relation between income inequality, measured by the Gini Coefficient, and intergenerational income elasticity, whereby low social mobility is associated with higher income inequality (and vice versa because of their reciprocity).

Many factors are involved in the intergenerational income transmission process, some are related to the household structure and the social environment in which offspring develop, others are related to heredity endowments. Albeit also genetic factors and inherited traits, such as ethnicity, personality and non-cognitive skills contribute to income mobility, the most important channels of transmission are financial resources and parental educational attainment. Wealth of parents affect offspring earnings by providing direct financial support and by improving nutrition, health, education, access to good housing and neighbourhood conditions. It follows that the greater the income inequality, the greater the disparity in the resources invested for children and the larger the transmission of the disadvantage. However, is the intergenerational correlation of education -i.e. the association between the educational attainment of parents and that of offspring- the factor having the greatest responsibility for the

persistence of inequality across generations. In fact, disparities in financial resources by parental education group translate into larger differences in investments in children's human capital, but also into a finer transmission of cognitive skills and in to a greater access to social and professional networks, and labour market opportunities.

1.2 Endogenous Drivers of Income Inequality

1.2.1 Democracy

It would seem reasonable for theoretical reasons to suggest that a greater level of democracy and length of a country's democratic history should reduce the incidence of income inequality, mainly because of the accustomed association between the democratic character of a country and the level of redistribution and structural reforms, which are assumed to be oriented towards the needy of the society (Meltzer & Richard, 1981). On the contrary, modern literature suggests that the impact of democracy and of the political process on economic disparities is more ambiguous; evidence of their impact are mixed and incongruous, and reliable conclusions about this issue cannot be derived. This is due to the fact that expectations on the equalizing effects of democracy may fail to be realized either when democracy is seized by the richer segments of the population, either when it accommodates the preferences of the middle class (Stigler's "Director's Law",1970), or when it exposes previously excluded segments of the population to disequalizing opportunities, thus exacerbating inequality among a large portion of the population.

In order to provide an intuition of drawbacks of this kind, the specific case of the U.S can be taken as an example. When it is argued that policies in democracies are designed to achieve more redistribution toward the poorer classes it is assumed that an increase in democracy gives those with less power a chance to influence decision making. However, in 2013 the voting participation has been reported to be skewed towards the top end of the income distribution, thus transferring political power to the middle class, and this has been attributed to the fact that the poorest of society tends to be, most of the time, hopeless and discouraged citizens or non-citizens, that are either unwilling or unable to exert any political power through elections.

1.2.2 Labour Market Institutions

The institutional setup in which firms and workers interact crucially determines labour market outcomes, which in turn model changes in the incidence and persistence of income inequality

by affecting the distribution of income. Among the main types of labour market institutions, namely employment protection legislation, labour taxation, unemployment benefits, unionisation and minimum wage, the last two mentioned seem to be more strongly associated with the sharp widening in the distribution of personal earnings. In fact, the increased income inequality has been mainly driven by the upper part of the income distribution, and large-scale studies find deunionisation to be related with the increase in income share of the top 10 percent earners at the expenses of all other income group. It is argued that since unions act to maintain consistent wage differentials between skilled and unskilled workers, the decline in union density (especially of the proportion of high-skilled membership as a consequence of globalization, SBTC and improvements in educational levels), exacerbates wage inequalities by reducing the relative bargaining power of labour and by increasing the relative size of the less-unionized service sector.

Reductions in the minimum wage relative to the median wage are found to bring about analogous outcomes; yet it is important to notice that, despite existing empirical literature support the positive relation between a rise in minimum wage and greater income equality, setting minimum wage too high may have the partly offsetting consequence of reducing employment opportunities for low-skilled workers.

In addition, also poorly designed job protection, which enlarge the gap between employment protection on regular and temporary contract (as well as part-time contracts), may contribute to inequality developments. Nonetheless, the overall impact of reforms to employment protection legislation is less clear cut as they affect both wage dispersion and employment levels in sometimes opposite directions.

1.2.3 Returns to Education

Policy makers usually legitimize higher educational spending as a compelling tool for reducing income inequality. As a matter of fact, education exerts significant impact on personal income by determining occupational choices and access to job, and by playing a pivotal role as a signal of ability and productivity in the labour market.

The past decades have witnessed a large decline in human capital inequality, but although one would expect that such a large decline in the inequality of the distribution of education would translate into an analogous decline in income disparity, inequality in the distribution of income has hardly changed.

As it emerges from theoretical and empirical studies, the relation between education and inequality is not so sheer. For example, Knight and Sabot (1983) emphasize that the ambiguous

impact of human capital accumulation and education expansion on income distribution is due to two conflicting forces, namely the composition and the compression effect, which affect inequality similarly to what is postulated by Kuznets Theory. Initially, the increase in the proportion of the labour force that is educated tends to increase inequality because of the composition effect; then, inequality should decline by means of the compression effects – which refers to competition in the labour market- since the increased supply of skilled workers decreases the wage premium to higher skill levels, thus lowering the skill premium.

In addition, the human capital model of income distribution furthered by the work of Shultz, Becker and Mincer (1963), if from one side predicts an unequivocally positive association between educational inequality - measured by the variance of schooling – and income inequality, from the other side finds the effect of increased schooling to be either positive or negative depending on the rate of return to education.

A first explanation to the puzzle is that the returns to education are convex, which means that returns to schooling are increasing with the level of educational attainment. Thus, relative low returns to primary education in relation to secondary or tertiary education could explain why the large reduction in the share of illiterates does not translate in to a sizeable increment in the income of the bottom quintiles of the income distribution, especially when human capital is also improving at the top.

A further account for the stability and endurance of income inequality is that the demand for skills has kept pace with the human capital investment despite the increase in the supply of educated workers. Expanded access to schooling, producing new cohorts of relatively more educated labour market entrants, makes the market for skill-biased technologies more attractive, thus generating accelerated skill-biased technical change, which in turn increases the skill premium so that wage dispersion remains unchanged in the long term.

1.2.4 Government Intervention

Government's intervention exerts significant impact on the distribution of income by serving redistributive purposes both directly, through taxes and transfers, and indirectly, through the provision of public services. Since the redistributive effect of taxes and transfers will be addressed in more details in the following chapters, this section focuses on the distributive implications of publicly-provided services, in particular in the fields of health care and education, which significantly narrow inequality (although this reduction is typically lower and less immediate than the one achieved through the combined effect of taxes and transfers).

According to national accounts data, public expenditure for the provision of services represents on average 21% of household disposable income, with health care accounting for about 45% of the total closely followed by education (41%), while other social services account only for the 14%. Studies that bases the imputation of health care expenditure on people's age report considerable inequality-reducing effects, which originate from the heavy concentration of spending in the lower quintiles - mainly because of the generous share accruing to the elderly - and whose patterns hold both in countries with universal health care system and, to an even greater extent, in those where access is limited to the disadvantaged.

On the educational expenditure side, the impact on income inequality crucially depends on the level considered: the stronger effect, with an average decline of around 0.5 point in the Gini coefficient, is attributed to public expenditure for primary and secondary education, firstly because of the larger outlay compared to the modest and almost negligible amounts devoted to pre-primary and tertiary education and secondly because the distribution of this category of expenditure is ,on average, particularly uniform across quintiles.

2. MEASUREMENT AND DEFINITIONS

2.1 Inequality of what?

The Income Accounting Framework and Equivalence Scales.

Economic inequality encompasses many different dimensions, and a number of measurement choices, dictated both by the availability of data and by the purpose at hand, are crucial for the accuracy of the results and for the consistency of the deriving interpretations.

Before presenting into details the different income inequality and redistribution measures, it is necessary to provide a framework that allows to relate different components of household income and to derive the required aggregates. Market Income is defined as the sum of gross wages and salaries, self-employment income, cash property income, occupational and private pensions, private transfers and other cash income. Adding to market income social security cash benefits (universal, income-related and contributory), Gross Income is obtained. Finally, Disposable Income is derived by subtracting from Gross Income mandatory payroll taxes and income taxes. The income definitions presented above are also referred to as: pre-fiscal income, income after transfers but before taxes, and post-fiscal income.

It is important to notice that such income components are aggregated in terms of equivalised household income: since households vary in size, it is desirable to adjust household income by means of an equivalence scale reflecting household composition and accounting for economies of scale that arise from sharing larger households. For example, most recent OECD publications (OECD 2011, OECD 2008) comparing income inequality across country, divide the sum of the income of all individuals in a household by the square root of the household size (so for the seek of simplicity, the equivalence scale for a four-person household would be 2). Other equivalence scales frequently used but that are gradually falling into disuses are the Oxford Scale (1982), which assigns a value of 1 to the first household member, of 0.7 to each additional adult and of 0.5 to each child, and the OECD-modified scale (1994), which ascribe a value of 1 to the household head, of 0.5 to each additional adult member and of 0.3 to each child.

2.2 Income Inequality Measures

A large number of measures and several approaches are used to seize the complex and multifaceted concept of income inequality, each providing a slightly different perspective of the phenomenon. However, in the absence of a presumption in favour of any particular measure,

the choice is usually based on convenience, familiarity and methodological grounds. In the following sections the key axioms are summarized, and some of the most widely adopted approaches are presented along with their main strengths and limitations.

2.2.1 Properties of Inequality Measures

There are a number of desirable properties which describe how inequality measures should behave and that define more formally the criteria for the measurement choice, and these are: scale invariance, translation invariance, the principle of population, the Pigou-Dalton principle, symmetry, decomposability and statistical testability.

For the property of scale invariance, the inequality index should not change when all incomes are scaled by the same factor; the translation invariance requires the index to be invariant to uniform additions or subtractions to original incomes; for the principle of population, the measure is supposed to be invariant to replications of the original population and to changes in population size; according to the Pigou-Dalton criterion, the index should fall with a progressive transfer, - i.e. an income transfer from richer to poorer individuals – and rise with a regressive transfer; the symmetry property requires no change in the inequality measure if individuals swap income; in addition indices are preferred to satisfy also the decomposability and the statistical testability axioms – i.e. the ability to test for the significance of changes in the index over time.

2.2.2 The Coefficient of Variation

The coefficient of variation (CV), also known as relative standard deviation (RDS) is a standardized measure of dispersion, generally expressed as a percentage, which is defined as the ratio of the standard deviation of the income distribution by its mean. Thus, the more unequal the income distribution the larger the coefficient of variation due to the larger standard deviation.

Although it is one of the most straightforward measures of inequality, it features important limitations when applied to income data that do not approach a normal distribution, because the mean and the standard deviation may be excessively influenced by anomalous – either too low or too high- income values.

2.2.3 *The 90/10 Decile Ratio*

Probably the simplest way of measuring inequality is to calculate decile ratios. The aim is to capture how much of the total income is earned by lower earning groups and how much of the total income is earned by higher earning groups by dividing the income of the ninetieth percentile by the income earned by the tenth percentile. If people from the top and the bottom groups earn the same proportion of income, then there is income equality; on the contrary, the larger the 90/10 ratio the richer are the rich compared to the poor and hence the more unequal is the distribution. One great virtue of this measure is its simplicity, which makes it easily accessible and intuitively interpretable. In addition, comparisons with other variants of the measure, such as the 20/80, 30/70 and 40/60 decile ratios, are particularly useful when performing sensitivity analysis. It is argued, however, that focusing exclusively on the fairly rich and the fairly poor ignores information about those in the middle of the income distribution.

2.2.4 *Generalized Entropy Measures*

Mathematically, the most refined measures of income inequality are those belonging to the family of Generalized Entropy measures, whose values vary between zero and infinity with zero representing an equal distribution and higher value representing higher level of inequality. Among this class the Theil's T statistic and the Theil-0 index, which seek to quantify the level of disorder within a distribution of income, are the most widely acknowledged. This is due to to their attractive property of additive decomposability, which implies that the aggregate inequality measure can be decomposed into component parts - by adding and subtracting the indices from one another - enabling analysis within and between any arbitrarily defined population subgroups.

2.2.5 *The Atkinson Index*

Developed by the British economist A.B. Atkinson, the Index owes its reputation to the peculiarity of allowing to assign different parts of the income distribution different weights, and to determine which end of the distribution contributes the most to the observed inequality. According to Atkinson, social judgement cannot be excluded from the measurement of income inequality, therefore the index incorporates a sensitivity parameter (ε) which can range from 0 - a state of equal distribution - to infinity, according to the degree to which the researcher, on behalf of the society, is concerned with the income position of the poorest individuals. Conventionally the inequality aversion parameter assumes the values of 0.5, 1, 1.5, and 2 the

more the Atkinson index becomes sensitive to inequalities at the bottom of the income distribution.

Moreover, Atkinson values can be used to determine the proportion of income required to achieve the present level of social welfare under the condition of an equal income distribution. For instance, and index of 0.30 suggest that, if incomes were perfectly distributed, $(1 - 0.30)\%$ of income would be necessary to achieve the same level of welfare as the current one.

2.2.6 The Lorenz Curve and the Gini Coefficient

The Lorenz curve is a cumulative frequency curve graphing the relationship between the cumulative percentage of households, ranked by income in ascending order, (on the horizontal axis) and the cumulative percentage of total income earned (on the vertical axis). Thus, to construct the Lorenz curve, all individuals of the population are first rank ordered by income from lowest to highest; next, for each rank, the proportion of the population and the corresponding proportion of total income earned at that rank or below is calculated; the curve is then obtained by plotting the relationship between these two proportions for every rank.

In a situation of perfect equality, where earnings are equally shared among household, the poorest 10% of the population would earn 10% of total income, the poorest 20% would earn the 20% and so on, and the Lorenz curve would correspond to a 45° line of perfect equality. As inequality increases, the curve deviates from the abovementioned line, whereby the poorest 20% may earn only 10% of the total income. Excluding the limit cases of perfect equality and perfect inequality - in which the total income is appropriated by a single individual and where the curve would correspond to the y-axis and the x-axis – it follows that the convex and upward-sloping Lorenz curve will always lie below the 45° line of equality.

The most appealing property of this framework is that the Gini coefficient, the most extensively used summary statistic of income inequality, can be easily derived from the Lorenz curve. In fact, the index is equal to twice the area between the 45° line and the Lorenz curve and its value increases the more the Lorenz curve deviates from the perfect equality line. The extreme values of the Gini coefficient are 0 and 1 (alternatively expressed in percentage), reflecting respectively a condition of equally shared income and of a perfectly unequal society. It is important to notice that the total Gini of a society is not equal to the sum of the Gini coefficients of its subgroups: this means that this measure of inequality fails to satisfy the principle of decomposability by being neither decomposable or additive across groups.

2.2.7 *Other measures of income inequality*

There are other measures of inequality, such as the range, the proportion of total income earned, the McLoone index and the Robin Hood index, which are less commonly used, either because too simplistic for the purposes at hand or unpopular, but which nonetheless deserve to be mentioned.

2.3 Redistribution: Measurement and Related Issues

Various measures can be used to estimate redistribution - i.e. the reduction in inequality produced by taxes and transfers - but most of them expand on the standard measure of redistribution developed by Kakwani (1986) and Ringen (1991), which defines the redistributive effect of taxes and transfers as the difference between market income inequality and disposable income inequality. The most extensively used summary statistics of pre-fiscal and post-fiscal inequality in the literature is the Gini coefficient, but the concentration coefficient is often employed as a valid alternative.

Before illustrating the singular developments and approaches, it is necessary to clarify some points. Firs of all, measurement in absolute terms is almost unanimously preferred to percentage measures, since it allows for an easier interpretation and a more meaningful comparison both between countries and points in time. Secondly, when calculating the market income inequality index and the disposable income inequality index, households should be ranked respectively by their market income and disposable income in order to incorporate the the re-ranking effect in the results. This is because in most of the cases, the position that households occupy in the distribution of post-government income does not parallel the one they take in the distribution of pre-government income because of the impact of taxes and transfers itself. Lastly, it is important to specify that the equalizing effect of taxes, and in particular of transfers, are analysed other things being equal, which implies assuming unchanged household and labour market structures and disregarding any possible behavioural response. This explains why redistribution measures are rather approximations, since labour supply decisions are supposed to be unaffected by the degree of efficiency, generosity, and universality of the welfare system.

2.3.1 *The Standard Approach*

As mentioned in the preceding section, the redistributive effect (RE) is expressed as the reduction in the Gini coefficient (or alternatively the concentration coefficient) from market

income (G_m), to disposable income (G_d) as shown in (1).

(1) $$RE = G_m - G_d$$

Expanding on this definition, Musgrave and Thin (1948) and Reynolds and Smolensky (1977) propose two different versions of the index, as presented respectively in (2) and (3), with C_d being the concentration coefficient of disposable income not accounting for the re-ranking effect (thus households are ranked by pre-fiscal income rather than by post-fiscal income).

(2) $$RE^{MT} = \frac{1 - G_d}{1 - G_m}$$

(3) $$RE^{RS} = G_m - C_d$$

2.3.2 The Sequential Accounting Decomposition Approach

The total redistributive effect as expressed in (1) can be disentangled to asses the partial effects of taxes and transfers on the overall income distribution following the sequential accounting decomposition approach (Mahler and Jesuit, 2006). In practice, the Gini coefficient is sequentially decomposed in order to determine the effective distributional impact of different income sources, offering a quantitative measure for the reduction in inequality by social programs, as shown by equations (4) and (5).

(1) $$RE = G_m - G_d$$

(4) $$RE_b = G_m - G_{m+b}$$

(5) $$RE_t = G_{m+b} - G_d$$

RE_b and RE_t represents respectively the partial redistributive effect of transfers, given by the difference between market income inequality and gross income inequality, G_{m+b}, and the partial redistributive effect of taxes, expressed as the difference between gross income inequality and disposable income inequality (where gross income is defined as in the income accounting framework presented in section 3.1). It must be noted that the logic of this approach, which is consistent with OECD practice for which transfers are levied on market income and taxes on gross income, may underestimate the redistributive effects of the last component.

An alternative method to estimate partial effects is to multiply the size of the transfer, measured as their share in gross income, by the Kakwani progressivity index of transfers, and to multiply

the size of taxes, measured as their share in disposable income, by the Kakwani progressivity index of taxes (OECD 2012).

2.3.3 *The Kakwani Decomposition*

The model for the decomposition of the redistributive effect, as defined in (1), into progressivity and re-ranking terms is first presented by Kakwani (1984,1986) with the aim of summarising the two theoretical concepts of vertical and horizontal equity into a unified framework, and it remains one of the most widely accepted tools in the income redistribution literature.

$$RE^K = V^K - R^{AP} \tag{6}$$

where $V^K = P^K \frac{t}{(1-t)G_m}$ and $R^{AP} = G_d - C_d$

As shown by equation (6), the redistributive effect is expressed as the difference between the Kakwani vertical effect V^K, which is equal to the Kakwani progressivity index P^K scaled by the average tax rate and normalized by G_m , and the Atkinson-Plotnick index of reranking R^{AP}, which respectively captures the progressivity and the re-ranking effect of fiscal systems.
Since the term V^K can be also expressed as the difference between market income inequality and the concentration coefficient of disposable income, equation (6) can be rearranged as follows:

$$RE^K = (G_m - C_d) - (G_d - C_d) \tag{7}$$

2.3.4 *The Sharegain Value*

The calculation of Sharegain values to be used as a proxy of redistribution is advanced by Milanovic (1999). Sharegain is defined as the difference between the share of market income and the share of disposable income earned by the same given decile of households (ranked by market income). So, for example, if the bottom decile receives 4% of total market income and the same households receive 10% of total disposable income, the sharegain is 6 percentage points. Usually sharegain50 and sharegain20 are the variables used to capture how the share of the bottom half and of the bottom quintile increases when moving from pre-fiscal to post-fiscal income to be used as a proxy for the redistributive effect of taxes and transfers.

3. *THEORETICAL FRAMEWORK AND REVIEW OF THE RELEVANT LITERATURE*

3.1 Redistribution and the Welfare State

Even though welfare states differ in the priority they assign to different social values, in the extent to which they pursue different social objectives, and in the effort they expend in implementing different social policies, concerns about the widening of economic disparities are at the core of policy debates across all OECD countries. In fact, in two-thirds of countries the dominant pattern over the entire period from the mid-1980s to the mid-2000s has been one of a moderate but fairly widespread rise in income inequality, both within and across countries, with a cumulative increase of around 7%. According to the 2008 OECD report "Growing Unequal", the Gini coefficient stood an average of 0.29 in the first decades and exhibited an increase by almost the 10% to an average of 0.316 in the last decade, caused by the enlarging gap between individuals at different ends of the income distribution. Surprisingly, this was the case not only for the already high-inequality countries, such as the US, but also for traditionally low-inequality countries, such as Denmark, Sweden and Germany. This worrisome scenario has triggered an argument in favour of redistribution strategies as an integral part of economic and social policy, leaving out of consideration whether they should be regarded from the perspective of equity, whereby redistribution[1] is considered as matter of social justice and it should be pursued as an ethical imperative, or from the perspective of welfare and economic efficiency.

Welfare state arrangements and government intervention have a huge influence on how the dynamics of the market translate into income inequality, and affect income distribution through a variety of inequality-reducing programs, but most directly through tax and transfer systems. For instance, in 2005 in the OECD area inequality in post-fiscal income, measured by the Gini index, was on average 25% lower than inequality in pre-fiscal income.

From one side, redistribution can be pursued to achieve a more equitable income distribution through the combined effect of social transfers and social insurance programs, which typically target the disadvantaged of society, such as: social assistance cash benefits, benefits for sickness, occupational injury and diseases, unemployment compensation benefits, child,

[1] *Recall that, as outlined in the previous chapter, redistribution is defined as the reduction in income inequality from market income to disposable income. That taxes and transfers are said to redistribute if they have an inequality reducing effect on income inequality*

maternity and family allowances, state old-age and survivors benefits, and other social insurance benefits. In combination, also direct taxation - in particular income taxes and taxes on personal profits - can be used for redistribution purposes, with the prudence of balancing the either reinforcing or offsetting effects of different tax and transfers instruments, and with particular attention in evaluating both their implications for the trade-off between equality and economic efficiency, and possible distortions in terms of labour supply decisions and welfare dependency.

Of course, the reduction in inequality brought about by the tax-benefit system varies across countries, both because those with a similar dispersion of household market income may implement different redistributive strategies, and because the same mix of policy instruments may lead to different outcomes depending on the specific country's inequality profile. More specifically, such cross-country variation in the redistributive impact of taxes and transfers depends on the design of social programmes in terms of size, targeting, progressivity and objective.

The size of the tax-benefit instrument is measured as the effective tax rate (or benefit rate), computed by dividing all taxes paid by the household (or alternatively benefits received) by the household pre-tax income (or pre-benefit), averaged over all households. Targeting involves determining either eligibility for benefits or the level of entitlements for those eligible: this means that all benefit systems are targeted to specific categories of individuals even though with varying degree of universality and means-testing. Progressivity of taxes refers to the way the tax rate progresses from low to high income and to the way in which the tax incidence is progressively shifted from those with a lower ability to pay to those with a higher ability to pay, as the marginal tax rate increases when the taxable amount increases. Progressivity of benefits, instead, refers to the profile of benefits when compared to market or disposable income, in other words, how larger a share of benefits is received by different income groups, and this depends on whether the system is means-tested, flat-fare or earning-related and to what degree. Lastly, the objective refers to the purpose and required outcome of different types of redistribution strategies. The first main objective of the welfare state, referred as to the "piggy-bank" (Barr 2001), is to provide income stability in the face of destabilizing events, such as unemployment, disability and sickness, and to redistribute across the individual's lifecycle to life-stages where larger economic resources are needed, such as retirement, childbearing and family establishment. The second main objective, called the Robin Hood motive, endorse the maxim of "taking from the rich to give to he poor", which translates in the provision of poverty relief and the reduction of social exclusion through the redistribution of income and wealth from

those with larger economic resources to the needy. Needless to say, the redistributive aim of welfare states involves a mix of both vertical and lifecycle redistribution, which of course are given different weights and are assigned different priorities depending on the characteristics of the specific welfare regime.

Analysing each component of different policy mixes according to the dimensions of size, targeting and progressivity explained above, allows to compile a set of policy indicators according to which it is possible to draw individual country profiles, and to group OECD countries in four clusters sharing broadly comparable tax and transfer systems. Not surprisingly there is a close, but not perfect, correspondence between clusters based on tax and transfers policy indicators and those resulting from grouping countries according to their inequality pattern and dimension.

The Nordic model is characterised by nearly universal cash transfers and in-kind benefits, by a highly redistributive tax mix and by a below-average disposable income inequality thanks to little wage dispersion and high employment rates. The Continental model is more oriented towards lifecycle redistribution, with a large share of cash transfers constituted by old age pensions, a tax system that does not promote redistribution across individuals, and a close to average level of inequality due to relatively low employment rates and a high concentration of self-employment and capital income. The Anglo-Saxon model present a highly targeted, means-tested and slightly progressive tax-transfer system, and an above average level of inequality stemming from severe disparities in labour earnings. The Lower-income model is characterised by a developing welfare system, with a level of taxation and spending on transfers considerably below the OECD average and by a significant level of income inequality originating in the labour market.

3.2 *Main Theories of Redistribution*

The relationship between income inequality and redistribution is undefined from a theoretical standpoint, and during the last three decades a plethora of theoretical models have been developed to identify and explain possible causal links. Intuitively it could be expected that pre-fiscally more unequal countries redistribute more simply because there is a greater potential and a larger scope for redistribution. However, since empirical investigation conducted so far has lead to inconsistent results and evidence are mixed, the issue is still the subject of an ongoing debate. In particular, much recent discussion has focused on the authority and validity

of the median-voter hypothesis advanced by Meltzer and Richard (1981) in this field, which is perhaps the most influential political economy model relating inequality and redistribution.

3.2.1 The Median Voter Hypothesis and The Robin Hood Paradox

The Meltzer-Richard model provides the political mechanism to support the intuition that countries with a more unequal distribution of pre-fiscal income redistribute more, which would imply that the inequality-reducing effect of taxes and transfer is stronger in pre-fiscally more unequal countries. According to the hypothesis, when individuals are ranked according to their market income, the income of the median voter - i.e. the individual with the median level of income, will be low compared to mean income. Assuming that all individuals are voters, that their preferences for redistribution strategies are determined solely by their position in the income distribution and that net transfers are progressive, the more unequal the society is the more the median voter gains from the joint action of taxes and transfers, and the more likely he will vote in favour of more redistribution.

This hypothesis is formulated in terms of a general equilibrium model in which the equilibrium level of redistribution depends on the ratio of median to mean income. Thus, voters with an income above that of the median voter favour lower taxes and less redistribution, while the contrary applies for individuals whose income is above the one of the pivotal voter. In other words, what is argued by A.Meltzer and S. Richard is that the preference for redistributive policy is a function of the distance between the income of the median voter and the average income of all voters: as pre-fiscal income inequality rises the distance between the median and mean income increases and so does the voting support for redistribution.

Despite the strong reputation and popularity, data do not completely vindicate this hypothesis, and most recent comparative studies demonstrate that in reality the reverse obtains. This lack of strong evidence in favour of the median-voter theory has motivated the development of alternative theories able to provide a justification to such opposite prediction, which has been named the Robin Hood Paradox (Lindert 2004). Indeed, the negative relationship between pre-fiscal income inequality and the extent of redistribution, for which it is least where it is most needed, could be easily explained by the fact that high-inequality countries lack the economic and/or political means to support programmes of social policy.

In this respect, interesting insights are offered by the power resource theory (Korpi 1983, Stephens 1979), which provides one of the most influential accounts of cross-national variation in the size, characteristics and outcomes of the welfare state. The presumption is that the level of income inequality and the resulting extent of redistribution depend on the organizational

resources and mobility of the working class: the more workers are able to organize and to engage in collective action, the more they will be able to pursue greater equality through economic or political action. Such organizational resources are crucially tied to the characteristics of labour market institutions, in particular to the degree of unionization, bargain coordination and employment protection which, as explained in section 1.2.2., are found to be lower in more unequal countries, thus providing one possible explanation for why taxes and transfers are less able to reduce income inequality where this is more urgent. In addition, proceeding from the same basic assumptions of the Meltzer-Richard model, Moene and Wallerstein (2001) attempt to resolve the said paradox by means of an insurance motive. The core proposition is that social policies provide an insurance against income losses, thus, given the same level of risk, as income increases also the demand for insurance does. Assuming that the mean income remains unchanged, it follows that the income of the median voter declines as inequality rises, and consequently the demand for redistribution becomes less pressing.

Another dimension along with the paradox of redistribution has been explained is the one concerning the size and targeting of redistribution instruments: Korpi and Palme (1998) posit that the more social policies are targeted toward low income-groups, the less likely they are to reduce inequality. In fact, in the authors' opinion, highly targeted programs lack the support of a large and cohesive political base because they do not offer a rational base for a coalition between the individuals above the poverty line and those below, while comprehensive programs tend to encourage coalitions between the working and the middle class, leaving low-income groups less isolated.

3.3 Empirical Evidence from the Literature

The last decade has seen a world-wide interest in the redistributive effects of social policy, and the research in this field is underpinned by conflicting believes about the role of the welfare state in the determination of income inequality. On average, across OECD countries, tax-transfer systems are only partially able to compensate for the rise in inequality of market income among household, but even though most have done so to some degree, researchers still stand divided on the nature of the relationship between income inequality and redistribution and its implications for welfare.

Literature on welfare state retrenchment reveals that the welfare state has become less redistributive over the past decade and the reduction of income inequality achieved by the combined effect of taxes and transfers has declined in around one half of OECD countries. On

the contrary, recent studies show that the extent and magnitude of redistribution has increased in most welfare systems from the mid-1980s to the mid-2000s, and it is argued that are markets and not redistribution policies that have become more inegalitarian as a whole. Nonetheless, there is a common agreement upon the prevailing role of transfer in reducing income inequality compared to the contribution made by taxes, whereby the redistributive outcome achieved by the welfare state is to be attributed mainly to the benefit side of the tax-transfer system.
If there exist several detailed national studies documenting trends in redistribution, cross-national comparative studies considering the entire tax-benefit system are rare, and usually international comparison either tends to focus on specific components of the redistribution system or is limited to a particular point in time. In fact, multi-country evaluation is sometimes though problematic due to the differences in the institutional setup and in the design of social programmes in terms of targeting and progressivity, which make it difficult to interpret countries' divergences in redistributive outcomes.

One of the first cross-national analysis of state redistribution in a comparative perspective is conducted by Jesuit and Mahler (2004), which perform an empirical exercise for 13 developed countries around the years 1999-2000 disaggregating overall redistribution into several tax and transfer components. Despite the very limited number of countries and time period considered, the study provides useful insights on the redistributive role of the welfare state: first of all, it demonstrate that, in the selected sample, redistribution has kept pace with the rise in market income inequality; secondly, it makes an important contribution to the evolving body of research by suggesting a new approach to the analysis of the redistributive effects of the tax-transfer system, which moves towards a more disaggregated measure of social policy.
Elaborating on the work of Jesuit and Mahler, Caminada and Wang (2011) and Caminada, Goudswaard and Wang (2012) provide detailed results of the redistributive effect of welfare state regimes across a selection of first 36 and then 20 LIS countries. Using the sequential accounting decomposition approach (see section 2.3.2 for the details), they calculate the partial redistributive effect over time of personal income taxes and of 11 different social benefits and social contribution programmes finding that on average, over the period considered, they have reduced inequality by almost one third. Most importantly, the two researches do not find evidence that the redistributive effect of taxes and transfers on income inequality has either declined or stabilized over time; on the contrary, it is claimed that the tax-benefit system has become even more effective at reducing inequality in the mid-2000s as compared to the mid-1990's. In particular, it is shown that 60% of the increase in overall redistribution is to be

attributed to old age pensions and to a less extent to social assistance, sickness, disability and family benefits, and that social benefits as a whole make a much stronger contribution in reducing income disparities compared to taxes.

Quite different conclusions are derived from a recent study conducted by Immervoll and Richardson (2011) for OECD countries over the last 20-25 years, which addresses the issue of whether and to what extent government redistribution policies have slowed or accelerated the trend of growing income inequality among non-elderly households. First they examine trends in market income inequality and trends in stated preferences to assess whether the need for redistribution has become more urgent in the last 20 years, finding that on average there is a greater demand for inequality-reducing policies. Then, by comparing Gini values for market income and disposable income, a detailed analysis of changes in the extent of redistribution, both across countries and across time, is conducted. It emerges that, on average, cross-country inequality increased both before and after taxes and transfers, and although the rise in market income disparities slowed significantly in the last decade, governments have become less effective at offsetting this upward trend compared to the mid-80s and 90s, with transfers being more responsive than taxes to growing inequality.

Confronting divergent positions supported by other researchers it is argued that, by considering the total population rather than restricting the analysis only to the working-aged, the redistributive effect of the tax-benefit system risks to be misjudged and overestimated. In fact, from one side not excluding the elderly makes it difficult to compare income across people at very different stages of their life, from the other side old-age pensions are mainly designed to redistribute intertemporally, while the phenomenon of interest should be interpersonal redistribution.

Moreover, it is also observed that, as pre-fiscal income inequality rises, the tax-benefit system have automatically a more redistributive impact because of the progressivity built into the system itself, in particular for what concerns income taxes. In this context, one of the main explanation provided by Prasad (2008) for the failure of social policy in reversing the trend of rising income inequality is the weakening progressivity of the tax system, which has not been offset by an adequate increased recourse to social transfers; tax rates on personal income and corporate income have on average declined over the past two decades while indirect taxes, which are generally regressive, are gradually gaining importance as a source of government revenue.

The work of Kenworthy and Pontusson (2005) offers a large contribution to comparative literature on the welfare state; using data from the Luxemburg Income Study they examine

redistribution, and in particular the relationship respectively between market income inequality and labour earnings inequality and between pre-fiscal income inequality and redistribution, in affluent OECD countries between the 1980s and the 1990s. Mapping trends in the distribution of market income among working-age households emerges that, within the overall trend of rising inequality, a relatively significant increase is also observed in the Nordic countries. This reflects the crucial role in shaping distributional outcomes of labour earnings disparities, which are driven by changes in labour market performance and institutions. However, their analysis on the equalizing effects of redistributive strategies shows that most welfare states have indeed become more effective at narrowing income disparities. In addition, with respect to the theoretical debate about the validity of the Meltzer-Richard hypothesis as opposed to the Paradox of Redistribution their conclusions are mixed. Plotting the redistributive effect, measured as the absolute difference in the Gini coefficients for pre and post-fiscal income, against levels of market income inequality, a pattern of positive association is witnessed only for Nordic countries, but overall results do not allow neither to support nor to discard the implications of the median-voter model in favour of the opposite prediction.

On the contrary, Morillas (2009) finds pre-fiscal income inequality to be negatively associated with the level of the redistributive effect of taxes and transfers across countries, showing that under certain realistic conditions greater inequality is related to less support for redistributive policies.

3.3.1 Main Findings

To conclude, perhaps the most comprehensive assessment of inequality and the role of policies for redistribution is offered by two OECD publications, namely "Growing Unequal? Income Distribution and Poverty in OECD Countries" (2008) and "Divided We Stand: Why Inequality Keeps Rising" (2011). The main findings are summarised below.

- Tax and transfer systems reduce overall inequality in all OECD countries.
- The extent of redistribution increased over the last two decades and the tax-benefit system appears to be more successful at offsetting widening income gaps at the bottom than at the top of the distribution.
- Increased redistribution did not prevent inequality from rising: on the whole, pre-fiscal income inequality grew by twice as much as redistribution, and the reduced redistributive capacity of social policy was in some cases the main source of growing economic disparities.

- Cash transfers redistribute more than taxes in most countries: on average, transfers are to be accounted for three quarters of the reduction in income inequality between market and disposable income
- The redistributive effect of cash transfers varies widely across countries, and even those with a similar dispersion of market income may follow different redistributive strategies in terms of targeting and progressivity of the benefit system.
- Contrarily to what a sizeable difference in the tax-to-GDP ratios would suggest, the cross-country variation in the redistributive effect of taxes is more limited; moreover, the progressivity of the tax system varies little despite the large divergence in the size of the tax instrument across countries.

4. EMPIRICAL ANALYSIS

As outlined in the previous chapter, the nature of the relationship between income inequality and redistribution and its implications for welfare are not clear cut, neither from a theoretical nor from an empirical viewpoint. From the very definition of pre-fiscal and post-fiscal income inequality, and by comparing actual levels of market income inequality with the corresponding lower levels of inequality after taxes and transfers, the role of social policy in this respect is undeniable. Given that welfare states are always redistributive to some extent, the aim of this section is to collect empirical evidence on the controversial issue on which defenders of the median-voter hypothesis and of the paradox of redistribution stand divided, that is, whether or not it is true that pre-fiscally more unequal countries are indeed the more redistributive ones.
Collecting data on income inequality for 34 OECD[2] member countries over the period 1980-2013, an econometric model is developed to test whether the effects of taxes and transfers on income inequality are stronger in countries that exhibit higher level of market income inequality, or the reverse holds.

4.1 Research Method and Preliminary Data Analysis

The Gini Index has been chosen as the most appropriate measure of income inequality for the purpose of the analysis since it is easily understandable and allows for meaningful comparisons both across countries and over time. Gini Coefficients for market income and disposable income have been derived from The Standardized World Income Inequality Database [3] (SWIID), which provides comparable Gini indices of gross and net household income inequality for 174 countries for as many years as possible from 1960 to the present, along with estimates of uncertainty in these statistics.
The database has been assembled by Solt (2014) using a custom missing-data multiple-imputation algorithm to standardize observations collected from the United Nations University's World Income Inequality Database version 2.0c, the OECD Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean generated by CEDLAS and the World Bank, Eurostat, the World Bank's PovcalNet, the UN Economic Commission for Latin America and the Caribbean, the World Top Incomes Database, the

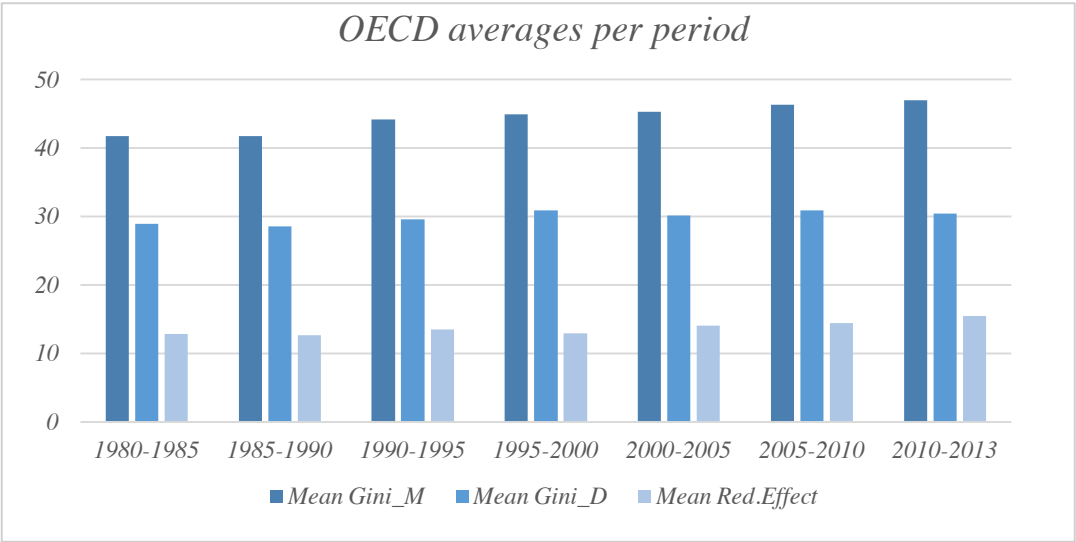
[2] See Data Appendix for the list of selected countries
[3] Solt, Frederick. 2014. "The Standardized World Income Inequality Database." Working paper. SWIID Version 5.0, October 2014.

University of Texas Inequality Project, and other national statistical offices around the world. The Luxembourg Income Study data served as the standard for definitions and harmonization guidelines. In the version of the SWIID used, the inequality estimates are represented by 100 separate imputations of the complete series, whose difference captures the uncertainty in the estimate for any given observation.

In order to simplify the analysis, these 100 separate estimates have been averaged to obtain a single summary statistic for pre-fiscal and post-fiscal income inequality. For each of the 34 OECD member states selected from the sample of SWIID countries we have computed the Gini coefficient of market income inequality, labelled *Gini_M*, and the Gini coefficient of disposable income inequality, *Gini_D*, for the years 1980-2013, expressed in percentage points. As a proxy for the redistributive effect of taxes and transfers a measure for redistribution RE has been obtained by subtracting *Gini_D* from *Gini_M*. Before proceeding with the econometric analysis, a preliminary examination of patterns of income inequality and redistribution across countries has been performed by averaging their respective values of pre-fiscal Gini, post-fiscal Gini, and redistribution over five-years slots.

In Figure 1 and Table 1 OECD averages per period are presented; detailed countries' individual profiles and trends, as well as OECD trends per period are found in the Appendix (Table 1.1, Figure 1.1 and Figure 1.2). At first glance it can be noted that, although at a moderate pace, inequality has kept rising from the 1980s. Nonetheless, also the extent of redistribution through taxes and transfers (even if it was not able to fully compensate for the widening of income disparities) seems to have increased over the period considered.

Figure 1



Source: based on own calculations

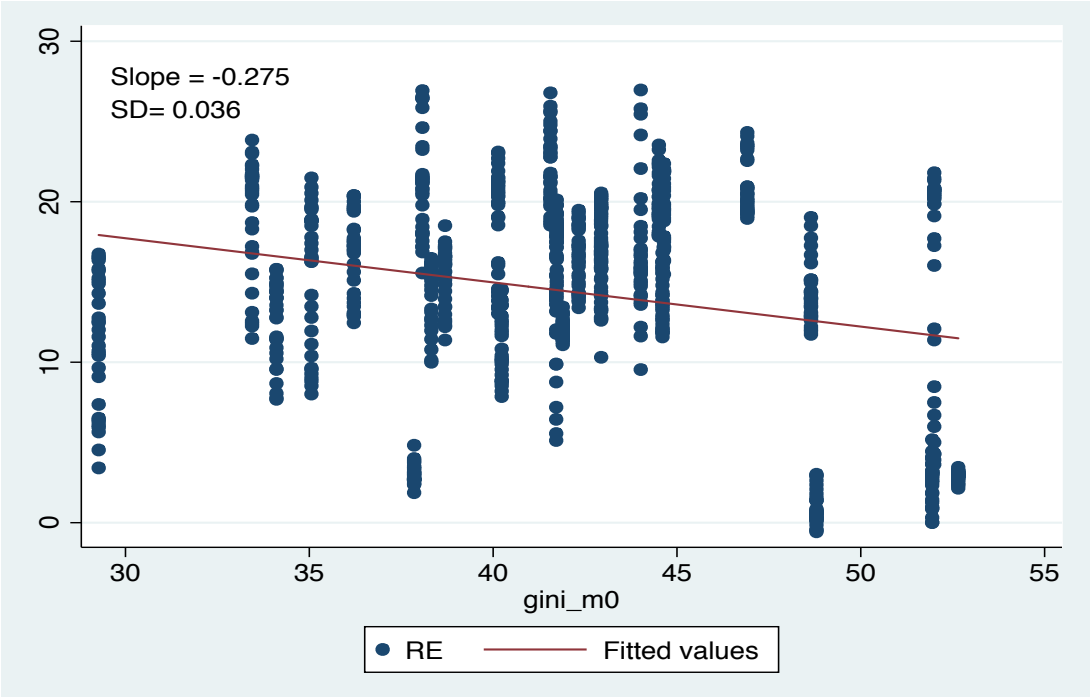
Table 1: OECD averages per period

Time period	*Mean Pre-Fiscal Gini*	*Mean Post-Fiscal Gini*	*Mean Redistributive Effect*
1980-1985	*41.73588066*	*28.94067012*	*12.79521054*
1985-1990	*41.71222137*	*28.55396721*	*12.62386555*
1990-1995	*44.22611119*	*29.56146532*	*13.5211163*
1995-2000	*44.93097603*	*30.85073351*	*12.95844096*
2000-2005	*45.26877766*	*30.14687741*	*14.0429842*
2005-2010	*46.31639292*	*30.92915767*	*14.38253186*
2010-2013	*46.96790408*	*30.39113525*	*15.41884097*

Source: based on own calculations

Figure 2 represents a very simplistic attempt to formulate a preliminary inference on the research question: plotting the redistribution coefficients *(RE= Gini_M - Gini_D)* of all of the 34 OECD countries for the whole period (1980-2013), against the corresponding market income inequality taken at the base level ($Gini\_M_0$) we obtain a negative relation between the two measures.

Figure 2: Do pre-fiscally more unequal countries redistribute more?



Source: based on own calculations

However, such solution does not represent a solid ground on which to derive convincing conclusions. Indeed, social policies are not the only actors that comes into play: as it has been emphasize in Chapter 1, income inequality is driven by a wide range of interrelated forces, and income distribution is affected by various interdependent dynamics whose role cannot be neglected in this analysis. In line with these considerations, an econometric model has been developed to control for some of those factors for which data are available, allowing to better seize the causal effects of taxes and transfers on income inequality.

4.2 Regression Analysis

4.2.1 Database Description

The database consists of panel data for 34 OECD countries over the period 1980-2013 and has been assembled by merging the SWIID with data extracted from various OECD databases, for a total of 1258 observations. The list of variables their summary statistics along with their description and source, are found in the Data Appendix. Among these, the one of interest are the OECD statistics for the Tax Revenue and the level of Social Expenditure, expressed as a percentage of GDP, which are chosen respectively as a proxy for redistribution through taxes and through cash transfers. The source of the Tax Revenue statistic is the "OECD Government at a Glance Database": the variable *Tax_GDP* covers only revenues from taxes on personal income and profits.

Social Expenditure aggregates are extracted from the "OECD Social Expenditure Database" (SOCX) which provides reliable and internationally comparable statistics on public and private social expenditure at programme level. The variable *SocExp_GDP* comprises public spending on cash transfers only (benefits in-kind are excluded) covering the following social policy areas: old age, survivors, incapacity-related benefits, health, family, active labour market programmes, unemployment, housing, and other social policy areas.[4]

4.2.2 Model Specifications

The baseline framework is a fixed effects regression model where disposable income inequality, *Gini_D*, is the dependent variable. First of all, since the regression analysis we are going to perform seeks to provide evidence in favour of or against the greater inequality-reducing effect

[4] For the complete list of programmes covered see Data Appendix

of redistribution policies in pre-fiscally more unequal countries, we want the effect of income taxes and cash transfers to depend on the level of market income inequality. For this reason two interaction terms *(Tax_GDP*Gini_M_0)* and (*SocExp_GDP*Gini_M_0)* have been generated, with *Gini_M_0* being the Gini coefficient of market income inequality in the base year, which for each country is taken to be the first year for which the summary statistic is available.

Secondly, entity and time fixed effects are incorporated to control for both unobserved omitted variables which are constant over time but vary across state and for those that are constant across states but vary over time, and this is done by including in the regression binary variables for *n-1* countries and *t-1* years.

In addition, control variables are added to hold constant factors which, if neglected, could lead to omitted variable bias in the estimation of the effects of interest. Strictness of employment protection legislation and unemployment rate are used to control for the role of labour market institutions and labour market dynamics; the percentage of population above 65 and the dependency ratio are introduced to control respectively for population aging and welfare dependency; the value of exports and imports are employed as a proxy for globalization, while government expenditure on research and development as an indicator for technological change.

In the first specification, the focus is on the tax side of the tax-benefit system as presented in (1), which defines the relationship between *Gini_D* and the redistributive effect of taxation as follows:

$$(1)\ Gini\_D = \beta_0 + \beta_1(Tax\_GDP_{it} * Gini\_M_{0i}) + \beta_3 Tax\_GDP_{it} + \beta_4 SocExp\_GDP_{it} + \beta_5 GERD\_GDP_{it} + \beta_6\, Exports_{it} + \beta_7\, Imports_{it} + \beta_8 EPstrictness_{it} + \beta_9 UnRate_{it} + \beta_{10} Pop65_{it} + \beta_{11} Depencency_{it} + \gamma_2 C2_i + \cdots + \gamma_n Cn_i + \delta_2 Y2_t + \cdots + \delta_n Yn_t + \varepsilon_{it}$$

Where i= 1, …,34 and t= 1, …,36, $(Tax\_GDP_{it} * Gini\_M_{0i})$ is the interaction that allows for the redistributive effects of taxes to depend on the base level of pre-fiscal inequality, and Tax_GDP_{it} and $SocExp\_GDP_{it}$ respectively denotes income taxes and cash transfers. $\gamma_2 C2_i + \cdots + \gamma_n Cn_i$ are the *n-1* country dummies that captures country-specific factors that may affect income inequality, and $\delta_2 Y2_t + \cdots + \delta_n Yn_t$ are the *t-1* year dummies that account for time

fixed effects. Lastly, the other regressors included in the equation are the control variables previously described and ε_{it} the error term.

The second specification, as in (2), shifts the attention from taxes to the inequality reducing effects of cash transfers, allowing in this case for the redistributive effect of $SocExp\_GDP_{it}$, to depend on $Gini\_M_0$.

$$(2)\ Gini_D = \beta_0 + \beta_2(SocExp\_GDP_{it} * Gini\_M_{0i}) + \beta_3 Tax\_GDP_{it} + \beta_4 SocExp\_GDP_{it} + \beta_5 GERD\_GDP_{it} + \beta_6\, Exports_{it} + \beta_7\, Imports_{it} + \beta_8 EPstrictness_{it} + \beta_9 UnRate_{it} + \beta_{10} Pop65_{it} + \beta_{11} Depencency_{it} + \gamma_2 C2_i + \cdots + \gamma_n Cn_i + \delta_2 Y2_t + \cdots + \delta_n Yn_t + \varepsilon_{it}$$

Finally, the third specification brings together the two redistribution instruments into a unified framework that defines income inequality as presented in equation (3).

$$(3)\ Gini\_D = \beta_0 + \beta_1(Tax\_GDP_{it} * Gini\_M_{0i}) + \beta_2(SocExp\_GDP_{it} * Gini\, M_{0i}) + \beta_3 Tax\_GDP_{it} + \beta_4 SocExp\_GDP_{it} + \beta_5 GERD\_GDP_{it} + \beta_6\, Exports_{it} + \beta_7\, Imports_{it} + \beta_8 EPstrictness_{it} + \beta_9 UnRate_{it} + \beta_{10} Pop65_{it} + \beta_{11} Depencency_{it} + \gamma_2 C2_i + \cdots + \gamma_n Cn_i + \delta_2 Y2_t + \cdots + \delta_n Yn_t + \varepsilon_{it}$$

Regression results are reported in tabular form and commented in the following section. Subsequently, in order to provide a more exhaustive answer to the research question, a further analysis, mainly based on regression (3), is performed.

4.3 Empirical Results

Table 2

Dependent variable: Gini_D			
Independent Variables	**(1)**	**(2)**	**(3)**
$Tax\_GDP_{it} * Gini\_M_{0i}$	0.020** (0.008)		0.016** (0.008)
$SocExp\_GDP_{it} * Gini\_M_{0i}$		0.014* (0.008)	0.007 (0.008)
Tax_GDP_{it}	- 0.889*** (0.325)	- 0.071 (0.047)	- 0.741** (0.320)
$SocExp\_GDP_{it}$	- 0.309*** (0.072)	- 0.884*** (0.328)	- 0.606* (0.329)
$GERD\_GDP_{it}$	0.376 (0.317)	0.270 (0.346)	0.341 (0.318)
$Exports_{it}$	0.015 (0.011)	0.015 (0.011)	0.014 (0.011)
$Imports_{it}$	- 0.002 (0.010)	- 0.002 (0.010)	- 0.001 (0.010)
$EPstrictness_{it}$	0.731* (0.391)	0.855** (0.384)	0.769** (0.391)
$UnRate_{it}$	0.108*** (0.032)	0.108*** (0.032)	0.108*** (0.032)
$Pop65_{it}$	0.339*** (0.094)	0.415*** (0.103)	0.370*** (0.104)
$Depencency_{it}$	0.117 (0.076)	0.099 (0.076)	0.118 (0.075)
Country Fixed Effect	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes
Observations	519	519	519

Note: Estimated using fixed-effects panel regressions.
Robust standard errors are reported in parentheses below the estimated coefficients.
Individual coefficients are statistically significant at the 10% (*), 5% (**) or 1%(***) significance level.

Columns (1), (2) and (3) of Table 2 show the results of the three fixed-effects panel regressions, reporting the estimates of the coefficients and the robust standard errors in parentheses.

First of all, as expected from the very fact that taxes and transfers are assumed to be always redistributive to some extent, which is to say, they do trim down inequality when moving from market income to disposable income, the coefficients on Tax_GDP_{it} and $SocExp\_GDP_{it}$ appear

with the negative sign in all of the three columns. In the first specification, whose aim is to capture the effect on disposable income inequality of the tax instrument only, the coefficients on both regressors are statistically significant at the 1% significance level (***). Instead, when the effect of cash transfers are considered, the coefficient on $SocExp\_GDP_{it}$ is significant at the 1% level, while the coefficient on Tax_GDP_{it} is no longer statistically significant. Lastly, in the third specification, once we account for the whole tax-benefit system, the tax instrument is found to be statistically significant at the 5% significance level, while the null hypothesis that $SocExp\_GDP_{it}$ has no effect on income inequality can be rejected only at the 10% level of significance.

Moreover, not accounting for the effect of $Gini\_M_0$ on the two social policy instruments, cash transfers appear to be more redistributive than taxes just in the second specification, where increasing social expenditure decreases post-fiscal income inequality by 0.884 percentage points, *ceteris paribus*, as opposed to a reduction of 0.071 percentage points for a unitary increase in tax revenue. In the first regression, instead, the inequality reducing effect of taxes ($\beta_3 =$ -0.889) seems to be larger compared to the expected reduction in disposable income inequality that is achieved, other things being equal, through the benefit system ($\beta_4 =$ - 0.309), and the same is supported by the coefficients on Tax_GDP_{it} and $SocExp\_GDP_{it}$ ($\beta_3 =$ -0.741, $\beta_4 =$ -0.606) estimated by the third specification.

In addition, it is important to note that the coefficients on the interaction terms $Tax\_GDP_{it} * Gini\ M_{0i}$ *and* $SocExp\_GDP_{it} * Gini\ \_M_{0i}$ are statistically significant, respectively at the 5% level and at the 10% level when considered separately in regression (1) and (2); instead, in the third specification, the coefficient on the first interaction term is significant at the 5% level while the hypothesis that the coefficient on the second interaction is zero cannot be rejected at any conventional significance level.

With regard to the variables that have been introduced in the model to control for omitted determinants of income inequality, some remarks deserve to be made even though the OLS coefficients are in general biased and do not have a causal interpretation under the conditional mean independence assumption[5]. While the effects of variables accounting for globalization are not significant, as one could expect the coefficients on unemployment rate are statistically

[5]The conditional mean independence assumption requires that the conditional expectation of ε_i given X_{1i}, and X_{2i} does not depend on X_{1i}, that is:

$$E(\varepsilon_i|X_{1i}, X_{2i}) = E(\varepsilon_i|X_{2i}),$$

where X_{1i} is the variable of interest and X_{2i} is the control variable. Including X_{2i} as a control makes X_{1i} uncorrelated with ε_i. On the other hand, the control variable remains correlated with the error term, which makes it subject to omitted variable bias.

significant at 1% level in all of the three specifications. In addition, also population aging, seems to strengthen income inequality, while welfare dependency appears to be of little or no importance in this respect. Having ascertained that taxes and transfers are, on average, redistributive, and that their effects depend on the base level of pre-fiscal income inequality, the analysis needs to be brought one step forward in order to be able to assess whether to support the implications of the median-voter theory or to reject them in favour of the antithetic predictions of the Robin Hood paradox.

4.3.1 Do pre-fiscally more unequal countries redistribute more?

According to specification (1) and (3), the effect on *Gini_D* of a change in *Tax_GDP* holding $Gini_M_0$constant equals:

$$(a) \qquad \frac{\partial Gini\_D}{\partial Tax\_GDP} = \beta_1 Gini\_M_0 + \beta_3$$

According to specification (2) and (3), the effect on *Gini_D* of a change in *SocExp_GDP* holding $Gini_M_0$constant equals:

$$(b) \qquad \frac{\partial Gini\_D}{\partial SocExp\_GDP} = \beta_2 Gini\_M_0 + \beta_4$$

In this case, since both β_3 and β_4 are negative while β_1 and β_2 are positive, the marginal effect of taxes and transfers on disposable income inequality could be either greater or smaller , respectively by the amount β_3 and β_4, for each additional percentage point in pre-fiscal income inequality $Gini\_M_0$. In order to answer to this question, we can compare how the slope of the line relating *Gini_D* and *Tax_GDP* and of the line relating *Gini_D* and *SocExp_GDP* changes when $Gini_M_0$is at different percentiles.

Referring to the model's first specification, when $Gini\_M_0$ is at the median ($Gini\_M_0$ = 41.558%) the slope of the line relating *Gini_D* and *Tax_GDP* is equal to -0.058 (0.020*41.558-0.889). That is, for a country with a market income inequality of around 41.6% the estimated redistributive effect of taxes is to decrease disposable income inequality by 0.058 percentage points, *ceteris paribus.* Instead, for a country with a market income inequality at the 25th

percentile ($Gini\_M_0$= 36.212%), the effect of taxes is predicted to decrease the Gini coefficient of disposable income by 0.165 percentage points (0.020*36.212- 0.889).
Estimating the same relation when $Gini\_M_0$ is at the 75th percentile ($Gini\_M_0$ = 44.510%), taxes are found ,on the contrary, to increase disposable income inequality by 0.001 percentage points. The t-statistic testing the hypothesis that the coefficient on the interaction $Tax\_GDP*Gini\_M_0$ equals zero, is 2.5 (0.020/0.008), which means that the difference between the estimated effects computed above is statistically significant at 5% level. This implies that with respect to our research question, the results of the first regression support the so called Paradox of Redistribution, according to which the reduction in income inequality achieved through the tax-benefit system is found to be smaller in countries where it is needed the most.
Applying this way of reasoning to the results of the second specification, emerges that the same pattern holds for cash transfers, whose redistributive effect is larger in countries where $Gini\_M_0$ is below the median. In fact, when the value of market income inequality taken as the base level is at the 25th percentile, for a unitary increase in social expenditure, a reduction in disposable income inequality of -0.377 (0.014*36.212- 0.884) percentage points is achieved. On the contrary, for a country with a $Gini\_M_0$ at the 75th percentile the estimated effect of transfers is to decrease post-fiscal income inequality by 0.116 [-0.377 - (0.014*44.510- 0.884)] percentage points less compared to a low inequality country. Nonetheless ,the coefficient on the interaction term $SocExp\_GDP*\ Gini\_M_0$ is statistically significant only at the 10% level.
Analogous conclusions can be derived by proceeding with the same calculations for the results obtained from the third specification. In this instance, however, only the coefficient on $Tax\_GDP*Gini\_M_0$ is statistically significant (the t-statistic is t = 0.016/0.008 = 2) while the difference between the estimated effects of *SocExp_GDP* on post-fiscal income inequality for $Gini\_M_0$ at different percentiles is not. Interestingly, it must be noted that the tax system seems to actually exacerbate income inequality for values of $Gini\_M_0$ greater than 46.313%, while transfers appear to be always redistributive.

For the seek of completeness, a dummy variable that takes on value 1 when $Gini\_M_0$ is below the median (41.558%) and 0 when it is above the median has been created, and it has been interacted first with *Tax_GDP* and then with *SocExp_GDP*. Running specification (3')[6]

[6] (3') $Gini\_D = \beta_0 + \beta_1(Tax\_GDP_{it} * Low_i) + \beta_2(SocExp\_GDP_{it} * Low_i) + \beta_3 Tax\_GDP_{it} + \beta_4 SocExp\_GDP_{it} + \beta_5 GERD\_GDP_{it} + \beta_6 Exports_{it} + \beta_7 Imports_{it} + \beta_8 EPstrictness_{it} + \beta_9 UnRate_{it} + \beta_{10} Pop65_{it} + \beta_{11} Depencency_{it} + \gamma_2 C2_i + \cdots + \gamma_n Cn_i + \delta_2 Y2_t + \cdots + \delta_n Yn_t + \varepsilon_{it}$

substituting *Tax_GDP*Gini_M*$_0$ and *SocExp_GDP*Gini_M*$_0$ respectively with *Tax_GDP*Low* and *SocExp_GDP*Low* allows to estimate the difference between redistribution achieved by low inequality countries and high inequality countries; results are reported in the Appendix, Table 2.1. The coefficient on Tax_GDP_{it} (β_3= 0.026) is the effect of a unitary increase in tax revenue on disposable income inequality for countries with a *Gini_M*$_0$ above the median (Low= 0), while $\beta_1 + \beta_3$ (-0.216- 0.026 = -0.242) is the effect of taxation on the dependent variable for low-inequality countries (Low= 1). It follows that the coefficient on the interaction *Tax_GDP*Low* (β_1=-0.216***) is, other things being equal, the difference in the effect on post-fiscal income inequality of a change in taxes for low versus high-inequality countries, which is to say, the tax system is predicted to reduce income inequality by 0.216 percentage points more in countries where the base level of income inequality is below the median compared to those whose *Gini_M*$_0$ is above. Likewise, considering the benefit side of the tax-transfer system, social expenditure is found to lower inequality by 0.271 percentage points more in low-inequality countries than in high-inequality countries.

Table 3 shows countries' values for *Gini_M*$_0$ arranged in ascending order. Based on the estimates of the third specification[7], we have computed the redistributive effects of taxes and transfers ,as defined in (a) and (b), and the 95% confidence interval for each country. The first thing to notice is that the effect of cash transfers on disposable income inequality is negative for all values of *Gini_M*$_0$, which means that they are always redistributive, with a greater inequality-reducing effect in low-inequality countries. For example, in Norway an increase in social expenditure is predicted to decrease income inequality by 0.353 percentage points, as opposed to Italy where, other things being equal, the effect of the benefit system is estimated to be lower (-0.294). With respect to the tax side of the social policy instrument, still the redistributive effect is grater in more equal countries, but the striking feature that emerges from the analysis is that a marginal increase in taxation is actually found to worsen disposable income inequality in the Netherlands, Greece, Mexico, Turkey, Portugal and Chile.

In addition, it can be observed that while the redistributive effect of transfers is always significant, taxes appears to be an effective instrument for redistribution only in low-inequality countries, since the estimated effect loses its significance for values of *Gini_M*$_0$ above the median. To conclude, for any given value of *Gini_M*$_0$, transfers are found to be on average

[7]From Table 3. β_1= 0.016***, $\beta_2 = 0.007$, β_3 = -0.741** and β_4= -0.606

more redistributive than taxes: the marginal effect of increasing social expenditure on disposable income inequality is greater than the marginal effect of increasing taxation, and this is true across all of the countries considered in the analysis.

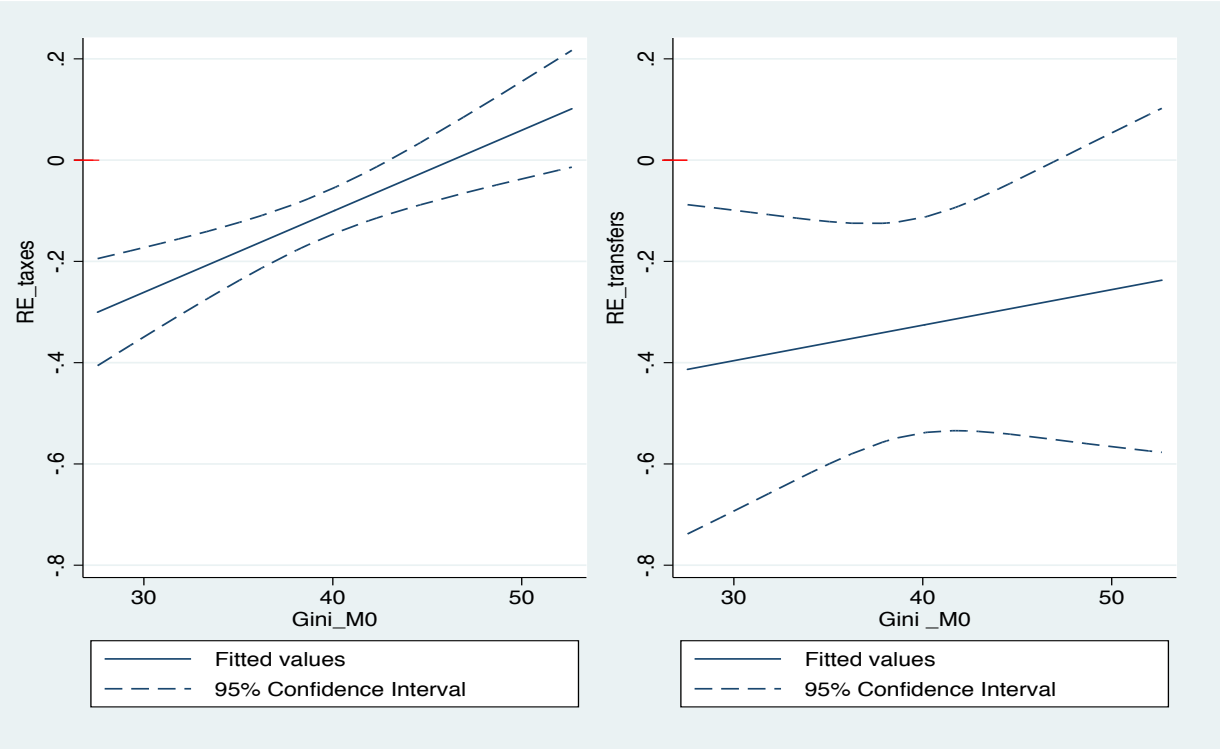
Table 3: Redistributive effect of taxes and cash transfers

Country	$Gini\_M_0$	$\frac{\partial Gini\_D}{\partial Tax\_GDP}$	$\frac{\partial Gini\_D}{\partial SocExp\_GDP}$
Slovenia	27.549	-0.300***	-0.413***
Japan	29.272	-0.273***	-0.401***
Czech Republic	30.898	-0.247***	-0.390***
Iceland	31.839	-0.232***	-0.383***
Estonia	33.329	-0.208***	-0.373***
Hungary	33.443	-0.206***	-0.372***
Slovak Republic	33.448	-0.206***	-0.372***
New Zealand	34.106	-0.195***	-0.367***
Poland	35.058	-0.180***	-0.361***
Norway	36.212	-0.162***	-0.353***
Austria	36.265	-0.161***	-0.352***
Korea	37.851	-0.135***	-0.341***
Finland	38.076	-0.132***	-0.339***
Canada	38.319	-0.128**	-0.338***
Australia	38.692	-0.122**	-0.335***
Denmark	40.138	-0.099**	-0.325***
Switzerland	40.233	-0.097*	-0.324***
Sweden	41.558	-0.076	-0.315***
Spain	41.716	-0.074	-0.314***
United Kingdom	41.732	-0.073	-0.314***
United States	41.894	-0.071	-0.313***
Luxembourg	42.328	-0.064	-0.310***
Israel	42.936	-0.054	-0.305***
France	42.940	-0.054	-0.305***
Ireland	44.016	-0.037	-0.298***
Belgium	44.510	-0.029	-0.294***
Italy	44.607	-0.027	-0.294***
Germany	44.647	-0.027	-0.293***
Netherlands	46.913	0.010	-0.278***
Greece	48.646	0.037	-0.265***
Mexico	48.796	0.040	-0.264***
Turkey	51.943	0.090	-0.242**
Portugal	51.999	0.091	-0.242**
Chile	52.651	0.101	-0.237**

Note: countries are listed in ascending order according to values of $Gini\_M_0$.
Redistributive effects of taxes and transfers, reported in the second and third column are based on the results of regression (3) Table 3.
Underlined countries are those that occupies the 25th ,50th and 75th percentiles of $Gini\_M_0$

Figure 3 offers a graphical representation of the relation between the redistributive effect of taxes and transfers and the base level of pre-fiscal income inequality.

Figure 3: Redistributive effect of taxes and cash transfers



Source: based on own calculations

Plotting the marginal effects from Table 3 against the corresponding values of $Gini\_M_0$ we can conclude that the more unequal a country is, the smaller is the effect of taxes and transfers on income inequality. Moreover, we can observe that transfers are more redistributive than taxes, and that their effect is statistically significant also for higher values of pre-fiscal income inequality, as opposed to the marginal effect of taxation which is not significant for values of $Gini\_M_0$ (x-axis) that fall inside the 95% confidence interval delimited by the dashed lines.

5. CONCLUSIONS

Widening economic disparity is considered a major challenge of our times and its implications are at the core of policy debates in all OECD countries. Even though different welfare systems may tackle income inequality with a different degree of effort and by implementing different strategies, redistribution through income taxes and cash transfers is the most direct and effective policy instruments to counteract the widening of the income gap. Nonetheless, the nature of the relationship between income inequality and redistribution and its implications for welfare are ambiguous and unclear, either from a theoretical and an empirical standpoint.

Gathering data for 34 OECD member countries over the period 1980-2013, the aim of this thesis has been to collect empirical evidence on the controversial issue on which defenders of the Median-Voter hypothesis and of the Robin Hood paradox stand divided. For this purpose, an econometric analysis has been performed to test whether the effects of taxes and transfers on income inequality are stronger in countries that exhibit higher level of market income inequality or the reverse holds.

First of all, we found the redistributive effect of taxes and transfers to be negatively associated with the level of pre-fiscal income inequality, with the tax-benefit system being more effective at shrinking income inequality in low inequality countries than in more unequal ones. As it has been mentioned in the literature review, such negative relationship between pre-fiscal income inequality and the extent of redistribution, for which it is least where it is more urgent, can be explained by the fact that more unequal countries lack the economic and/or political means to support programmes of social policy, and that under certain realistic conditions greater inequality is related to less support for redistributive policies.

Secondly, transfers are found to be always an effective instrument for redistribution, while increasing income taxation actually seems to exacerbate economic disparities in countries where these are already quite severe. Moreover, we concluded that, other things being equal, the marginal effect of cash transfers on income inequality is greater than the the marginal effect of taxes, with the transfer system to be accounted for the largest share in the difference between pre-fiscal and post-fiscal income inequality.

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APPENDIX OF TABLES AND FIGURES

Table 1.1: Countries' individual profiles per period

	1980-1985			*1985-1990*		
	Mean Gini_M	*Mean Gini_D*	*Mean RE*	*Mean Gini_M*	*Mean Gini_D*	*Mean RE*
Australia	41.233	28.187	13.046	43.934	29.045	14.889
Austria	35.449	26.249	9.200	34.938	24.006	10.932
Belgium	43.449	23.832	19.617	42.742	23.149	19.593
Canada	39.454	28.595	10.859	40.911	28.092	12.819
Chile	53.341	50.252	3.089	54.259	51.246	3.013
Czech Republic				30.329	18.198	12.131
Denmark	36.376	22.082	14.294	38.865	24.678	14.187
Estonia	33.329	22.562	10.767	35.046	23.590	11.456
Finland	37.140	20.267	16.873	38.801	20.695	18.105
France	44.564	31.348	13.216	47.622	30.417	17.205
Germany				43.588	26.217	17.371
Greece	48.693	34.441	14.252	48.281	33.705	14.576
Hungary				40.003	23.868	16.136
Iceland						
Ireland	46.322	33.919	12.403	49.975	32.975	16.999
Israel	43.897	30.279	13.618	47.369	30.942	16.427
Italy	42.948	30.908	12.040	43.903	31.659	12.244
Japan				32.598	26.127	6.470
Korea	37.046	33.832	3.214	35.319	32.166	3.153
Luxembourg	41.015	25.242	15.773	38.307	24.195	14.112
Mexico	46.255	46.548	-0.293	45.762	45.389	0.373
Netherlands	47.945	24.683	23.262	47.457	24.354	23.103
New Zealand	34.962	26.618	8.344	37.958	27.415	10.544
Norway	35.108	21.941	13.167	36.856	23.049	13.807
Poland				36.895	26.424	10.471
Portugal	50.070	29.390	20.681	48.400	27.978	20.423
Slovak Republic				31.226	17.599	13.627
Slovenia				28.177	16.916	11.261
Spain	41.827	31.950	9.876	34.629	28.017	6.612
Sweden	39.754	19.723	20.031	39.807	19.683	20.124
Switzerland	39.983	31.195	8.788	36.458	26.045	10.413
Turkey	51.100	47.234	3.865	46.904	43.544	3.359
United Kingdom	42.939	27.447	15.492	49.207	30.845	18.361
United States	42.835	30.903	11.932	44.771	32.850	11.920

(Table 1.1 continued.)

	1990-1995			*1995-2000*		
	Mean Gini_M	*Mean Gini_D*	*Mean RE*	*Mean Gini_M*	*Mean Gini_D*	*Mean RE*
Australia	42.085	28.760	13.325	46.719	29.982	16.737
Austria	41.509	26.713	14.796	43.334	26.757	16.577
Belgium	45.856	23.512	22.344	47.964	26.009	21.955
Canada	43.403	28.128	15.276	45.862	29.840	16.022
Chile	53.334	50.179	3.156	54.189	51.202	2.987
Czech Republic	37.440	20.405	17.035	40.885	23.426	17.459
Denmark	43.735	24.178	19.557	43.011	22.802	20.209
Estonia	39.126	30.588	8.538	43.245	33.745	9.500
Finland	43.993	20.894	23.100	48.285	22.947	25.338
France	46.249	28.640	17.609	49.195	28.870	20.326
Germany	45.721	26.815	18.906	46.624	26.903	19.721
Greece	46.320	33.632	12.687	47.504	35.044	12.460
Hungary	49.329	29.392	19.937	51.362	29.764	21.598
Iceland	31.846	20.024	11.822	34.378	21.205	13.172
Ireland	49.385	33.382	16.003	47.848	32.823	15.025
Israel	48.085	31.162	16.923	50.388	33.199	17.189
Italy	44.942	31.840	13.103	47.826	34.043	13.783
Japan	38.542	27.261	11.281	37.157	26.451	10.706
Korea	35.462	31.707	3.755	34.523	31.555	2.968
Luxembourg	38.268	23.885	14.383	42.865	25.963	16.902
Mexico	47.869	47.404	0.465	48.760	48.100	0.660
Netherlands	46.037	25.967	20.069	45.088	24.846	20.242
New Zealand	44.643	31.617	13.026	46.347	33.336	13.011
Norway	40.234	23.550	16.683	41.059	23.628	17.430
Poland	42.220	27.084	15.136	50.400	30.297	20.103
Portugal	47.432	31.982	15.450	41.054	35.805	5.249
Slovak Republic	38.623	19.412	19.211	43.692	24.621	19.071
Slovenia	33.838	20.966	12.872	36.356	22.607	13.749
Spain	46.104	32.937	13.166	49.201	34.684	14.517
Sweden	43.802	20.932	22.870	47.436	22.088	25.348
Switzerland	39.013	29.229	9.784	35.514	26.799	8.715
Turkey	46.103	44.898	1.204	44.736	44.053	0.682
United Kingdom	51.565	33.654	17.912	53.574	34.265	19.309
United States	46.814	34.244	12.571	48.548	36.736	11.811

(Table 1.1 continued)

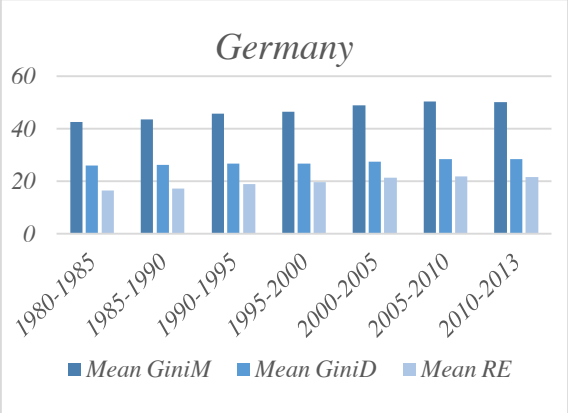
	2000-2005			*2005-2010*		
	Mean Gini_M	*Mean Gini_D*	*Mean RE*	*Mean Gini_M*	*Mean Gini_D*	*Mean RE*
Australia	48.346	31.192	17.154	48.373	31.779	16.594
Austria	44.706	26.416	18.290	43.056	27.825	15.231
Belgium	45.772	26.800	18.972	43.812	25.635	18.177
Canada	46.832	31.641	15.191	47.124	31.621	15.503
Chile	53.673	50.819	2.854	51.246	48.658	2.588
Czech Republic	43.101	24.805	18.297	44.790	25.060	19.730
Denmark	42.544	21.720	20.824	44.486	23.828	20.658
Estonia	49.739	35.416	14.323	46.691	32.418	14.272
Finland	46.615	25.231	21.384	46.936	26.185	20.751
France	47.411	27.478	19.933	48.132	28.485	19.646
Germany	48.891	27.485	21.406	50.433	28.503	21.931
Greece	46.681	33.395	13.286	48.247	32.318	15.929
Hungary	49.724	27.750	21.974	49.607	27.324	22.282
Iceland	35.622	24.115	11.507	37.302	26.494	10.807
Ireland	46.596	31.175	15.421	50.874	29.995	20.880
Israel	52.268	34.781	17.487	51.216	37.165	14.050
Italy	48.094	33.137	14.956	48.850	32.973	15.877
Japan						
Korea	33.396	30.808	2.588	33.900	31.222	2.678
Luxembourg	44.612	26.938	17.674	46.089	27.405	18.684
Mexico	48.114	47.041	1.072	47.486	45.395	2.092
Netherlands	45.130	25.718	19.412	46.238	26.818	19.420
New Zealand	48.931	33.375	15.556	46.770	32.770	14.000
Norway	42.607	24.573	18.035	44.325	24.681	19.644
Poland	48.454	29.118	19.337	49.179	31.041	18.138
Portugal	44.982	36.249	8.734	54.715	35.164	19.551
Slovak Republic	45.833	27.491	18.342	42.706	25.626	17.080
Slovenia	36.709	21.924	14.786	39.980	23.436	16.544
Spain	46.528	32.605	13.922	46.317	31.482	14.835
Sweden	44.227	23.451	20.776	47.205	24.187	23.018
Switzerland	39.429	27.442	11.987	44.572	30.582	13.990
Turkey	44.368	41.186	3.181	42.038	39.042	2.996
United Kingdom	52.332	34.175	18.156	53.348	35.459	17.889
United States	48.536	36.973	11.563	49.208	37.539	11.669

(Table 1.1 continued)

	2010-2013		
	Mean Gini_M	*Mean Gini_D*	*Mean RE*
Australia	48.818	33.168	15.651
Austria	46.863	28.750	18.113
Belgium	45.426	25.124	20.302
Canada	47.496	31.543	15.953
Chile	50.574	48.169	2.405
Czech Republic	43.535	24.173	19.362
Denmark	48.050	25.542	22.509
Estonia	49.542	32.769	16.773
Finland	47.534	26.048	21.486
France	49.517	30.621	18.896
Germany	50.270	28.550	21.721
Greece	51.830	33.408	18.423
Hungary	48.463	28.025	20.438
Iceland	37.955	23.830	14.124
Ireland	55.023	28.954	26.068
Israel	50.764	37.768	12.996
Italy	49.132	33.004	16.127
Japan			
Korea	33.790	31.087	2.703
Luxembourg	46.384	27.127	19.258
Mexico	46.840	43.884	2.956
Netherlands	45.999	25.624	20.375
New Zealand	48.092	33.356	14.736
Norway	44.701	24.348	20.353
Poland	46.993	30.587	16.406
Portugal	55.241	33.708	21.534
Slovak Republic	41.877	25.666	16.211
Slovenia	41.293	24.994	16.299
Spain	51.192	33.895	17.298
Sweden	48.028	23.779	24.249
Switzerland	41.978	29.793	12.184
Turkey	40.777	38.069	2.707
United Kingdom	53.684	35.143	18.541
United States	50.522	37.342	13.180

Gini coefficients are expressed in percentage points.
Source: based on own calculations.

Figure 1.1: Countries' individual profiles per period


Germany
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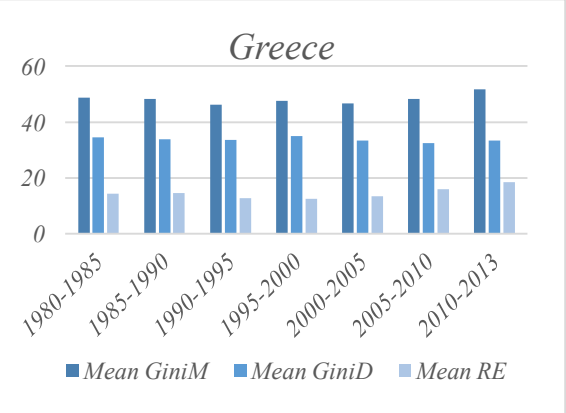
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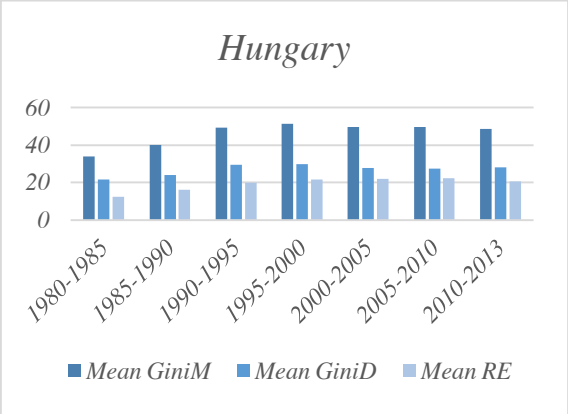
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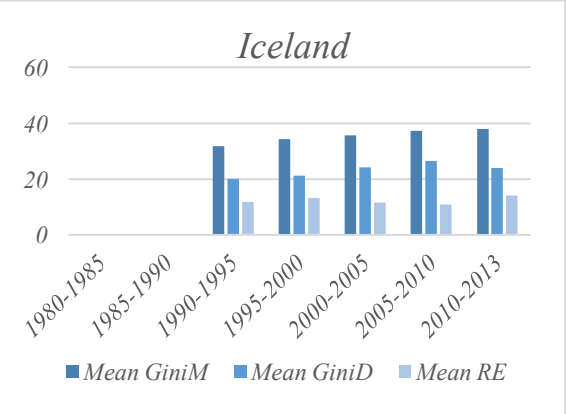
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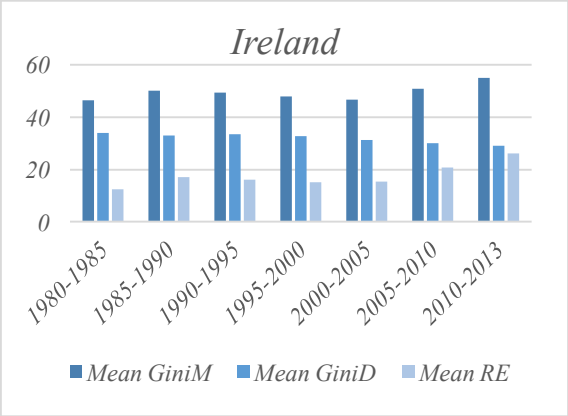
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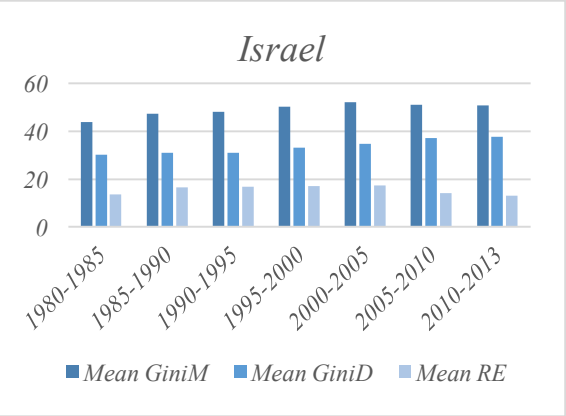
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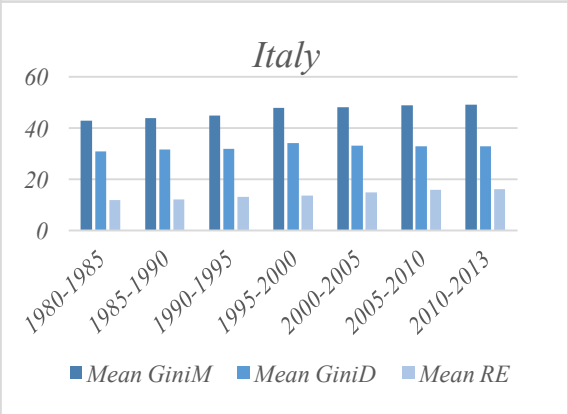
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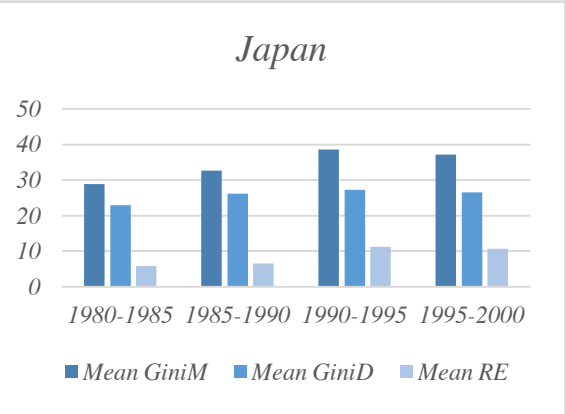
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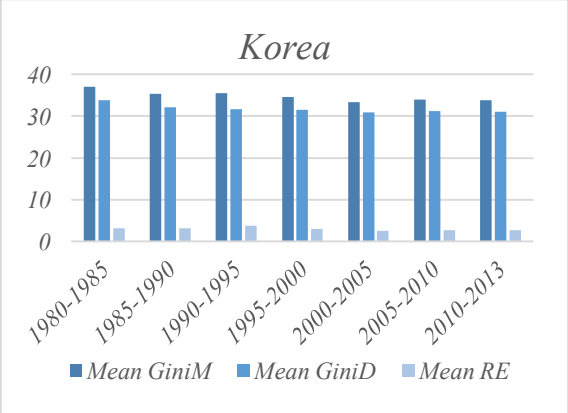
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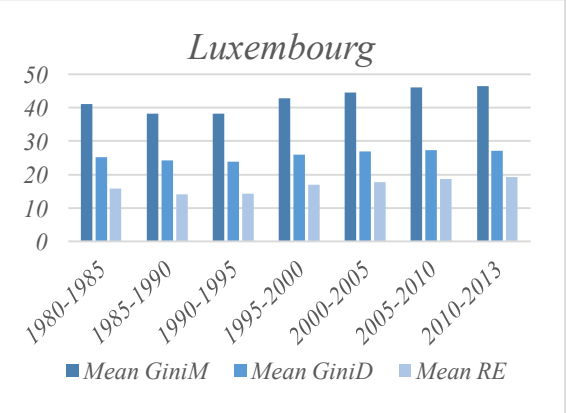
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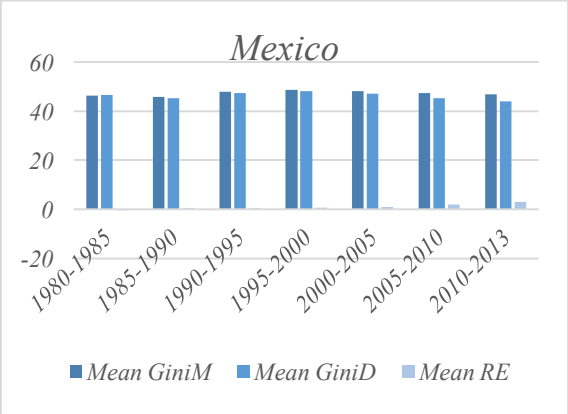
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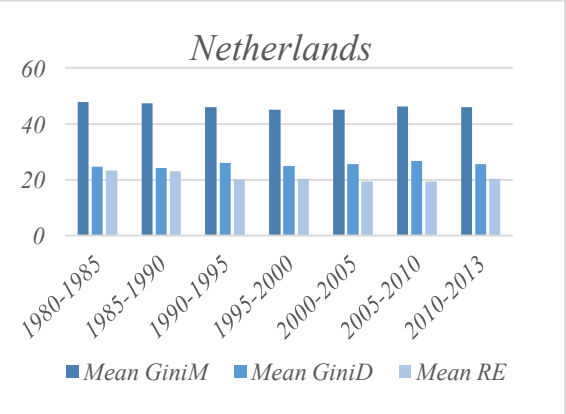
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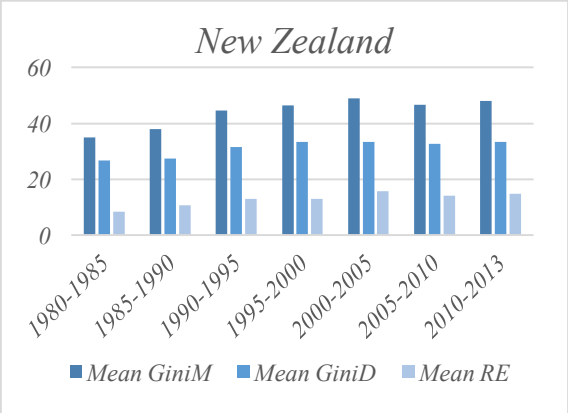
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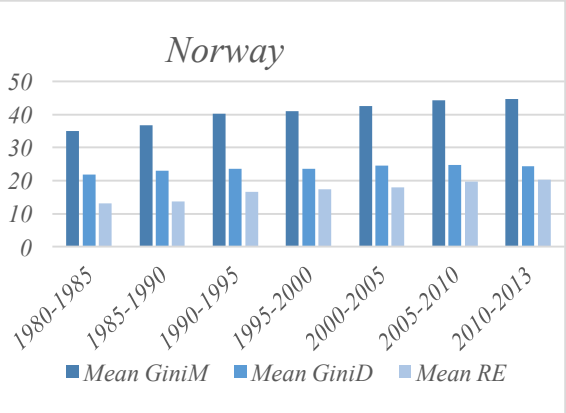
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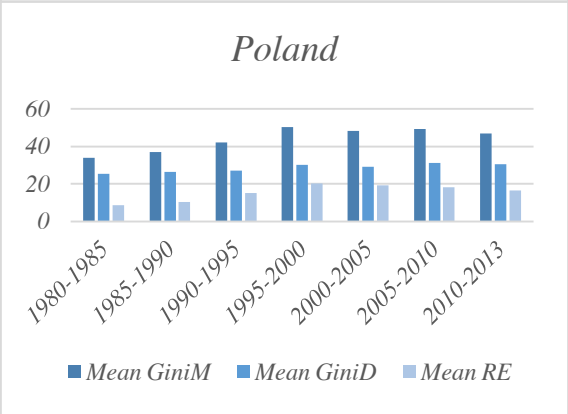
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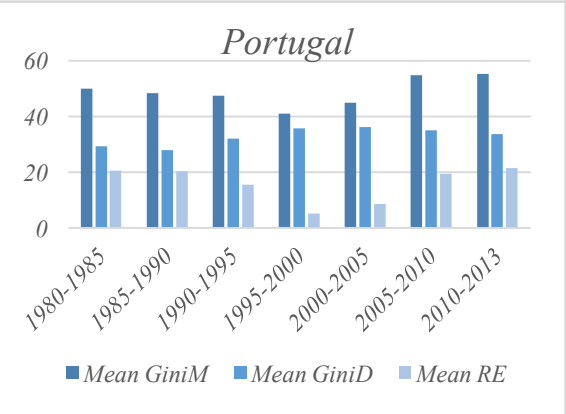
Portugal
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Mean GiniM
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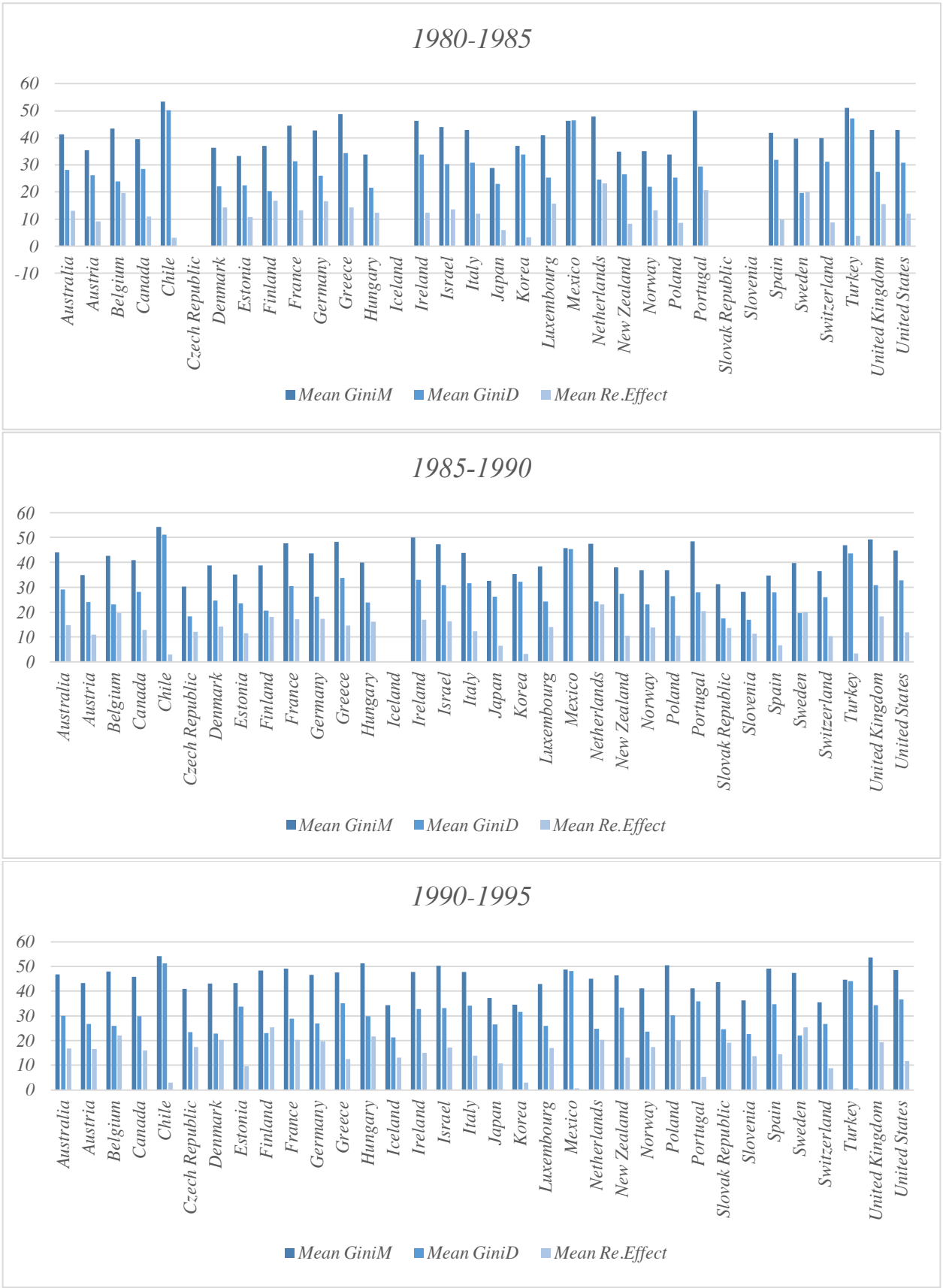
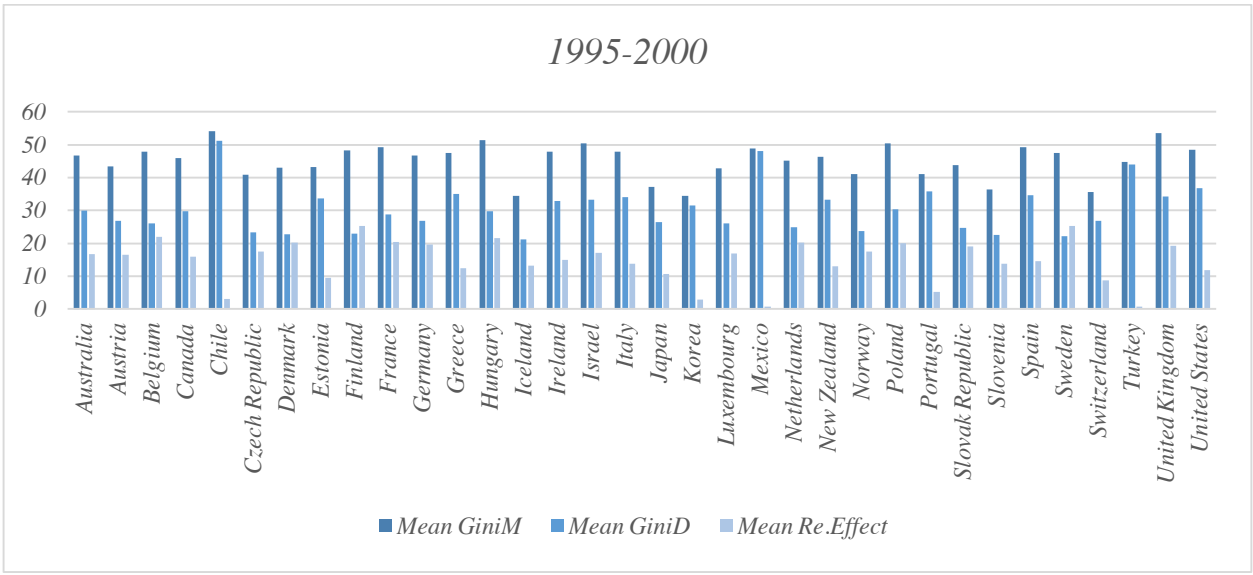
Source: based on own calculations

Figure 1.2: Trends in Income Inequality and Redistribution over the period 1980-2013

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Chile
Czech Republic
Denmark
Estonia
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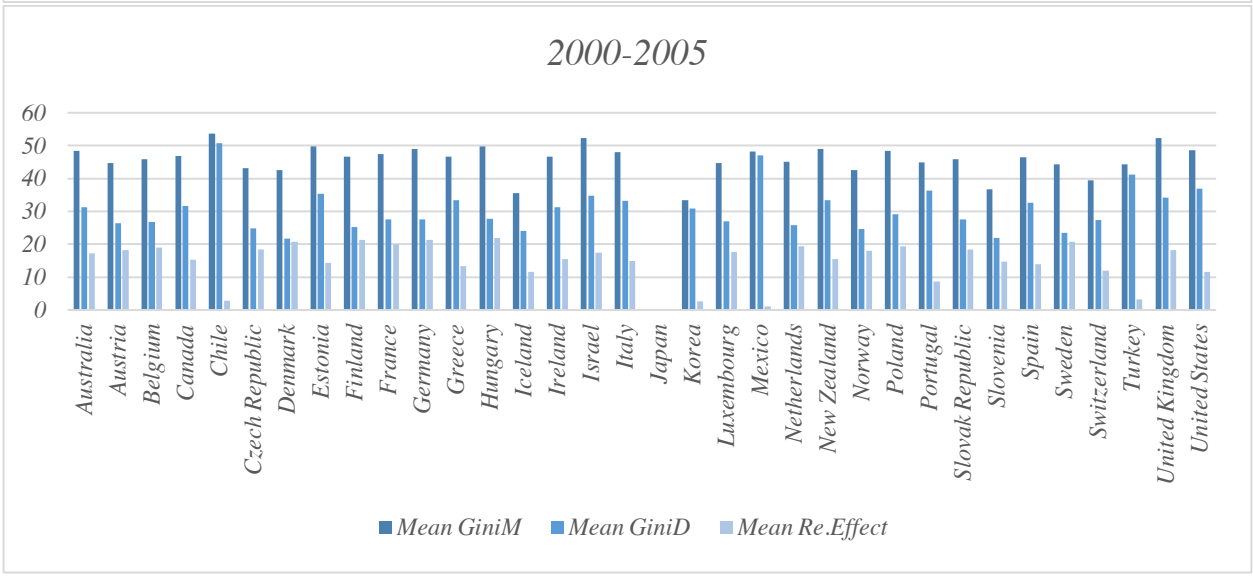
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States
Mean GiniM
Mean GiniD
Mean Re.Effect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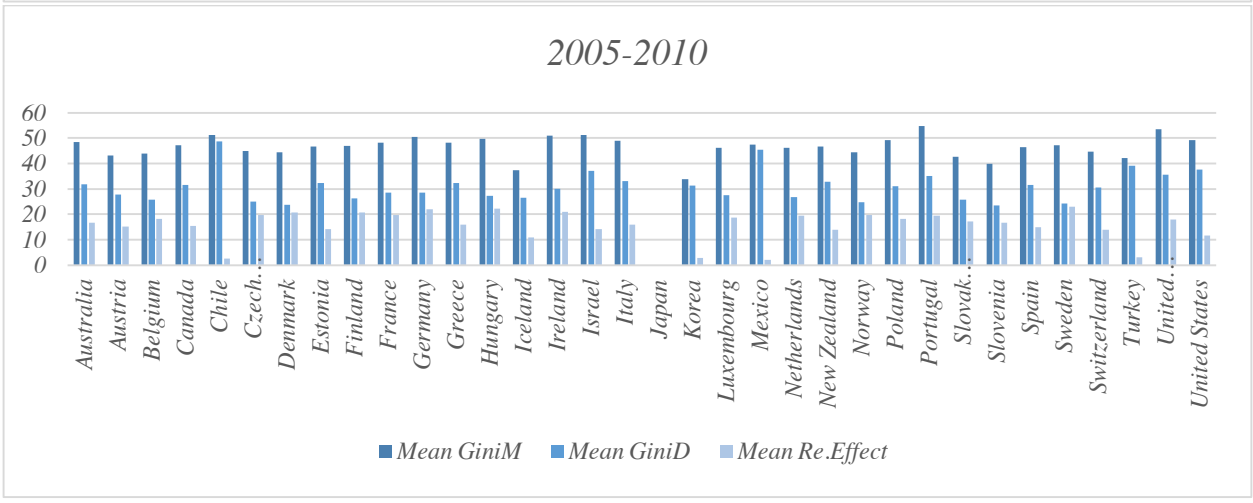
Belgium
Canada
Chile
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States
Mean GiniM
Mean GiniD
Mean Re.Effect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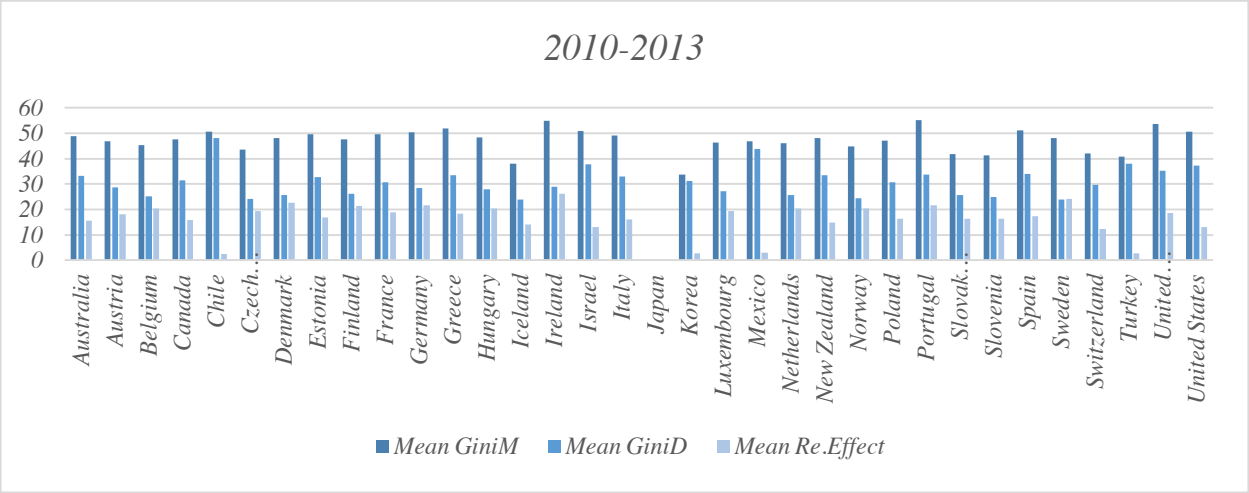
Sweden
Switzerland
Turkey
United...
United States
Mean GiniM
Mean GiniD
Mean Re.Effect



Source: based on own calculations

DATA APPENDIX

Sample Countries

34 OECD member states:

Australia	Estonia	Ireland	Netherlands	Spain
Austria	Finland	Israel	New Zealand	Sweden
Belgium	France	Italy	Norway	Switzerland
Canada	Germany	Japan	Poland	Turkey
Chile	Greece	Korea	Portugal	United Kingdom
Czech Republic	Hungary	Luxembourg	Slovak Republic	United States
Denmark	Iceland	Mexico	Slovenia	

Variables Description and Source

Variable	*Description*	*Source*
Gini_M	Estimate of Gini index of inequality in equivalized (square root scale) household market (pre-tax, pre -transfer) income, using the Luxembourg Income Study data as the standard.	"The Standardized World Income Inequality Database."(SWII) Solt, Frederick. 2014
Gini_D	Estimate of Gini index of inequality in equivalized (square root scale) household disposable (post-tax, post-transfer) income, using the Luxembourg Income Study data as the standard.	"The Standardized World Income Inequality Database."(SWII) Solt, Frederick. 2014
Tax_GDP	Social policy indicator Tax Revenue from income and profits of individuals expressed as a percentage of GDP.	OECD "Government at a Glance" Database
SocExp_GDP	Social policy indicator Public expenditure on cash benefits expressed as a percentage of GDP.	OECD Social Expenditure (SOCX) Database
GERD_GDP	Science and technology indicator Government resources devoted to research and development expressed as a percentage of GDP.	OECD Main Science and Technology Indicators (MSTI) Database
Exports	International trade indicator Exports' growth on the same period of the previous year, expressed in percentage points.	OECD Key Economic Indicators (KEI) Database

Imports	International trade indicator Imports' growth on the same period of the previous year expressed in percentage points.	OECD Key Economic Indicators (KEI) Database
EPstrictness	Synthetic indicator of the strictness of regulation on dismissals and the use of temporary contracts. (individual+ collective)	OECD Labour Force Statistics (LFS) Dataset
UnRate	Harmonised unemployment rates (all persons, all ages)	OECD Key Economic Indicators (KEI) Database
Pop65	Percentage of resident population above the age of 65.	OECD Population Statistics Dataset
Dependency	Dependency ratio Considers individuals at/below the age of 15 and at/below the age of 65.	OECD Population Statistics Dataset

Social Policy Programmes Considered in" Social Expenditure"

Old Age	Pension, Early retirement pension, Residential care/Home-help services, Other cash benefits.
Survivors	Pension, Funeral expenses, Other cash benefits.
Incapacity Related	Disability pensions, Paid sick leave for occupational injury and diseases, Paid sick leave for other sickness and daily allowances, Residential care/Home-help services, Rehabilitation services, Other cash benefits.
Family	Family allowances, Maternity and parental leave, Early childhood education and care, Home-help/Accommodation, Other cash benefits.
Active labour market programmes	PES and administration, Training, Job rotation and Job sharing, Employment incentives, Supported employment and rehabilitation, Direct job creation, Start-up incentives.
Unemployment	Unemployment compensation/Severance pay, Early retirement for labour market reasons.
Housing	Housing assistance
Other social policy areas	Income maintenance, Social assistance, Other cash benefits

Summary Statistics

Variable	*Obs.*	*Mean*	*Std. Dev.*	*Min*	*Max*
Gini_M	1081	44.44002	5.567806	26.73318	56.42655
Gini_D	1081	29.93548	6.84275	15.6766	51.51563
$Gini\_M_0$	1096	40.4917	6.309979	27.5492	52.6509
Tax_GDP	1080	33.11761	7.978367	10.654	50.882
SocExp_GDP	1032	11.61242	4.45081	0.209	21.911
GERD_GDP	893	1.67835	0.8912379	0.1476774	4.407447
Exports	1047	7.956912	13.35853	-35.19751	97.62996
Imports	1047	7.709767	14.66512	-40.99175	96.97626
EPStrictness	804	2.182542	0.8229451	0.2566667	5
UnRate	743	7.71319	4.062592	1.5	27.7
Pop65	1189	13.14508	3.671989	3.8	26
Dependency	1121	33.71484	2.884473	23.44684	49.37376

$Gini\_M_0$ *Descriptive Statistics*			
Percentiles			
1%	27.5492		
5%	29.2719		
10%	33.3293	Obs	1096
25%	36.2117	Sum of Wgt.	1096
50%	41.5577	Mean	40.4917
		Std. Dev.	6.309979
75%	44.5095		
90%	48.7956	Variance	39.81584
95%	51.9989	Skewness	0.0647637
99%	52.6509	Kurtosis	2.416045

Table 2.1: Results from Regression (3')

Dependent variable: Gini D	
Independent Variables	**(3')**
$Tax\_GDP_{it} * Low$	-0.216*** (0.073)
$SocExp\_GDP_{it} * Low$	-0.271* (0.098)
Tax_GDP_{it}	0.026 (0.062)
$SocExp\_GDP_{it}$	-0.194** (0.086)
$GERD\_GDP_{it}$	0.385 (0.297)
$Exports_{it}$	0.014 (0.011)
$Imports_{it}$	-0.0004 (0.010)
$EPstrictness_{it}$	0.728* (0.380)
$UnRate_{it}$	0.105*** 0.032)
$Pop65_{it}$	0.424*** (0.102)
$Depencency_{it}$	0.083 (0.073)
Country Fixed Effect	Yes
Time Fixed Effect	Yes
Observations	519

Note: Estimated using fixed-effects panel regressions.
Robust standard errors are reported in parentheses below the estimated coefficients.
Individual coefficients are statistically significant at the 10% (*), 5% (**) or 1%(***) significance level.