

UNIVERSITY OF ST.GALLEN

MASTER THESIS

**Fiscal consolidation and rising inequality
in Europe: An empirical assessment**



Universität St.Gallen

Author:

Karin GARCIA MORENO

Supervisor:

Prof. Dr. Reto FOELLM

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UNIVERSITY OF ST.GALLEN

Abstract

Master of Arts in Economics

Fiscal consolidation and rising inequality in Europe: An empirical assessment

This paper uses household level micro-data to empirically describe the most recent developments in income inequality in Greece and Germany after the 2007-2008 crisis and the implementation, at least in the case of Greece of sharp fiscal consolidation measures. The paper uses the last wave of LIS data and applies the Budget Incidence methodology of Lustig et al. (2013) to provide a detailed and quantitative description of how the inequality has changed. I found that levels of income in Greece were lower in 2010 than in 2007, this being a sign of the welfare-reduction dynamics in Greece. Furthermore, the total redistributive power of fiscal policy also changed but how it did depends mostly on how contributory pensions are taken into account. Interestingly, regardless of how pensions are taken into account, the ending income inequality (of post-fiscal income) is similar which suggests that the level of post-fiscal income inequality is to a great extent the result of political consensus. The paper also shows, in many different ways, the important role that contributory pensions play in the redistribution of income. However, these findings hide a dimension in which transfers, which are mainly contributory retirement pensions, are very regressive.

JEL: D63, D31, O15

Keywords: income inequality, budget incidence methodology, austerity measures

Author's e-mail: karin.garcia-moreno@student.unisg.ch

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Abbreviations

ECB	E uropean C entral B ank
EU	E uropean U nion
GDP	G ross D omestic P roduct
IMF	I nternational M onetary F und
LIS	L uxembourg I ncome S tudy
OECD	O rganization for E conomic C ooperation and D evelopment
SILC	S ocial I ncome and L iving C onditions S urvey

*For my mother, because without her unconditional support, I would
have not started and finished this project. For my father who
remains the stable tree in the forest. For my brother, guarding angel.
And for the love of my life, Max, who endures living with me . . .*

1. Introduction

Countries in Europe have been quite successful in reducing income inequality during the XXth century. This paper explores whether this trend has reversed after the financial crisis of 2007-2008, known as the Great Recession, and studies the role that “austerity measures” -implemented in response to rising national budget deficits-, played during this period.

The paper benefits from the return of income inequality to the academic and political major arena. After being a subject of interest mainly for development economics in the late 80s, income inequality and income distribution returned to the spotlight partly thanks to civil society movements as *Occupy Wall Street* or *Indignados* and partly thanks to academics concerned about the apparent increasing concentration of income.

Existing economic literature has in fact found that income inequality has risen and is higher today than it was 30 years ago and that the gap between rich and poor has grown, with the rich improving their income relative to low- and middle-income groups (Atkinson and Morelli (2013), Bourguignon and Ferreira (2005), IMF (2007), OECD (2008)). There have been, however, other periods in history where countries achieved a sustained decline in income inequality, which suggests that a rise in income inequality is not inevitable.

Recent inequality increases happened while the global economy as a whole went through the deepest recession in recent years. With the U.S. as the epicenter, the crisis quickly reached Europe where the economy shrank by over 5 percent between the first quarter of 2008 and the second of 2009 when the recession reached its bottom (Jenkins, 2012). Policy makers reacted with a set of policies labeled “austerity measures” because they frequently involved cutting back social benefits. Automatic stabilizers accompanied the cuts to counteract their effect, this being the reason why overall we observe that the Great Recession led to an unprecedented increase in public debt (Woo et al., 2013).

Thus the response to the crisis was a complex multidimensional effort, which raises the question of its distributional consequences. Moreover, in addition to political arguments¹ there are instrumental (economic) reasons to be concerned with inequality. It is the latter who interest us more. High inequality levels are relevant because of they have negative consequences on growth, efficiency and welfare.

¹Political arguments are concerned with high inequality levels because they jeopardize the legitimacy of modern states impeding citizens the full enjoyment of rights. Furthermore, excess inequality may undermine the political stability thus threatening a society’s ability to reach the consensus needed to undertake welfare-enhancing political reforms.

Inequality may be pervasive for growth and may slow down economic recovery, posing a risk for economic stability and sustained growth. However, the total effect of inequality on growth (and of growth on inequality) remain unclear since there are equalizing and unequalizing effects during the economic cycle (See Hoeller and Pisu (2014) for a comprehensive review). Kuznets' (1955) pioneering findings suggest already back then, that in the process of economic development, a country goes through an inverted U-curve of economic growth and economic inequality.

The first part of this inverted U-curve is often used to illustrate the disjunction between equality and efficiency. Already Okun in 1975 argued that efforts to achieve a more equal distribution of income reduce the incentives to work and invest, and furthermore, that during the distribution process something vanishes and is wasted. This claim has not found unanimous empirical support. Olstry and Berg (2011), for instance, have found that there may be no trade-off in the long term; on the contrary, the difference between countries that can sustain high levels of growth and those that can't could be lower levels of inequality. If they are right, inequality could hamper growth in the long term.

But growth is not the only element to consider when assessing whether inequality matters. We also want to know if inequality affects welfare. Based on an application of the law of diminishing marginal return to individual utility functions, and from the perspective of a social planner, redistribution is justified because individuals with less income will enjoy higher marginal utility from an increase in income. This implies that economies with high levels of inequality would attain lower welfare levels than economies with lower levels of inequality.

Keep in mind, that these considerations apply for certain high levels of inequality. Moderate levels thereof, stemming from, for instance, earning more than others, is often a powerful motivator. Moreover, differences in productivity, efficiency or talent should be rewarded accordingly and will thus inevitably lead to an unequal distribution of income.

These theoretical arguments complement the findings of existing empirical work (reviewed in detail in section 2) that deals with the distributional effects of fiscal responses to financial or economic crises. Whilst this literature acknowledges the impact that past fiscal consolidation episodes have had on the income distribution, there is only limited evidence for the impact of the latest fiscal consolidation ("austerity measures") on inequality in the aftermath of the Great Recession. One of the notable examples is the paper of Jenkins et al. (2012) where the authors find that in the first two years following the crisis, the real income level declined in many advanced countries although there was not much immediate change in the disposable income distribution. According to them this is mainly the result of government support via tax and benefits.

In this paper, I want to tackle this vacuum by a) conducting a thorough description of the latest developments of income inequality in Germany and Greece using the sensitivity analysis methodology pioneered by Lustig et al. (2013), and b) by applying quintile regression techniques to explore whether the latest fiscal consolidation policies have impacted different quintiles differently. To my knowledge, these questions have not been treated in the European economic literature.

Originally, I intended to conduct this research using data from Eurostat Income and Living Conditions (EU-SILC) survey, which has data up to 2012. However, the process of accessing the data took longer than what I could afford so I embraced the second preferred option, which was using the latest wave of the Luxembourg Income Studies (LIS) database - with data up until end of 2010. A similar analysis using EU-SILC data is left for future research. Nevertheless, my findings not only contribute to the understanding of what happened to the income distribution in Greece and Germany between 2007 and 2010 but also shed light on implications of the policy responses to the crisis.

The rest of the paper is organized as follows: section 2 presents a brief literature review, section 3 describes the criteria used to select the countries to analyze, section 4 presents the empirical strategy, section 5 present a thorough description of the data used and the decisions made in the data preparation phase, section 6 presents the main findings and finally section 7 concludes.

2. Literature review

2.1 Recent developments

Atkinson and Morelli (2013) summarize the long-run development of income inequality in a selection of OECD countries using the share of the top 1% in total gross income during the 1911-2010 period. They find that in the post-war period and especially during the mid 1960s and mid 1970s inequality declined significantly, with the Nordic countries and Germany as remarkable success examples. The trend reversed sharply in the mid 1970s. Ferreira et al. (2008) support Atkinson's findings with data that include 130 low- and middle-income countries. They too find that inequality has risen in the 2000s compared to the levels of the 1990s. Increasing globalization and a demand shift from unskilled to skilled labor are the most prevalent reasons in the literature explaining this development (Alderson and Doran, 2013; Atkinson, 2003; Ostry et al. 2014).

Regarding the impact of fiscal consolidations on income inequality, current evidence supports the idea that fiscal consolidations tend to increase income inequality. This is the main finding of Woo et al. (2013) using a panel of advanced and emerging economies in the latest three decades. Additionally, they find that the composition of fiscal consolidation matters as spending-based consolidations tend to significantly worsen inequality, relative to tax-based consolidations. Mulas Granados (2005) corroborates these two findings using a panel of 15 EU countries during 1960-2000. He too finds that spending cuts are worse than tax-based consolidations. Agnello and Sousa (2012) also find that income inequality rises during periods of consolidation, at least for a sample of 18 OECD countries in the period of 1978 to 2009. They also find that inequality worsen when consolidation takes place in financially turbulent times or when the country goes through a period of slow growth. Ball et al. (2013) study the short- and long-term effects that fiscal adjustments have on unemployment in advanced economies and uncover that it too tends to rise after periods of fiscal adjustment.

In summary, the state of the knowledge points to the conclusion that over the last 50 years inequality has been steadily increasing and that it is detrimental to growth in the long run. Most studies present cross-country evidence for the second half of the 20th century up until the first years of the 2000s but few focus on assessing whether this is also the case for the latest developments after the Great Recession. This paper broadens the existing literature by using LIS data to examine thoroughly the latest development of inequality in Germany and Greece and to empirically assess the impact of the austerity measures on different income groups.

2.2 Theoretical considerations

Economic theory has given several accounts of how inequality arises. Most of them involve an explanation of how distribution of resources in an economy takes place and see inequality as the result of more or less (re-)distribution. Different theories concentrate on different elements and reveal various determinants of distribution¹. Each of these explanations deals with a different part of the inequality puzzle which indicates i) that inequality is a complex function of macro and microeconomic variables and the institutional setting, and ii) that there is no unified theory of inequality and redistribution (Atkinson and Bourguignon, 2000). In my opinion the lack of a unified theory is not dramatic, as each of these approaches remains an important analytical tool.

The first account is the Walrasian framework in which income accrues to individuals as a remuneration of the assets they own and income distribution is explained mainly as the result of factor rewards. This approach remains the underlying theory of most distribution accounts that take a macroeconomic perspective in spite of at least three drawbacks. First, the fact that it does well in explaining inequality between groups differentiated by their income source (e.g.: landlords, capitalists and workers) but does poorly in explaining the inequality within those groups (e.g.: dispersion in labor earnings). Second, the fact it excludes investments people make on themselves that may increase productivity (human capital). And third, the fact that it omits that in the current economy people's income accrues to a great extent from sources that are not assets owned, most notably public and private transfers.

A seminal variation of this account, the “race” between technological development and education argument is often used to explain the increasing wage dispersion in several countries because it provides an explanation for why inequality has risen even when the relative supply of skilled workers has increased. In terms of this model, skill-biased technological change has been faster than education and this explains the earnings dispersion. This account however, leaves a lot of the observed inequality unexplained because it does not explain how people get and keep their endowments. An answer to these issues can be found in the family of dynamic general equilibrium models. The interested reader is referred to Atkinson and Bourguignon (2000, pp. 14 - 22) for a comprehensive description of models in this family that provide an explanation of how individuals accumulate factors.

¹For example, the ownership of land and capital is crucial when comparing inequality levels across countries, inheritance patterns are central to understanding why inequality persists or diminishes across generations, factor shares and their change in time affect the distribution of income within a country, and understanding the labor market is essential for understanding the distribution of labor earnings, often the main source of individual and household income

2.3 Methodological approaches

The vast recent literature on the topic can be broadly grouped in two alternative approaches. The first one is a comparative cross-country approach where several countries are compared in order to look for empirical regularities that explain differences and commonalities across countries. The second approach is a microeconomic approach that uses individual or household data to identify the determinants of inequality and its dynamics over time. The Lustig and Higgin's methodology, is part of the latter. The microeconomic approach has three methodological implementations.

On the one hand, the Shorrocks (1982) decompositions by factor components disaggregate the income of individual or households into different factor components, such as earnings, investment income, and transfer payments, and evaluates the contributions of these sources to the total income inequality. Shorrocks examines under which conditions it is possible to decompose overall inequality in an additive way into inequality within subgroups and inequality between groups (See Shorrocks (1982), Shorrocks (1984)) and also sheds light on how to identify the contribution to inequality of any given component of income.

On the other hand, the Oaxaca-Blinder decomposition deals with decomposing the differences in mean wages between two components: one associated with differences in returns to individual characteristics (the "price effect") and the other associated with differences in the characteristics themselves (the "endowment effect"). See Bourguignon et al. (2008) for an explanation.

These two approaches focus on the distribution of wages, which are only a fraction (albeit large) of income. Bourguignon et al. (2005) extend this by treating households as the unit of analysis (as opposed to individuals) to evaluate the simultaneous effects on inequality of combinations of labor market, demographic and educational dynamics (See Leite et al. (2006) for an empirical application). This allows including other elements such as the individual decision to enter the labor market, the presence of other income sources in the household and the effect of fertility and occupation decisions. Overall Bourguignon et al. (2005) seek to shed light on the determinants of increases in inequality by means of differences in i) individual characteristics, ii) returns on these characteristics, iii) non-observable characteristics of the households. The strengths of this approach lie in that it considers the complete distributions, rather than only dealing with the averages, and in that it explicitly considers that changes in poverty and inequality are likely driven by several factors whose impacts are simultaneous and interdependent. Lustig's methodology which we follow in this paper, relies heavily on this approach. I explain it in detail in section 3.

3. Selecting the countries to analyze

3.1 Criteria used in the selection of countries

Europe is a wide and heterogeneous continent and therefore applying Lustigs's methodology to all the 28 countries in the European Union or to the 50 countries that make geographical Europe is beyond the scope of this paper. This paper studies in depth two countries out of the EU-25¹ plus Iceland sample with the idea of portraying on the one hand side, countries that implemented large fiscal consolidation measures, and on the other hand, countries that did not.

From this 26 countries sample I excluded some countries either because they have different growth patterns, are in another stage of development or because they are very special in terms of GDP composition.

First, I exclude the countries of the former Eastern Block² because their economy structure makes them more similar to emerging markets than to Western European countries. With the exception of Slovakia and Slovenia, none of them uses the Euro and they all have different growth paths than the Western European countries³.

Second, I exclude Cyprus, Malta and Luxembourg. The former two, because they are small, Mediterranean service-based economies, highly dependent on the flows of tourists, money and foreign trade from and to mainland Europe. The latter because it is a small country whose economy is highly dependent on the banking and financial services industry.

Finally, I exclude Norway because its prosperity is based on an abundance of natural resources that has allowed them to finance a very generous welfare system that was not touched during the 2007-2011 crisis.

To chose among the 16 remaining countries in the sample I use the following criteria:

¹The EU-25 countries are those in the European Union up until December 2006, i.e. it includes: Austria, Belgium, Cyprus, Czech Republic, Estonia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and United Kingdom; and excludes Bulgaria, Rumania and Croatia.

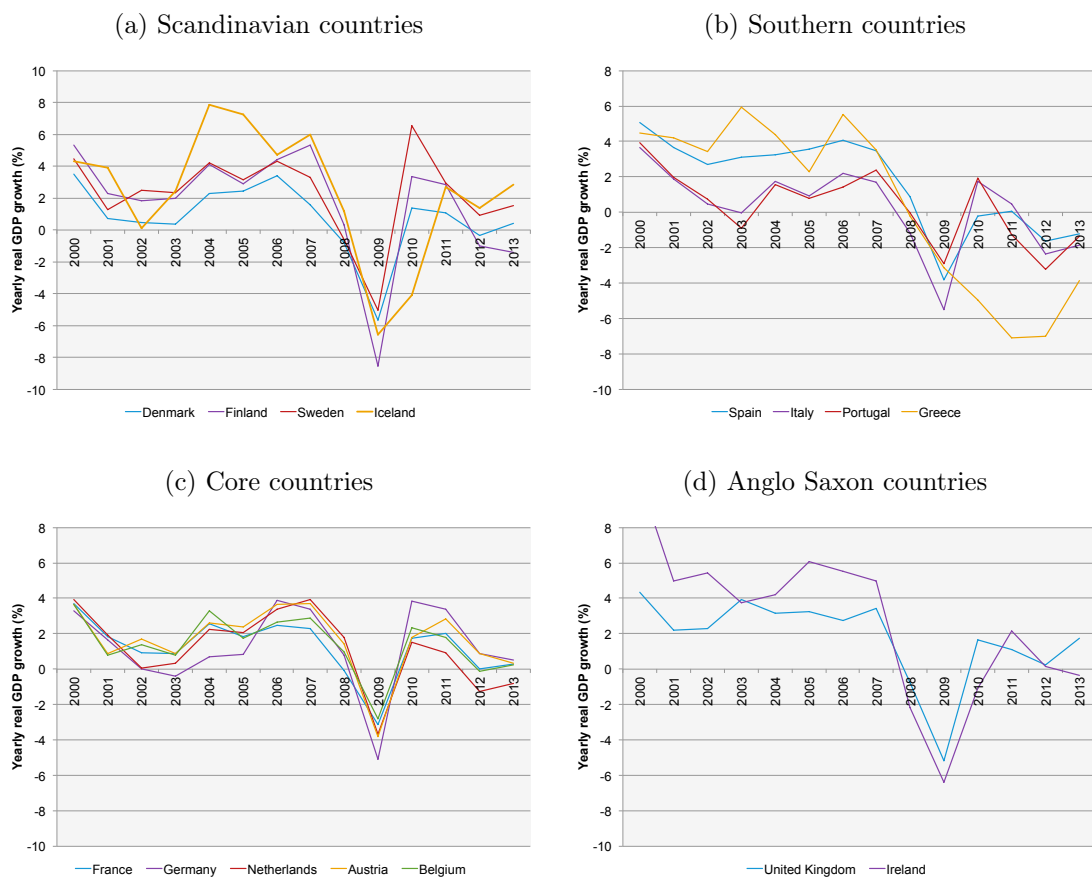
²This includes Estonia, Latvia, Lithuania and also Hungary, Poland, Czech Republic, Slovakia and Slovenia.

³The Baltic countries for example, experienced a rapid catch up in the early 2000s (average growth rate of real GDP of 7.92%, 8.5%, and 7.525% between 2000 and 2007 for Estonia, Latvia and Lithuania, respectively), but were then badly hit by the crisis in 2008 and 2009 when their economies shrank in real terms -4% and -14% in Estonia, -2.8% and -17.7% in Latvia and 2.9% and -14.8% in Lithuania.

1. Contraction in the economy measured by the yoy GDP change (See Figure 3.1 in the Appendix)
2. Changes in inequality measured by the Gini coefficient of market and disposable income
3. Size of austerity measured by the fiscal tightening (structural general government balance)
4. Changes in unemployment

The four panels in Figure 3.1 show the yearly real GDP change of the remaining 16 economies in our sample since 2000.

Figure 3.1: Yearly changes in real GDP



Source: IMF World Economic Outlook. Accessed September 2014

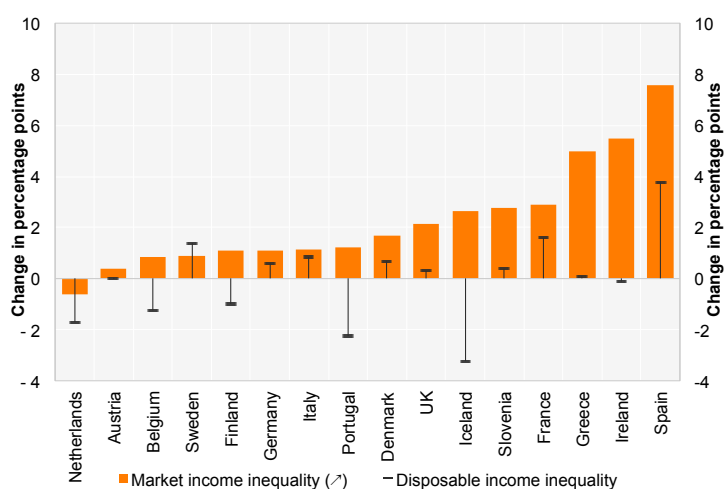
All countries went through the same cycle but the extent and depth of the recession each one experienced varied widely. Scandinavian countries had a deep recession but they recovered pretty fast reaching sound positive growth rates in 2010 already. Except from Finland, they do not show signs of going through a double dip. In contrast, Southern countries also experienced a deep recession that seemed to be over in 2010 for all except

Greece. This positive development was soon overridden with another dip in 2011 and 2012. Up until today, these countries continue with negative growth rates with the depth and length of the recession in Greece and Spain drawing special attention. In the core countries, the recession was milder and the recovery faster whereas the Anglo-Saxon countries had higher growth rates in the early 2000s and in that sense their fall in 2007 was sharper.

From this criterion, I decided to take the sample of the core countries, which represents countries with a milder economic contraction, and compare against countries in the Anglo-Saxon or Southern groups that went through a harsher contraction.

The second criteria emphasizes that we need to complement changes in GDP growth, with an analysis of the countries where inequality changed the most in the period analyzed. Figure 3.2 summarizes how inequality of market and disposable income (a detailed definition will be given in section 4) has changed in the sample of 16 European countries.

Figure 3.2: Percentage point changes in the Gini coefficient of household market and disposable incomes: 2007 - 2011



Source: OECD stats. Accessed September 2014

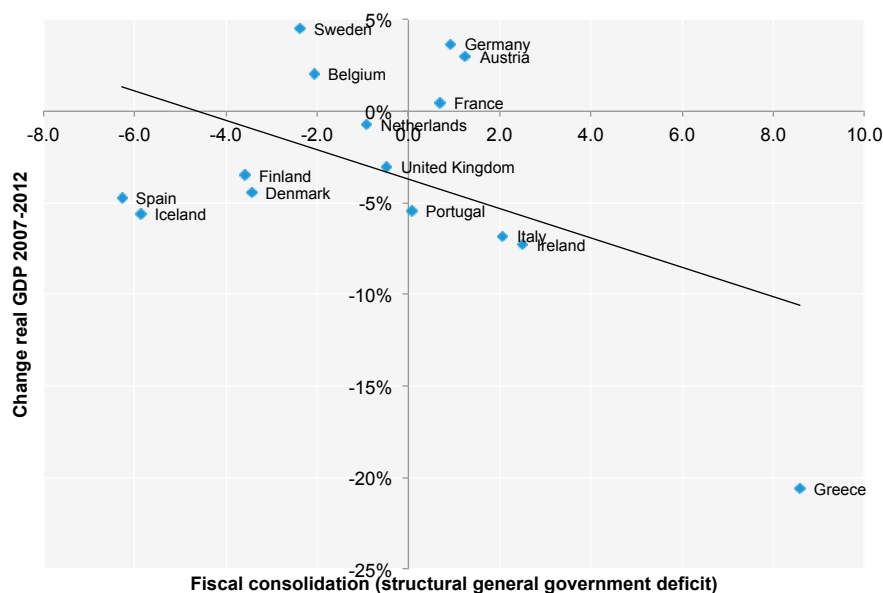
Overall we see that, market income inequality increased between 2007 and 2011 in all the countries except the Netherlands. Disposable income inequality also rose in the majority of the countries but it did to a much lesser extent. In fact, in 5 countries (Ireland, Iceland, Portugal, Finland and Belgium) disposable income inequality improved whereas market income inequality worsened. With the exception of Sweden, disposable income inequality rose less than market income inequality in all countries, indicating that the redistributive effect of taxes and transfer was hurt.

Based on the second criterion I selected Greece, Ireland, Iceland, Portugal or Spain as candidates because they are the countries where inequality worsened the most.

The third criterion suggests completing the picture by assessing the extent of the fiscal consolidation or of fiscal tightening. Social expenditure is cyclical in nature, and therefore, the analysis needs to leave aside variations of social expenditure that are induced by business cycle fluctuations and needs to include austerity measures that were deliberately implemented to reduce fiscal deficits. Austerity measures are therefore policies that governments design and implement, in particular during times of slow economic growth, with the intention to reduce their budget deficits.

The key word here is intention, and therefore, I define fiscal tightening as the change in the structural, or cyclically adjusted, general government deficit from 2007, the year of the crisis, to 2012⁴. The assumption is that this change represents the results of policy, rather than cyclical effects.

Figure 3.3: Primary balance as a percentage of GDP: 2007 - 2011



Source: IMF World Economic Outlook (Accessed 09 September 2014)

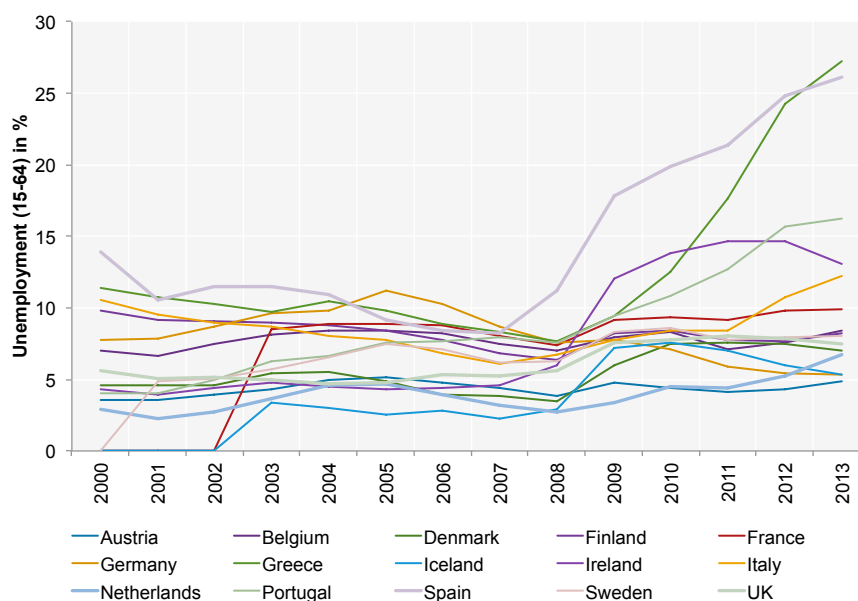
Figure 3.3 shows the size of fiscal tightening in the 16 countries of the sample relative to the change in GDP for the period of 2007-2012. Overall, we see a negative relation between fiscal consolidation and GDP growth. Countries that implemented the biggest fiscal consolidation packages are also the countries whose GDP shrank the most. The graph also shows that fiscal consolidation has been biggest in Greece, Ireland and Italy and Portugal; and, that Spain and Iceland structural balance has not improved to the

⁴ Apart from this approach of taking the structural, or cyclically adjusted, primary balance (Alesina y Ardagna, 2009), there is another, more historical approach in the literature to identify fiscal consolidation episodes by Devries et al. (2011). The latter fiscal consolidation episodes by examining policymakers' intentions and actions as described in contemporaneous policy documents, to identify measures motivated primarily by deficit reduction.

same extent as the aforementioned countries. For the countries that underwent through positive growth between 2007-2012 we have both countries that implemented fiscal consolidation (Germany and Austria) and countries that did not (Sweden and Belgium). Based on the third criterion, I took Greece, Ireland, Italy or Portugal as candidates.

Finally, the fourth criterion invites to consider the level of unemployment in these countries because earnings are the most important source of household income. Understanding what happens to them and how people enter and exit the job market is therefore relevant to the question at hand.

Figure 3.4: Unemployment: 2000 - 2012



Source: OECD Stats

Figure 3.4 shows unemployment levels since 2006 in the 16 countries in the sample. Spain, Greece, Ireland and Portugal are the countries where unemployment levels rose the most. Although we saw that Iceland went through a sharp recession, the unemployment levels did not rise as sharp and on the contrary remained around 7% during the crisis period.

With these elements in mind I choose Greece to represent the side of the recession and Germany to represent the countries in the control group.

3.2 Overview of austerity measures in selected countries

3.2.1 Greece

Greece was one of the countries particularly hit by the 2007 crisis, although this fact became apparent only in 2009. The rapid Greek economic expansion that had started in 2000 slowed down in 2008 when real GDP plummeted to -0.21% in 2008 down from 3.53% in 2007, a remarkable fall that put the country in the negative growth area. Unemployment even declined to 7.4% in 2007 from 8% in 2006. Amidst this not all negative economic environment, business sentiment indicators tilted downwards already hinting towards what would come next.

Market fears materialized in 2009 when the contraction severed: the economy shrank by 1.9% in real terms, investment growth deteriorated constantly on average 10% quarterly compared to 2008, the external sector shrank -16% and unemployment rose to 9.3%. Confidence of the markets vanished, however, in the fourth quarter of 2009 when previous statistics (notified in April 2009) on budget deficit and debt-to-GDP ratio turned to be wrong and had to be revised upwards: the deficit figure rose to 7.75% of GDP (from 5% notified in April) and the debt ratio rose to 99% of GDP at the end of 2008 (in contrast to 97.6% reported in April). These numbers questioned not only the overall quality of data reported by Greece but also its ability to meet its debt obligations. As a result of the lack of confidence, financing costs increased and the capital markets were practically no longer available for Greece as a funding source. The Greek government had to ask for a bailout or face default.

A joint commission from the IMF, the European Central Bank (ECB) and the Financial Directorate of the European Commission was called to negotiate a loan. In return for accessing a pool of EUR 110bn loans in the next three years, Greece committed to a package of EUR 30bn of fiscal consolidation implemented over 2010-2014, to privatization of government assets worth 50bn (by the end of 2015) and to the implementation of structural reforms to enhance competitiveness and growth prospects. The austerity measures included in the fiscal consolidation package amounted to 11% of the GDP whereof 3.9% were revenue increasing measures, 7.1% were expenditure cuts and further 1.8% of GDP were structural reforms of the taxation and of the pension system. Other measures in extent of 5% had been previously agreed with the European Commission, involving fiscal consolidation of 16% of GDP. As table 3.1 shows, the austerity measures were frontloaded with the biggest adjustment to be made in the first year (2010) to be followed by further, but smaller, adjustments.

	2010	2011	2012	2013	Cum	% GDP
I. Revenue measures						
VAT rates increase by 10%)	800	1000	0	0	1800	0.8
Broadening VAT base	0	1000	500	0	1500	0.7
Excise tax on fuel	200	250	0	0	450	0.2
Excise tax on cigarettes	200	300	0	0	500	0.2
Excise tax on alcoholic beverages	50	50	0	0	100	0
Excise goods on non-alc. bev.	0	0	300	0	300	0.1
Excise tax on luxury goods	0	100	0	0	100	0
Green taxes	0	300	0	0	300	0.1
Gaming royalties	0	200	400	0	600	0.3
Gaming licenses	0	500	225	-725	0	0
Special levy on highly profitable firms	0	600	0	0	600	0.3
Presumptive taxation of professionals	0	400	100	0	500	0.2
Taxation of wage in kind (cars)	0	150	0	0	150	0.1
Book specification of incomes	0	50	0	0	50	0
Increase legal value real estate	0	400	200	100	700	0.3
Amnesty land use violations	0	500	0	0	500	0.2
Taxation unauthorized establish.	0	800	0	0	800	0.3
II. Expenditures measures						
Boni cuts	1100	400	0	0	1500	0.7
Workforce reduction	0	0	600	500	1100	0.5
Savings from introduction of unified public sector wages	0	100	0	0	100	0
Eliminate pension bonuses	1500	500	0	0	2000	0.9
Additional pension reductions	350	150	0	0	500	0.2
Nominal pension freeze	0	100	250	200	550	0.2
Means test unemployment benefit	0	0	500	0	500	0.2
Cancel second installment of solidarity allowance	400	0	0	0	400	0.2
Cut intermediate consumption	700	300	0	0	1000	0.4
Kalikrates	0	500	500	500	1500	0.7
Cut in transfers to public enterprises	0	0	1500	0	1500	0.7
Cut investment spending	500	500	500	0	1500	0.7
Yet to be quantified yield from structural reform initiatives	0	0	0	4200	4200	1.8
Total annual measures	5800	9150	5575	4775	25300	11
Revenue measures	1250	6600	1725	-625	8950	3.9
Expenditures measures	4550	2550	3850	5400	16350	7.1
Total measures (in % GDP)	2.5	4.1	2.5	2		11
Revenue measures	0.5	3	0.8	-0.3		3.9
Expenditure measures	2	1.1	1.7	2.3		7.1
Memorandum item						
Nominal GDP	231	224	228	235		229

Source: Greece authorities and IMF staff estimates. IMF (2010) Greece Request for SBA

Table 3.1: Greece Fiscal Measures Included in the Program (EUR Bn)

3.2.2 Germany

Table 3.2 displays the German budget at the federal level between 2006 and 2011 and shows that Germany did the contrary of austerity in the time period studied. In November of 2008, in the midst of the crisis, the Federal General Government approved the “Konjunkturpaket I”, a program with a budget of 50 billion euros to be spent in the next two years with the objective of better overcoming the financial crisis. The program, effective on January 1st of 2009, included spending measures such as wages for partially-employed workers and building of infrastructure.

The table shows clearly the expenditure increase between 2008 and 2011 (approx. 30 billion difference) under the public sector expenditure category⁵ and the increase in revenue between 2010 and 2011. The latter is consequence of the economic cycle as strong economic growth reduces unemployment, which on the one hand side, reduces expenses on unemployment assistance benefits, and on the other, increases revenue because all the new workers also pay taxes. As can be seen, strong economic growth, buoyant tax revenues and lower unemployment have helped Germany, to reduce its deficit despite the ongoing euro zone crisis.

Expenditures	2006	2007	2008	2009	2010	2011
	(EUR mio)	(EUR mio)	(EUR mio)	(EUR mio)	(EUR mio)	(EUR mio)
Personnel	26'110	26'038	27'012	27'939	28'196	27'856
Operating expenses	18'225	18'776	19'692	21'372	21'408	21'840
Interest payments	37'469	38'721	40'171	38'099	32'617	31'846
Public sector expenditures	127'383	133'328	133'561	144'330	164'320	161'536
Private sector expenditures	49'234	47'576	55'499	56'878	58'408	54'709
Other	1'332	1'967	1'855	1'094	1'764	1'094
Total	259'753	266'406	277'790	289'712	306'713	298'881

Revenue	2006	2007	2008	2009	2010	2011
	(EUR mio)	(EUR mio)	(EUR mio)	(EUR mio)	(EUR mio)	(EUR mio)
Taxes	225'645	251'686	260'756	252'643	254'937	276'681
Income from economic activity	3'768	5'013	5'354	7'218	5'006	4'971
Fees and other operating income	5'553	5'960	6'310	7'404	8'065	8'259
Financial income and other revenues	9'810	8'154	11'217	10'276	10'728	10'848
Total	244'776	270'813	283'637	277'541	278'736	300'759

Source: Genesis Database of the Federal Office for Statistic

Table 3.2: Federal Government Expenditure Germany

The German case is interesting because it portrays the case of a country that did not need austerity measures to reduce its budget deficit, and as such can be used like a control group with respect to Greece. Furthermore, because of its economic development it is on a different growth path than Greece. Therefore, if we were to encounter the same results on both countries, we could be sure that it is not due to the economic cycle.

⁵The table also shows the revenue-increasing effect of the change in the regular VAT rate in 2006 (to 19%), a change that is not in the period studied in this paper and an increase in revenue from 2010 to 2011

4. Methodology

4.1 Budget Incidence Methodology

The incidence approach employed by Lustig, belongs to the benefit incidence analysis tradition started by Meerman (1979) and Selowsky (1979) and commonly used in both the academic literature as well in policy analysis to evaluate the distribution of public spending, social programs and even health initiatives (for example, vaccination programs). It sheds light on how governments allocate public spending, who benefits of social programs and who bears the burden of taxation by classifying the beneficiaries of transfers and the contributors of taxes in the overall distribution of income.

The benefit incidence analysis is one response, besides the behavioral approach ¹, to the challenge of measuring the benefits derived from public spending, especially when the goods and services are either directly provided by the state or its provision is subsidized by it. In such cases, there is no explicit price (or only a misleading one) to measure the value of these goods and services for the individual. To overcome this challenge, benefit incidence analysis combines the unit cost of providing public services (obtained from government data) with information of their use (obtained from household surveys) to approximate a distribution of the benefit of government spending or the burden of taxation. Because data on the use refers to subsidized public services or to the receipt of public transfers, budget incidence methodology can only include public expenditure used to provide private goods and services. Public expenditure for the provision of public goods or other non-rival goods is excluded, which means that the incidence analysis approach only takes a small portion of the total public expenditure into account.

The basic idea of incidence analysis is to input to those households receiving a service, the cost of providing that service. This amount is the amount by which household income would have to increase if it had to pay for the service used and the welfare remained constant.

The incidence analysis methodology is concerned with the average incidence of public spending and taxes, i.e. with describing how taxes and transfers in a particular point in time affect the distribution of income in that particular point in time. This contrasts with the marginal incidence of changes in public spending or tax collection, which is beyond the scope of this paper.

¹See for instance van der Walle (1998).

The descriptive nature of the budget incidence approach has made it susceptible for criticisms because it may be “too simple”. The omission of behavioral responses to policies, which would require the estimation of demand functions in various markets, and, the failure to account for general equilibrium effects that would take into account spillovers into other markets when prices change, are certainly two drawbacks of this approach. However, I believe that the cost of moving beyond this simple descriptive approach is high and it remains to be seen if it is worthy. Some scholars like Ballard (1985) and Ballentine (1975) have analyzed countries using general equilibrium approaches and have found very similar results.

4.2 Lustig’s approach to decomposing income inequality

In the Commitment to Equity Assessment Project (CEQ), Nora Lustig and her team have developed a methodology based on the incidence approach that enables the thorough description, decomposition and analysis of inequality by assessing the progressivity of social spending and taxes, their impact on poverty reduction and the redistributive effects of taxes and transfers. The incidence methodology together with the diagnostic framework should enable authors to answer the following three questions: How much redistribution and poverty reduction does a country accomplish through social spending and taxes? How progressive are revenue collection and social spending? What could be done to further increase redistribution and improve re-distributional effectiveness?

Lustig and her colleagues have focused in particular in applying the methodology to Latin American countries but since the framework enables a consistent comparison across countries and potentially across time periods as well, I apply it to Greece and Germany in this paper.

Lustig’s approach to assessing the burden of both taxes and transfers is based on using household level micro-data on income, transfers, and consumption expenditure complemented with national account data on taxes and public transfers and when available tax authorities information. With this information, several income concepts are defined with the intention of measuring the effect of taxes and transfers separately or of taxes and transfers together. Equations 4.2 to 4.4 summarize the different distributive effect, these

income concepts capture:

$$\text{Total} = Gini_{mi} - Gini_{pfi} \quad (4.1)$$

$$\text{By direct taxes and SSC} = Gini_{mi} - Gini_{nmi} \quad (4.2)$$

$$\text{By direct transfers} = Gini_{nmi} - Gini_{di} \quad (4.3)$$

$$\text{By indirect taxes} = Gini_{di} - Gini_{pf} \quad (4.4)$$

Where,

- mi** = market income
- pfi** = post-fiscal income
- nmi** = net market income
- di** = disposable income

As an example, the overall redistributive effect of taxes and social transfers is measured by the difference in income inequality (Gini coefficient) between post fiscal income and market income. Market income is a measure that captures the baseline case, the situation most closely related to the counterfactual of not having redistributive fiscal instruments whatsoever. It adds up pre-tax labor income, capital income (income from dividends, interests, profits, and rents), self-consumption or home production, imputed rent for owner occupied housing and private transfers. Private transfers are included here because market income is supposed to fully capture the baseline scenario without fiscal instruments in which it is possible for a household to receive money from a rich uncle or grandmother, for instance.

Post-fiscal income on the other hand, is a measure intended to represent the situation where households end up after having paid direct and indirect taxes (on income and assets) and received direct transfers from the government. It should represent the amount of money households have in their pockets available to spend before they buy anything.

In this paper, I use in addition to market income and disposable income, two other income concepts: net market income and post-fiscal income. This is to characterize inequality and the redistribution achieved by taxes and transfers in Germany and Greece in 2007, before most of the austerity measures were in place, and in 2010, when the bulk of them were implemented already.

To characterize inequality this paper uses the Gini coefficient, Theil index and 90/10 measures and to characterize distribution it looks at the difference in inequality measures for each concept with respect to market income and net market income for both years respectively. I believe this is reasonable because as section 4 showed, the austerity measures studied in this paper include both direct and indirect tax changes as well as

transfers changes and I want to study the overall impact on the redistributive effect. A detailed definition of the five income concepts is in section 5.3.

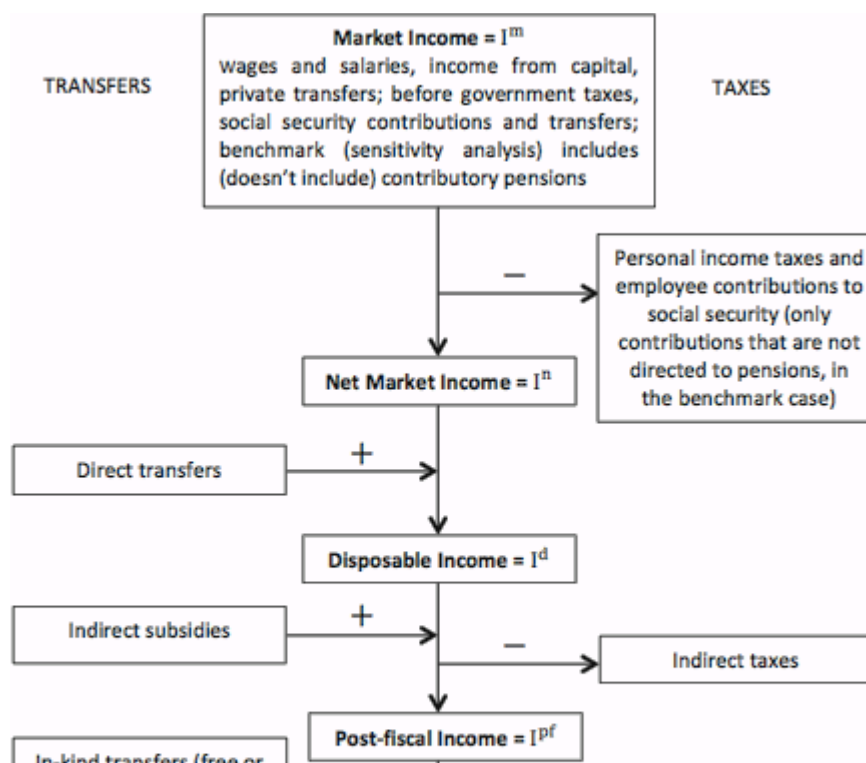
It is important to at least mention some caveats of this approach. Ideally I would like to compare the situation where people do not receive any welfare benefits to the current situation, where they do to various degrees. We try to capture this counterfactual situation with the market income concept. However, by doing so I am assuming that the individual labor-search and labor-hours decisions remain unchanged in the presence of a welfare state. This assumption is known as the no-behavioral-change assumption in the literature and is at best a contested claim because behavioral responses, such as reduced efforts to job-search and reduce work-effort, may be expected in the presence of a welfare state. In a situation without state, we would expect people to try harder to find a job, than they might do now, with unemployment protection. However, in practice, we can never know how hard would people look for a job, or start their own business if they would not have employment insurance, for instance. It is for this reason that the effect of all redistributive measures should be seen as an approximation rather than an exact indicator.

This paper compares the overall effect of taxes and transfers in 2007 to the overall effect of taxes and transfers in 2010. The paper however, does not intent and is not able to identify the impact of individual particular measure but only to tell a story of the overall result of going through a recession and implementing measures of the extent implemented in Greece. The case of Germany is interesting because it is a country that went through the same economic cycle, but did not shirk to the same extent as Greece and since it did not implemented austerity measures can tells us a lot about the effect of only the economic cycle

4.3 Definition of income concepts

Following Lustig and Higgins (2013), I start with the definition of the income concepts that will be the base of the analysis: market, net market, disposable, and post-fiscal income. Contrary to Lustig et Higgins I do not include post final income because data for in-kind transfers (health, housing and education) was only available on a per capita basis based on national accounts data and adding the same amount for all household in the sample would have had no impact on the distribution of income. Figure 4.1 presents the elements included in each income concept and each of them is explained in detail below.

Figure 4.1: Definition of income concepts



Source: Lustig and Higgins (2013)

I coincide with Lustig and Higgins (2013) in the treatment of contributory pension income and include both a benchmark analysis case, where pensions are considered in market income and a sensitivity analysis case, where pensions are part of transfer income². In the benchmark case, pensions are seen as deferred income whereas in the sensitivity analysis case, pensions are seen as a public transfer, which may be largely be the case in countries where pensions are heavily subsidized. I decided therefore to follow Lustig et al. and run all analyses for both the benchmark and the sensitivity analysis case.

Since we want to measure how the redistribution achieved by taxes and transfer changed between 2007 and 2010 after the implementation of the austerity measures. The redistribution at each year in turned is measured in terms of how distribution change with respect to market income or with respect to net market income.

4.3.1 Market income

The first step in assessing the impact of austerity measures on income inequality is to define a baseline measure. In this case it is market income. As it is implied by its name,

²There is no consensus in the literature regarding the appropriateness of each definition. See Lustig and Higgins (2013) for references using both approaches

it is income households receive in the different market in exchange for their work or as a return on assets they own. It is therefore defined as the sum of labor income (which includes regular paid-employed income as well as self-employment income), income from capital sources (such as interests and dividends or rental income), self-consumption (to measure income that would otherwise been spent), imputed rent for owner occupied housing (to level off households living in household they own with household paying rent) and private transfer (mainly inter-household transfers from other relatives or charities).

Market income is defined as:

$$y_{mbc} = hil + hic + hcrown + hchousi + hitp + hitsi + hicvip \quad (4.5)$$

$$y_{msa} = hil + hic + hcrown + hchousi + hitp \quad (4.6)$$

Where,

y_{mbc}	=	market income (benchmark case)
y_{msa}	=	market income (benchmark case)
hil	=	gross (pre-tax) wages and salaries in formal and informal sector and income from self-employment
hcrown	=	auto-consumption or production for own use
hchousi	=	imputed rent for owner occupied housing
hitp	=	private transfers (remittances and other private transfers such as alimony)
hitsi	=	retirement pensions from contributory social security system
hicvip	=	voluntary pensions

Lustig and Higgins (2013) do not include income from voluntary pensions however, I decided to include it here because it is deferred income and the analysis would not be complete if left out. However, as Lustig and Higgins I exclude extraordinary windfall income coming from the sale of durable gift as real estate or winning lotteries.

Lustigs methodology assumes that the burden of payroll taxes is taken fully by labor and therefore, market income must be grossed up to create the pre-payroll tax counterfactual. The idea is that the burden of the payroll taxes paid in practice by employers falls entirely on employees in the form of lower wages. By grossing up market income we are correcting market income by the amount paid by the employer in payroll tax to account for the fact that in the absence of such tax, market wages would be higher by the amount of these contributions. This payroll tax is again subtracted as direct tax when moving to net market income so that net market income is net of taxes and contributions paid by employers and employees. Table 2 shows the contributions in place in Greece and Germany for 2007 and 2010.

4.3.2 Net Market income

Net market income is a measure of the income left after paying direct taxes (including the payroll tax paid by employers) but before receiving any transfers (in the sensitivity analysis case). It is defined as:

$$y_{nbc} = y_{mbc} + hxits + hxot + hxit \quad (4.7)$$

$$y_{nsa} = y_{msa} + hxiti + hxot \quad (4.8)$$

where,

- y_{nbc}** = net market income (benchmark case)
- y_{nsa}** = net market income (sensitivity analysis case)
- $hxit$** = direct taxes (on all income sources) and all social security contributions (for health services, retirement pension and other social services)
- $hxits$** = portion of social security contributions except going towards pensions

4.3.3 Disposable income

Disposable income is a measure intended to represent the income available once direct taxes are paid and direct transfers are received but before indirect taxes are paid. It is defined as:

$$y_{dbc} = y_{nbc} + hitsu + hitsa \quad (4.9)$$

$$y_{dsa} = y_{nsa} + hitsu + hitsa + hitsi \quad (4.10)$$

where,

- y_{nbc}** = disposable income (benchmark case)
- y_{nsa}** = disposable income (sensitivity analysis case)
- $hitsu$** = public transfers in the form of universal benefits
- $hitsa$** = public transfers in the form of assistance benefits

The LIS data includes three groups of social transfers which are explained in detailed in Appendix B.

4.3.4 Post-fiscal income

Post-fiscal income is a measure of the income left after paying direct and indirect transfers and after receiving transfers. It is defined as:

$$y_{\text{pfbc}} = y_{\text{dbc}} - \text{txS}_{\text{ind}} \quad (4.11)$$

$$y_{\text{pfsa}} = y_{\text{dsa}} - \text{txS}_{\text{ind}} \quad (4.12)$$

where,

- y_{pfbc} = post fiscal income (benchmark case)
- y_{pfsa} = post fiscal income (sensitivity analysis case)
- txS_{ind} = public transfers in the form of universal benefits

Note that LIS datasets do not contain information regarding indirect taxes. Some datasets for some countries contain information on expenditure which can be used together with the prevailing tax rates to estimate tax expenditure. However, neither the datasets for Germany nor the datasets for Greece contained this variable. Following Lustig's methodology I could use the inference method or the simulation method to estimate indirect taxes.

A simulation would have required three steps: *a)* an estimation of total household expenditure using income variables and other household or individual characteristics in the data (age, education, employment status, rural or urban, household size, etc); *b)* estimation of budget shares for specific goods groups using the same classification as in national accounts (alcoholic beverages, food and non-alcoholic beverages, clothing and footwear, etc) and, *c)* calculation of indirect tax expenditure for each group of goods based on the prevailing tax rate.

I decided against employing the simulation method to estimate indirect tax expenditure because any estimation of total expenditure without including prices of goods would have been biased. LIS data only has a deflator factor which would allow to get to the general price index but not to the price of individual goods. Estimation of such demand functions would be beyond the scope of this paper.

This is why I relied on the imputation from secondary sources. I used national account data on consumption expenditure by quintile (see table 4.1) and merged this data with the LIS data using factor income quintile as identifier and the prevailing VAT rates as shown in table 4.2 and 4.3 respectively.

It can be seen that Greece increased the VAT rate as a revenue measure in the austerity package negotiated with the IMF and its partners.

Table 4.1: Mean consumption expenditure by income quintile

Country /year	quintile	Total	food	alc.& tobacco	clothes	housing & utilities	housing equipment	health	transp.	comm.	fun & culture	educ.	rest. & hotels	misc.
de07	Total	28501												
de07	1	14388	2245	331	662	5180	576	317	1324	633	1367	129	446	1180
de07	2	20978	2916	441	986	6776	1028	545	2266	734	2371	189	818	1888
de07	3	26877	3387	511	1344	8278	1478	726	3333	833	3145	242	1129	2526
de07	4	33216	3621	565	1661	9799	1893	1063	4418	930	3886	266	1462	3687
de07	5	47047	3764	612	2117	12185	2729	2446	7622	1035	5081	329	2164	6822
de10	Total	28367												
de10	1	12189	1816	280	439	5022	414	366	963	500	1036	61	390	890
de10	2	18519	2259	352	759	6574	704	593	2074	648	1907	111	741	1574
de10	3	25302	3188	455	1063	8223	1189	860	3264	759	2707	177	1139	2277
de10	4	33857	4029	576	1490	10157	1591	1219	4909	880	3623	305	1625	3453
de10	5	51984	4990	676	2443	12944	2755	2495	8681	1040	5666	520	2703	7070
gr07	Total	30975												
gr07	1	18617	3965	838	1266	4710	1024	1247	1396	782	614	354	1378	1043
gr07	2	22926	4493	963	1536	5732	1215	1444	2201	917	757	504	1742	1421
gr07	3	27629	4725	995	1851	6824	1658	1685	2791	1105	1133	635	2348	1934
gr07	4	35673	5280	1177	2533	8455	1926	1926	3960	1320	1534	963	3175	3246
gr07	5	50020	5552	1251	3551	11505	3651	2801	5752	1751	2401	1200	4652	5852
gr10	Total	29974												
gr10	1	13950	3153	474	614	4548	614	809	837	460	279	209	1297	670
gr10	2	19235	3943	635	943	6117	962	1116	1520	635	462	269	1635	1019
gr10	3	25445	4656	865	1425	7506	1221	1196	2494	916	789	560	2366	1450
gr10	4	34751	5630	1043	2016	9661	1703	1703	3579	1251	1251	1008	3406	2259
gr10	5	56524	6613	1413	4013	13396	3674	3109	7348	1809	3052	2204	5709	4183

		Regular	Reduced	Super Reduced
Germany	2007	19%	7%	0
Greece	2007	19%	9%	4.5%
Germany	2010	19%	7%	0
Greece	2010	23%	13%	6.5%

Table 4.2: VAT rates

	Regular	Reduced	Super reduced	Exempt
food and non-alc. beverages		X		
Alcohol and tobacco	X			
clothing and footwear	X			
housing and utilities		X		
housing equipment			X	
health			X	
transport		X		
communications	X			
recreation and culture			X	
education				X
restaurants and hotels			X	
miscellaneous	X			

Table 4.3: VAT rates per consumption group

5. Data

5.1 Description of LIS data

This paper uses micro-level data for Greece and Germany from the Luxembourg Income Studies Database (LIS). LIS offers micro-data on public and private sources of income that contains household- and person-level data on market and government income, demography, employment, and expenditures for countries in Europe, North America, Latin America, Africa, Asia, and Australasia. The income datasets are organized in waves corresponding to regular intervals. Because of the scope of the data and the variables included, LIS data allows researchers to follow the trajectory of different income variables and adjust for taxes and social contributions and transfers. Furthermore, because of its composition, LIS data allows us not only to measure overall redistribution but also to explore whether redistribution has been mainly achieved by direct taxes, indirect taxes or transfers.

I use household level LIS data to study the redistribution system in place in Germany and Greece in 2007 and 2010. In order to assess the impact of inequality measures on the income inequality, I need to define the reference situation to which we will compare against. I take 2007 as the reference year as we can unambiguously consider it a pre-crisis year (See Figure 3.1) and contrast it with 2010, the latest year for which we have data available. Keep in mind that at this point the recession was not over as data indicates that some countries went through a double-dip, which lasted until 2012 (See Figure 3.1). Also note that other parts of the Greek austerity measures were implemented between 2011-2013 and are therefore not included in the data.

As mentioned before, LIS data is complemented with publicly available national account information and information of tax records publicly available to estimate the indirect tax expenditure which is not included in the household surveys that are the base for LIS data.

5.2 Data preparation

In this section, I introduce some technicalities used when working with the data and give examples of some of the decisions implemented.

First there is the issue of the unit of analysis. Not only in the LIS data, but also in other surveys reporting income variables, the basic unit is often the household and not

the individual. Rationale behind this convention is the idea that household members live together and pool their incomes and therefore, their individual welfare does not only depend on their personal income but on the pooled income from all the individuals living together. However, households vary in size and in composition and it is therefore difficult to say whether household “A” with two working members and one child is better off than household “B” with one working member and two children and the same disposable income. To take these economies of scale into account it is common practice to introduce an *equivalence scale*. The LIS practice is to “equivalize” income by dividing household level income by the square root of the number of household members, weighting households by the number of members they include. This assigns every household member the same income regardless of age, gender or other factors.

Contrary to LIS convention, Lustig and Higgins (2013) do not encourage using an equivalence scale and their analysis uses household per capita income as unit of analysis. I decided to use household per capita income as main unit of analysis (in the benchmark case) and then conduct the analysis with the equivalence as a second sensitivity analysis to check the robustness of the results. As seen in table C.4 and table ?? with all results in Appendix C, this does not change the interpretation of the results.

A second issue is the weighting of the data. LIS micro-data comes from household surveys that are representative for the national population, but are still samples of the population and not a census. As such, in order to obtain statistics and results representative for the underlying population and relevant for the unit of analysis (per capita household income) I weight the data by the inflated household weights¹ provided by LIS multiplied by the number of persons in the household.

A third issue arises from the practice of dealing with outliers and observations with negative values in key variables.

The first inspection of the data showed observations reporting negative total income (gross sum of labor income, capital income and transfer income), labor income, capital income or transfer income. It is reasonable that the range from these variables is from minus infinity to infinity because it is possible that a household has taken debt (has dissaved) and therefore reports negative values. However, this imposes challenges because including negative income observations can lead to a Gini coefficient greater than one which implies “that it may overestimate the inequality of the distribution in the presence of negative income values” (Chen et al. (1982), p. 476). Furthermore, the Theil index is not defined for negative values. To handle this I 1) winzorised negative labor income variables (replaced negative values with zero) and 2) dropped observations that reported

¹Inflated weights differ from normalized weights because they expand the population to its “natural”, real size, as opposed to a normal distribution.

negative total income because these households need to survive from something. Please note that in no case this implied deleting more than 5% of the sample.

Two concerns remain regarding other kind of outliers in the sample. By design, top-incomes are generally underreported or underrepresented in household surveys as the ones underlying LIS. This means that by construction judgments of inequality based on household surveys may underestimate inequality since they possibly lack observations of the top percentiles of the population, or because respondents simply understate their income. Furthermore, inequality measures like the Gini coefficient are very sensitive to observations that are both very high and very low. I checked the sensitivity of the results with respect to top-coded observations using the LIS equivalence scale (10 times the median of non-equivalised income) and overall the conclusions are the same. Nevertheless, I prefer to show the not-top-coded data because it was not clear if I should top-code all income variables or just the market income variables and did not want to falsify the results. Compared to other studies this implies that I may be overrepresenting lower income households.

A fourth issue was dealing with missing values. Since the paper compares incomes before and after fiscal policy intervention, it requires that the sample is the same before and after. In this respect I follow Mahler and Jesuit (2006) and keep all observations coming from households that report zero private income (either from labor, capital or private transfers) but drop all observations that report zero total income.

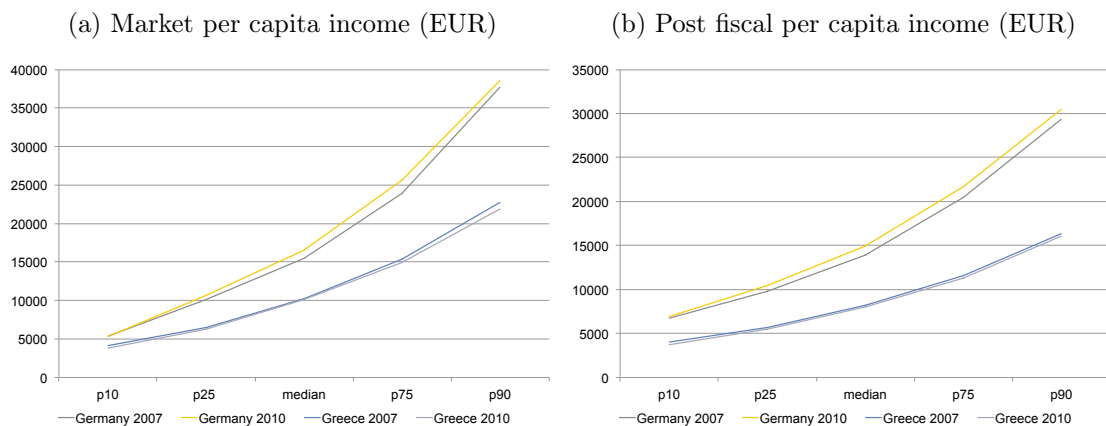
6. Results

This paper uses the income concepts defined in section 4.3 to measure the impact of different policy instruments on income inequality and distribution. Furthermore, it uses three indicators (Gini, Theil index and 90/10 measure) with the objective of checking the robustness of the results and of overcoming the pitfalls of each of these measures. Most of the time the three indicators tell the same story and therefore, I will use especially the Gini coefficient to interpret the results. The reader is referred to Appendix C for all detailed results of Gini, Theil index and the 90/10 indicator.

6.1 Changes in the level of income

Figure 6.1 shows the levels (in 2007 constant EUR) of the household per capita market income and post-fiscal household income at some percentiles. Even though neither of the graphs shows an abrupt decline in neither market per capita income or post fiscal income, they do show that Greek households had both more market and post-fiscal income in 2007 than in 2010. The reverse was the case for Germany, where income was higher for all points in 2010 than in 2007 for both market income and post-fiscal income.

Figure 6.1: Levels of income in 2007 and 2010



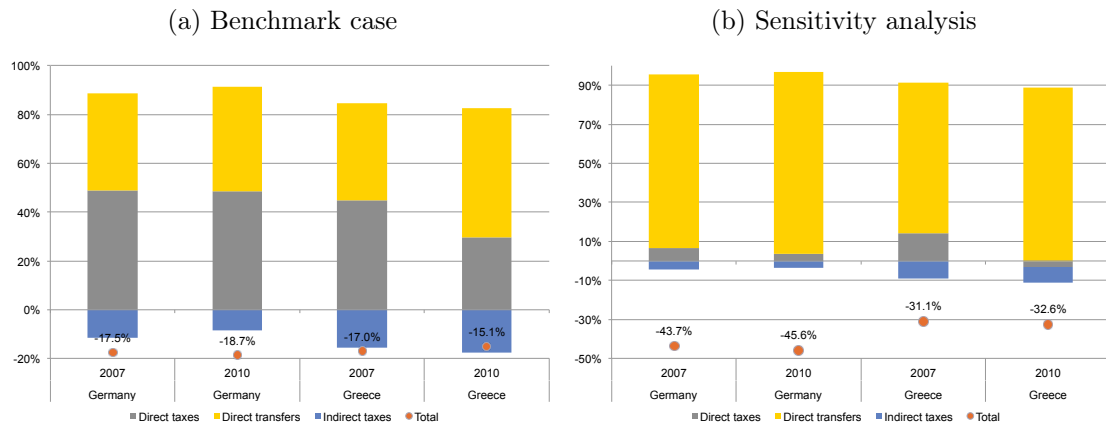
Source: Own calculations based on LIS Data

6.2 Changes in the total redistributive effect of fiscal policy

Equation 4.2 defined the overall redistributive effect of taxes and transfers as the difference in inequality between market income and disposable income. Figure 6.2 shows

this difference and how it composed. The points in figure 6.2 show the total redistributive effect of fiscal policy as the difference between the Gini of market and the Gini of post-fiscal income. The bars decompose this total effect into the individual effect of direct taxes, indirect taxes and transfers. The contrast of benchmark case and sensitivity analysis case, illuminates the role of pensions in fiscal policy.

Figure 6.2: Total redistributive effect



Source: Own calculations based on LIS Data

Figure 6.2 illustrates two important points. First, the overall redistributive effect in the benchmark case is lower than in the sensitivity analysis case for both Greece and Germany. This points out to the fact that contributory pensions alone, are the factor with the most equalizing effect. Second, the change in total redistribution effect has different signs for the benchmark and for the sensitivity analysis in the Greek case.

The difference in magnitude of the total redistribution effect in benchmark and sensitivity case is seen in figure 6.2¹. On the one hand, in the benchmark case - where contributory pensions are part of market income - the total effect was of 17.5% in 2007 and 18.7% in 2010 for Germany, meaning that the extent to which fiscal policy reduced inequality increased in Germany by 1.2 percentage points. The reverse was true for Greece where the total redistributive effect decreased by 1.9 percentage points (from 17% to 15.1%) during the period studied, showing a reduction in the redistributive power of fiscal policy in Greece.

On the other hand, in the sensitive analysis case - where contributory pensions are part of transfer income, the magnitude of the total redistributive effect was much higher (43.7% and 45.6% in 2007 and 2010 respectively in Germany, and 31.1% and 32.6% in 2007 and 2010, respectively, in Greece) and the total redistributive effect increased for both Germany and Greece, with a slightly bigger increase in Germany than in Greece.

¹This is corroborated by the Theil index, which is smaller and closer to zero for post-fiscal income than for market income in both years. See Appendix B.

This indicates that most of the inequality reducing effect is stemming from contributory pensions.

The inequality decreasing effect of direct transfers, which increased in both scenarios, could explain the different signs of the total redistributive effect in the benchmark and in the sensitivity case. This increase was enough to offset the inequality increasing effect of indirect taxes.

With this insight at hand, table 6.1 offers a detailed view of the differences in the levels of inequality and in the composition of these changes between the benchmark and sensitivity analysis case.

Table 6.1 shows that market income is much more unequal in the sensitivity analysis case than in the benchmark case. However, the resulting post-fiscal income inequality in both scenarios differ by a much lesser extent. This suggest that the levels of resulting level of post-fiscal income inequality is to a great extent the result of political consensus regarding the idea of redistributing income, as market forces alone would produce an income distribution that resembles more the sensitivity analysis.

An analysis of the composition of the total redistribute effect in the benchmark case shows that while in Germany the most important equalizing element are direct taxes, in Greece the most important equalizing element were taxes in 2007 but became transfer in 2010 (See Table 6.1). Also, while the effect of transfers remained almost constant in Germany between 2007 and 2010 (51.4% vs 51.9%), it went from 57.7% in 2007 to 81.1% in Greece. Contributory pensions are therefore a crucial element in the redistribution of income.

Also, a closer look at the composition of this change in the sensitivity analysis case corroborates this finding: the inequality-decreasing effect of direct taxes is a lot smaller here than in the benchmark case. For the Greek case in particular, we see that direct taxes, changed in the context of tax reform, became inequality increasing. This effect was nevertheless fully counteracted by direct transfers, ensuring this way an increase in the overall total effect.

Furthermore, the tax reform implemented in Greece as part of the austerity package together with more efforts to prevent and avoid tax evasion also enlarged the inequality-increasing effect of indirect taxes (See table 6.2). It is also remarkable that this effect is also seen in Germany where no reform was implemented.

In addition to seeing the isolated effect of fiscal measures, it is insightful to study the cumulative redistribution effect at each concept. Table 6.2 summarizes this by showing, for all income concepts, the difference (in percentages) with respect to market income

Table 6.1: Composition of total redistributive effect

(a) Benchmark Case

Country	Year	Indicator	Market Income [1]		Net Market Income [2]		Disposable Income [3]		Post-fiscal income [4]		Total redistributive effect [5] = [1] - [4]		Thereof attributable to		
			Value	Change 2007 wrt	Value	Change 2007 wrt	Value	Change 2007 wrt	Value	Change 2007 wrt	Value	%	Direct taxes	Indirect taxes	
Germany	2007	Gini	0.4064		0.3614		0.3249		0.3354		0.07	-17.5%	63.4%	51.4%	-14.8%
Germany	2007	Theil	0.3027		0.2308		0.199		0.2132		0.09	-29.6%	80.3%	35.5%	-15.9%
Germany	2010	90/10	7.0869		5.9565		4.2421		4.5725		2.51	-35.5%	45.0%	68.2%	-13.1%
Germany	2010	Gini	0.3946	-2.9%	0.3517	-2.7%	0.3135	-3.5%	0.321	-4.3%	0.07	-18.7%	58.3%	51.9%	-10.2%
Germany	2010	Theil	0.2654	-12.3%	0.2053	-11.0%	0.1717	-13.7%	0.1799	-15.6%	0.09	-32.2%	70.3%	39.3%	-9.6%
Germany	2010	90/10	7.4845	5.6%	6.2044	4.2%	4.28	0.9%	4.4905	-1.8%	2.99	-40.0%	42.8%	64.3%	-7.0%
Greece	2007	Gini	0.3862		0.3438		0.306		0.3207		0.07	-17.0%	64.7%	57.7%	-22.4%
Greece	2007	Theil	0.2666		0.2043		0.1645		0.1802		0.09	-32.4%	72.1%	46.1%	-18.2%
Greece	2007	90/10	6.0353		5.1133		3.8113		4.168		1.87	-30.9%	49.4%	69.7%	-19.1%
Greece	2010	Gini	0.3848	-0.4%	0.3583	4.2%	0.3111	1.7%	0.3266	1.8%	0.06	-15.1%	45.5%	81.1%	-26.6%
Greece	2010	Theil	0.2666	0.0%	0.2053	0.5%	0.1717	4.4%	0.1799	-0.2%	0.09	-32.5%	70.7%	38.8%	-9.5%
Greece	2010	90/10	6.3007		5.5622		4.0147		4.3284		1.97	-31.3%	37.4%	78.5%	-15.9%

(b) Sensitivity analysis

SENSITIVITY ANALYSIS															
Country	Year	Indicator	Market Income [1]		Net Market Income [2]		Disposable Income [3]		Post-fiscal income [4]		Total redistributive effect [5] = [1] - [4]		Thereof attributable to		
			Value	Change 2007 wrt	Value	Change 2007 wrt	Value	Change 2007 wrt	Value	Change 2007 wrt	Value	%	Direct taxes	Indirect taxes	
Germany	2007	Gini	0.5915		0.5729		0.3206		0.333		0.2585	-43.7	7.2%	97.6%	-4.8%
Germany	2007	Theil	0.5981		0.4533		0.2041		0.2223		0.3758	-62.8	38.5%	66.3%	-4.8%
Germany	2007	90/10									0				
Germany	2010	Gini	0.5869	-0.8%	0.5765	0.6%	0.3096	-3.4%	0.3192	-4.1%	0.2677	-45.6	3.9%	99.7%	-3.6%
Germany	2010	Theil	0.5548	-7.2%	0.4089	-9.8%	0.1734	-15.0%	0.1846	-17.0%	0.3702	-66.7	39.4%	63.6%	-3.0%
Germany	2010	90/10									0				
Greece	2007	Gini	0.4733		0.448		0.3101		0.326		0.1473	-31.1	17.2%	93.6%	-10.8%
Greece	2007	Theil	0.3799		0.3147		0.1863		0.1863		0.1936	-51	33.7%	75.3%	-9.0%
Greece	2007	90/10	12.0471		12.3541		3.9689		4.3034		7.7437	-64.3	-4.0%	108.3%	-4.3%
Greece	2010	Gini	0.4918	3.9%	0.4978	11.1%	0.3141	1.3%	0.3313	1.6%	0.1605	-32.6	-3.7%	114.5%	-10.7%
Greece	2010	Theil	0.4144	9.1%	0.3862	22.7%	0.1764	4.4%	0.1962	5.3%	0.2182	-52.7	12.9%	96.2%	-9.1%
Greece	2010	90/10	11.9644	-0.7%	26.6096	115.4%	4.1231	3.9%	4.559	5.9%	7.4054	-61.9	-197.8%	303.7%	-5.9%

Source: Author's calculations based on LIS data

and the difference in percentage points of this redistributive effect between 2007 and 2010. Compared to table 6.1 this shows the aggregated effects at different points of the income trajectory. As such, the difference between disposable income and market income capture the effect of direct taxes and direct transfer together, for instance.

In the benchmark case, we see again a reduction in the total redistributive effect decreased for Greece, while in Germany we see an increase in the redistributive effect. Furthermore, in the case of Germany both the Theil Index and the Gini coefficient show a decrease in the redistributive effect of direct taxes but an increase in the redistributive effect of transfers that offsets this completely. The 90/10 measure of income concentration confirms this picture. In the case of Greece, all indicators show a decrease in the redistributive effect of all fiscal instruments. However, transfers again play a significant inequality-decreasing role as they offset to a great extent the inequality increasing effect of taxes.

(a) Benchmark Case

BENCHMARK CASE (H.H p.c)		Germany 2007	Germany 2010	Change 2010 to 2007 in p.points	Greece 2007	Greece 2010	Change 2010 to 2007 in p.points
Diff in Gini wrt to Market income	Net Market Income	-11.1%	-10.87%	-0.20	-11.0%	-6.9%	-4.09
	Diposable Income	-20.1%	-20.6%	0.50	-20.8%	-19.2%	-1.61
	Post fiscal income	-17.5%	-18.7%	1.18	-17.0%	-15.1%	-1.84
Diff Theil wrt to Market income	Net Market Income	-23.8%	-22.6%	-1.11	-23.4%	-16.2%	-7.20
	Diposable Income	-34.3%	-35.3%	1.05	-38.3%	-34.9%	-3.41
	Post fiscal income	-29.6%	-32.2%	2.65	-32.4%	-28.2%	-4.24
Diff 90/10 wrt to Market income	Net Market Income	-16.0%	-17.1%	1.15	-15.3%	-11.7%	-3.56
	Diposable Income	-40.1%	-42.8%	2.67	-36.8%	-36.3%	-0.57
	Post fiscal income	-35.5%	-40.0%	4.52	-30.9%	-31.3%	0.36

(b) Sensitivity analysis

SENSITIVITY ANALYSIS (H.H p.c)		Germany 2007	Germany 2010	Change 2010 to 2007 in p.points	Greece 2007	Greece 2010	Change 2010 to 2007 in p.points
Diff in Gini wrt to Market income	Net Market Income	-3.1%	-1.8%	-1.37	-5.3%	1.22%	-6.57
	Diposable Income	-45.8%	-48.1%	2.30	-34.5%	-36.1%	1.65
	Post fiscal income	-43.7%	-86.5%	42.76	-31.1%	-32.6%	1.51
Diff Theil wrt to Market income	Net Market Income	-24.2%	-26.3%	2.09	-17.2%	-6.8%	-10.36
	Diposable Income	-65.9%	-68.7%	2.87	-55.5%	-57.4%	1.89
	Post fiscal income	-62.8%	-66.7%	3.89	-51.0%	-52.7%	1.69
Diff 90/10 wrt to Market income	Net Market Income				2.5%	122.4%	-119.86
	Diposable Income				-67.1%	-65.5%	-1.52
	Post fiscal income				-64.3%	-61.9%	-2.38

Source: Author's calculations based on LIS data

Note: Negative (positive) values are interpreted as a decrease (increase) in the redistributive effect until that income concept. The line for the difference in the Gini coefficient between market income and net market income means: in 2007 the inequality of net market income in Germany was 11.1% smaller than the inequality of market income, in 2011 the inequality of net market income in Germany was 10.87% smaller than the inequality of market income, therefore in Germany the distributive effect of direct taxes was 0.2 percentage points smaller in 2010 than in 2007. Same for Greece.

Table 6.2: Cumulative redistribution effect

In the sensitivity analysis, the findings tell a different story. In Germany, the redistributive effect increased by 42 percentage points between 2007 and 2010 while in Greece the Gini and the Theil, show, an increase in the redistributive effect. It is albeit small

(1.65 and 1.51 percentage points) but still an increase. One possible explanation for this apparent contradictory finding could lie in the equalizing role contributory pensions play in Greece. It offsets not only the inequality increasing-effect of direct taxes but also levels off the initial distribution of market income by 31.1% or 32.6%.

6.3 Different impact per quantile: incidence analysis

In this section I want to concentrate on the effect at different quantiles of the distribution. I chose quantiles because this was the finest level of granularity for which indirect taxes data was available.

Table 6.4 shows for each quintile, different variables as percentage of market income². It stands out that the burden of direct taxes is heavier for households in higher quintiles, this being an initial sign of the progressivity of this charge. It is remarkable that direct transfers do not reach lower deciles in neither of the countries, this raising the question of how the targeting is being done since apparently richer quintiles, most likely in less need, are enjoying a bigger share of transfers.

A possible explanation could be related to figures A.1 and A.2 in Appendix A, which show the composition of social expenditure in both Greece and Germany: old age pensions make the second largest element in social expenditure. Combining this with column “direct transfers” in table 6.4 gives an approximation of how this spending is targeted. As can be seen, households in richer quantiles are receiving more of this pie than households in lower quantiles. This makes sense if we think of who is more likely to receive old age contributory pensions: households that contributed the most during their working lifetime. Furthermore, since the amount of the pension depends on the amount paid in, or of the salary in the years prior to retirement, high-earners get higher pensions and therefore a bigger share of the pie. This leads to the conclusion that old age contributory transfers are inequality decreasing, but nevertheless function as a public subsidy for households in the higher quintiles.

In addition to that, table 6.4 also shows that the burden of indirect taxes is carried mostly by poorer households, who destine a considerable proportion of their market income to pay it. This is the case for both Greece and Germany in both years analyzed. It is remarkable, nonetheless that share that higher quintiles assign to indirect taxes has increased in Greece. This may be due to the tax reform implemented which implemented a higher tax rate for luxury goods.

²Results for the sensitivity analysis case can be found in table D.1 in Appendix D

(a) Greece 2007

Greece 2007	Direct Taxes	Net Market Income	All Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Quintile							
1	0.8%	-9.3%	0.0%	14.3%	-45.6%	-2.7%	-44.8%
2	-21.2%	-11.0%	0.0%	-2.2%	-29.9%	-13.6%	-51.1%
3	-40.2%	-13.6%	0.0%	-9.7%	-25.2%	-18.9%	-65.5%
4	-59.1%	-17.8%	1.2%	-15.7%	-24.0%	-23.7%	-83.1%
5	-88.7%	-25.6%	21.8%	-25.1%	-17.3%	-30.8%	-106.0%
Total Population	-61.0%	-19.2%	9.8%	-15.5%	-23.3%	-23.6%	-84.2%

(b) Greece 2010

Greece 2010	Direct Taxes	Net Market Income	Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Deciles							
1	-13.7%	74.5%	0.0%	17.9%	-35.4%	2.7%	-358.4%
2	-27.7%	60.9%	0.0%	-0.3%	-25.1%	-10.4%	-190.4%
3	-37.1%	49.5%	0.0%	-7.9%	-23.3%	-16.6%	-162.9%
4	-48.5%	35.8%	2.1%	-13.1%	-22.8%	-20.8%	-147.1%
5	-73.4%	4.8%	26.7%	-21.1%	-19.0%	-26.7%	-125.9%
Total Population	-53.0%	29.7%	12.1%	-12.5%	-22.2%	-20.1%	-141.9%

(c) Germany 2007

Greece 2007	Direct Taxes	Net Market Income	All Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Quintile							
1	0.8%	-9.3%	0.0%	14.3%	-45.6%	-2.7%	-44.8%
2	-21.2%	-11.0%	0.0%	-2.2%	-29.9%	-13.6%	-51.1%
3	-40.2%	-13.6%	0.0%	-9.7%	-25.2%	-18.9%	-65.5%
4	-59.1%	-17.8%	1.2%	-15.7%	-24.0%	-23.7%	-83.1%
5	-88.7%	-25.6%	21.8%	-25.1%	-17.3%	-30.8%	-106.0%
Total Population	-61.0%	-19.2%	9.8%	-15.5%	-23.3%	-23.6%	-84.2%

(d) Germany 2010

Greece 2010	Direct Taxes	Net Market Income	Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Deciles							
1	-13.7%	74.5%	0.0%	17.9%	-35.4%	2.7%	-358.4%
2	-27.7%	60.9%	0.0%	-0.3%	-25.1%	-10.4%	-190.4%
3	-37.1%	49.5%	0.0%	-7.9%	-23.3%	-16.6%	-162.9%
4	-48.5%	35.8%	2.1%	-13.1%	-22.8%	-20.8%	-147.1%
5	-73.4%	4.8%	26.7%	-21.1%	-19.0%	-26.7%	-125.9%
Total Population	-53.0%	29.7%	12.1%	-12.5%	-22.2%	-20.1%	-141.9%

Source: Own calculations based on LIS Data

Note: White columns are expressed as a fraction of market income and grey columns are expressed as change with respect to market income.

Table 6.4: Incidence - Benchmark case

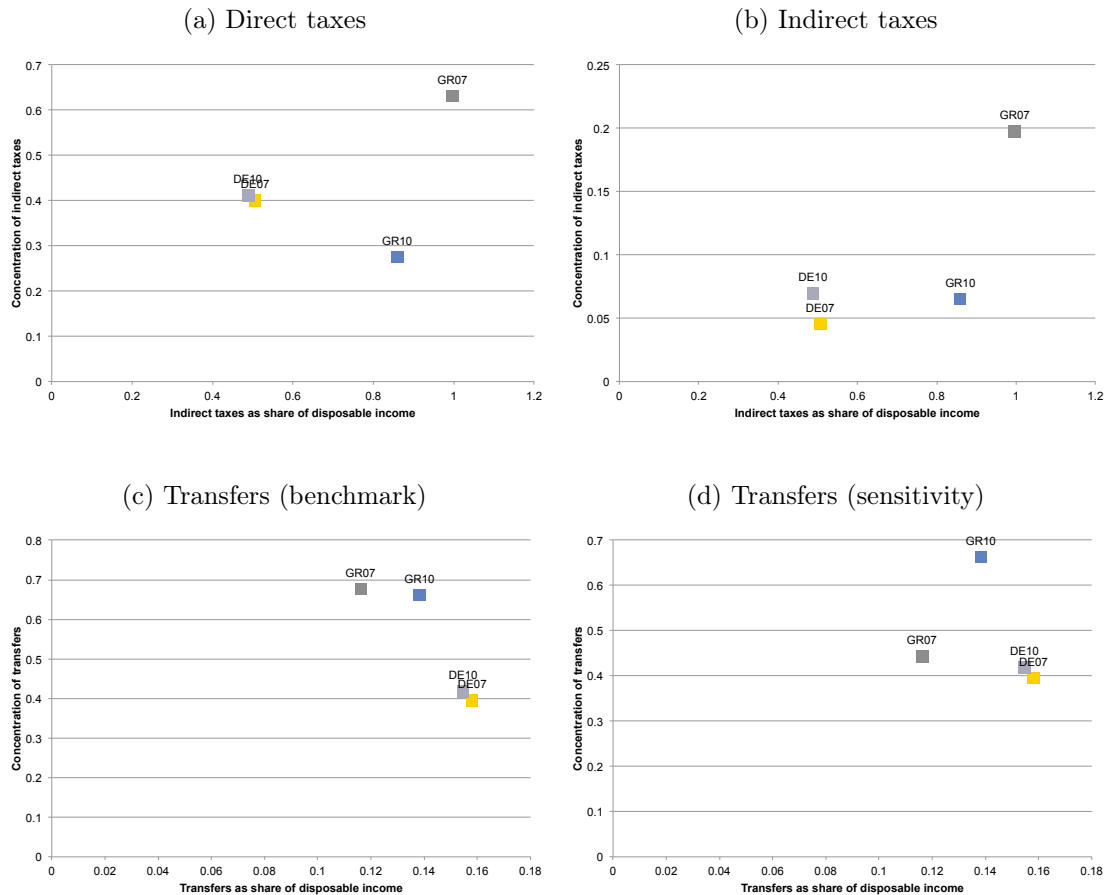
I need to raise a flag regarding the “All Taxes” column in table 6.4 since the values depicted here imply that the total tax expenditure is more than market income, at least in some cases. It could be that most of the consumption is financed by debt, and therefore indirect taxes are financed on a longer period of time. Or it could be that this is what people were supposed to pay without filing any tax return at the end of the fiscal year.

6.4 A Word on Progressivity

In this section I want to deepen into the concentration of transfers in higher quantiles to see the effect of the austerity measures in Greece compared to Germany.

Because of the several dimensions of the analysis, I chose to do this with a summary indicator as the Kakwani index³. Figure 6.3 shows the different in size and in progressively of taxes and transfers.

Figure 6.3: Redistributive impact of taxes and transfers



Source: Author's calculations based on LIS data

Greece obtains a larger redistributive impact with a corresponding bigger size of taxes and transfers, whereas Germany features a smaller progressivity in transfers and a smaller size of the taxes than Greece.

³The Kakwani index is defined as twice the area between a payments' concentration curve and the Lorenz curve and is calculated as $\pi K = C - G$, where C is the payment's concentration index and G stands for the Gini coefficient of the variable under consideration. The value of the Kakwani index πK ranges from -2 to 1 with negative values indicating regressivity and positive numbers indicating progressivity. Zero is consider the case of perfect proportionality.

7. Concluding remarks

I wrote this paper with the purpose of studying the recent developments of income inequality in Greece¹ and Germany, two countries that I select to represent two different growth paths in Europe.

The relevance of the question stems, in my opinion, from the depth and extent of the most recent economic turmoil that the continent went through. Whether it worsened or improved the distribution of income and whether its impact was differentiated for different quantiles of the population is a subject of economic and even political relevance.

I addressed this question relying on the budget incidence methodology of Lustig and Higgins (2013). I found evidence that shows an overall reduction of the levels of income available for Greek households in 2010 compared to the baseline in 2007. Contrary to this experience, German households, enjoyed more income in 2010 than in 2007.

Furthermore, the total redistributive power of fiscal policy also changed but how it did depends mostly on how contributory pensions are taken into account. If they are part of market income, the extent to which fiscal policy reduced income inequality increased in Germany but decreased in Greece. If they are part of transfer income, then the equalizing effect of fiscal policy increased for both Germany and Greece. Results indicate that direct transfer alone explain this as they offset completely the inequality increasing effect of taxes.

Interestingly, regardless of how pensions are taken into account, the ending income inequality (of post-fiscal income) is similar. This suggests that the level of post-fiscal income inequality is to a great extent the result of political consensus and that both the benchmark and the sensitivity analysis capture this political will but at different points: the benchmark case captures it at the market income level while the sensitivity analysis case captures it at the disposable income level.

Moreover, the paper shows in many different ways the important role that contributory pensions play in the redistribution of income. For example, the inequality increasing effect of transfers in Greece was big enough to offset the effect of the tax reform implemented, which proved to be inequality-increasing.

However, these findings hide a dimension in which transfers, which are mainly pensions, are very regressive. Transfers are mainly concentrated in quantiles 4 and 5 of the population, but mostly in quantile 5. Consequently, the fact that richer households carry a

¹Greece is expected to have a meager growth rate of 0.6% in 2014 according to forecasts of the European Economic Commission. The first positive growth rate since 2008)

heavier burden of direct taxation is wiped out completely by the regressive behavior of contributory pension transfers.

These findings are enlightening since they offer a glimpse on the developments during the aftermath of the Great Recession. Notwithstanding, it is necessary to keep in mind that it may be too soon to draw definite conclusions. The data I used is only capable of capturing the effects in development until 2010, which is in the middle of the recession and before all austerity measures were rolled out. Analysis which include a longer time perspective, based on more recent data and applicable for more countries are welcome in future research. Analysis which further Specially because the method employed in this paper does not enable to separate the effects due to the economic cycle and the effects due to intentional economic policy decisions.

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A. Social expenditure composition

	Greece					
	2'007			2'011		
	EUR Mio	EUR per capita	% GDP	EUR Mio	EUR per capita	% GDP
Expenditure in social protection	55'258	4'950	24.8	62'989	5'663	30.2
Social protection benefits	53'872	4'826	24.1	60'165	5'409	28.9
Old age	23'474	2'103	10.5	26'474	2'380	12.7
Sickness / Health care	15'150	1'357	6.8	15'557	1'399	7.5
Survivors	4'513	404	2.0	4'892	440	2.3
Family children	3'324	298	1.5	3'726	335	1.8
Disability	2'645	237	1.2	2'928	263	1.4
Unemployment	2'423	217	1.1	4'472	402	2.1
Social exclusion n.e.c	1'255	112	0.6	1'363	123	0.7
Administrative costs	1'376	123	0.6	2'740	246	1.3
Housing	1'088	97	0.5	752	68	0.4
Other expenditure	10	1	0.0	83	7	0.0
Pensions	27'442	2'458	12.3	31'139	2'799	14.9
Old age	15'486	1'387	6.9	17'908	1'610	8.6
Anticipated old age pension	5'830	522	2.6	6'629	596	3.2
Disability pension	1'667	149	0.7	1'659	149	0.8
Early retirement (reduced capacity)	0	0	0.0	0	0	0.0
Survivors pensions	4'433	397	2.0	4'825	434	2.3
Early retirement (labour market)	26	2	0.0	118	11	0.1

Source: Eurostat

Table A.1: Social expenditure composition in Greece

	Germany					
	2'007			2'011		
	EUR Mio	EUR per capita	% GDP	EUR Mio	EUR per capita	% GDP
Expenditure in social protection	672'627	8'176	27.7	768'078	9'390	29.4
Social protection benefits	646'952	7'864	26.6	737'411	9'015	28.3
Old age	226'356	2'752	9.3	244'419	2'988	9.4
Sickness / Health care	193'479	2'352	8.0	245'686	3'004	9.4
Survivors	51'372	624	2.1	52'838	646	2.0
Family children	67'267	818	2.8	81'926	1'002	3.1
Disability	51'450	625	2.1	57'886	708	2.2
Unemployment	37'631	457	1.5	34'270	419	1.3
Social exclusion n.e.c	3'587	44	0.1	3'906	48	0.1
Administrative costs	24'072	293	1.0	28'319	346	1.1
Housing	15'811	192	0.7	16'479	201	0.6
Other expenditure	1'603	19	0.1	2'348	29	0.1
Pensions	302'085	3'672	12.3	322'083	3'938	14.9
Old age	210'689	2'561	8.7	227'302	2'779	8.7
Anticipated old age pension	15'060	183	0.6	16'190	198	0.6
Disability pension	4'480	54	0.2	4'484	55	0.2
Early retirement (reduced capacity)	19'570	238	0.8	20'381	249	0.8
Survivors pensions	50'722	617	2.1	52'165	638	2.0
Early retirement (labour market)	1'564	19	0.1	1'561	19	0.1

Source: Eurostat

Table A.2: Social expenditure composition in Germany

B. Transfers included in LIS data

1. *Work- related insurance transfers (hitsi):*

Monetary transfers stemming from systems where the eligibility is based on the existence and/or the length of an employment relationship; in most cases the benefits are financed by contributions paid by employers, workers or both, and their amount is usually dependent on either the previous earnings or the previous contribution. Work-related insurance transfers include both short term and long term insurance transfers. Long-term insurance transfers are pensions from the contributory system.

2. *Universal benefits (hitsu):*

Monetary transfers stemming from public programs that provide flat-rate benefits to certain resident or citizens, provided that they are in a certain situation, but without consideration of income, employment or assets; note that in some cases the benefit amount may also depend on the other incomes of the individuals, which at the limit may result on some proportion of the population at the upper end of the income distribution to be excluded from receipt. Universal benefits comprise: old age/disability/survivors universal pensions, unemployment universal benefits, disability universal benefits, child/family universal benefits, education related universal benefits

3. *Assistance benefits (hitsa):*

Monetary transfers stemming from public programs that provide benefits especially targeted to needy individuals or households (i.e. with a strict income or assets test); the amount of the benefits is either flat rate or based on the difference between the recipient income and a standard amount representing the minimum subsistence needs as guaranteed by the government. Assistance benefits comprise: general social assistance, old age/disability/survivors assistance pensions, unemployment assistance, family/maternity/child assistance, education assistance

C. All results

C.1 Per Capita Variables

Benchmark Case: pensions are part of market income (household p.c)										
GERMANY 2007	Market income	Net Market Income	Disposable income	Post-fiscal income		GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.4064	0.3614	0.3249	0.3354		Gini	0.3946	0.3517	0.3135	0.321
% change wrt to Market income		-11.1%	-20.1%	-17.5%		Diff. wrt to Market income		-10.9%	-20.6%	-18.7%
p - value		0.0000	0.0000	0.0000		p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-10.1%	-7.2%		% change wrt to Net Market income			-0.1086	-0.0873
p - value			0.0000	0.0000		p - value				0.0239
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income		GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.3862	0.3438	0.306	0.3207		Gini	0.3848	0.3583	0.3111	0.3266
% change wrt to Market income		-11.0%	-20.8%	-17.0%		Diff. wrt to Market income		-6.9%	-19.2%	-15.1%
p - value		0.0000	0.0000	0.0000		p-value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-11.0%	-6.7%		% change wrt to Net Market income			-13.2%	-8.8%
p - value			0.000	0.000		p - value			0.000	0.000
Sensitivity Analysis: pensions are part of transfers (household p.c)										
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income		GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.5915	0.5729	0.3206	0.333		Gini	0.5869	0.5765	0.3096	0.3192
% change wrt to Market income		-3.1%	-45.8%	-43.7%		% change wrt to Market income		-1.8%	-48.1%	-86.5%
p - value		0.0000	0.0000	0.0000		p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-44.0%	-41.9%		% change wrt to Net Market income			-46.3%	-44.6%
p - value						p - value				
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income		GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.4733	0.448	0.3101	0.326		Gini	0.4918	0.4978	0.3141	0.3313
% change wrt to Market income		-5.3%	-34.5%	-31.1%		% change wrt to Market income		1.2%	-36.1%	-32.6%
p - value		0.0000	0.0000	0.0000		p - value		0.0226	0.0000	0.0000
% change wrt to Net Market income			-30.8%	-27.2%		% change wrt to Net Market income			-36.9%	-33.4%
p - value			0.000	0.000		p - value			0.000	0.000

Source: Own calculations based on LIS data

Table C.1: Gini - Per capita variables

C.2 Equivalised Variables

Benchmark Case: pensions are part of market income (household p.c)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.3027	0.2308	0.199	0.2132	Theil	0.2654	0.2053	0.1717	0.1799
% change wrt to Market income		-23.8%	-34.3%	-29.6%	% change wrt to Market income		-22.6%	-35.3%	-32.2%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-13.8%	-7.6%	% change wrt to Net Market income			-16.4%	4.8%
p - value			0.000	0.000	p - value			0.000	0.000
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.2666	0.2043	0.1645	0.1802	Theil	0.2666	0.2235	0.1736	0.1915
% change wrt to Market income		-23.4%	-38.3%	-32.4%	% change wrt to Market income		-16.2%	-34.9%	-28.2%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-19.5%	-11.8%	% change wrt to Net Market income			-22.3%	8.0%
p - value			0.000	0.000	p - value			0.000	0.000
Sensitivity Analysis: pensions are part of transfers (household p.c)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.5981	0.4533	0.2041	0.2223	Theil	0.5548	0.4089	0.1734	0.1846
% change wrt to Market income		-24.2%	-65.9%	-62.8%	% change wrt to Market income		-26.3%	-68.7%	-66.7%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-55.0%	-51.0%	% change wrt to Net Market income			-57.6%	-54.9%
p - value			0.000	0.000	p - value			0.000	0.000
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.3799	0.3147	0.1689	0.1863	Theil	0.4144	0.3862	0.1764	0.1962
% change wrt to Market income		-17.2%	-55.5%	-51.0%	% change wrt to Market income		-6.8%	-57.4%	-52.7%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-46.3%	-40.8%	% change wrt to Net Market income			-54.3%	-49.2%
p - value			0.000	0.000	p - value			0.000	0.000

Source: Own calculations based on LIS data

Table C.2: Theil Index - Per capita variables

Benchmark Case: pensions are part of market income (household p.c)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure	7.0869	5.9565	4.2421	4.5725	90/10 measure	7.4845	6.2044	4.28	4.4905
% change wrt to Market income		-16.0%	-40.1%	-35.5%	% change wrt to Market income		-17.1%	-42.8%	-40.0%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-28.8%	-23.2%	% change wrt to Net Market income			-31.0%	-27.6%
p - value			0.0000	0.0000	p - value			0.0000	0.0000
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure	6.0353	5.1133	3.8113	4.168	90/10 measure	6.3007	5.5622	4.0147	4.3284
% change wrt to Market income		-15.3%	-36.8%	-30.9%	Diff. wrt to Market income		-11.7%	-36.3%	-31.3%
p - value		0.0000	0.0000	0.0000	p-value				
% change wrt to Net Market income			-25.5%	-18.5%	% change wrt to Net Market income			-27.8%	-22.2%
p - value			0.0000	0.0000	p - value			0.0000	0.0000
Sensitivity Analysis: pensions are part of transfers (household p.c)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure					90/10 measure				
% change wrt to Market income					% change wrt to Market income				
p - value					p - value				
% change wrt to Net Market income					% change wrt to Net Market income				
p - value					p - value				
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure	12.0471	12.3541	3.9689	4.3034	90/10 measure	11.9644	26.6096	4.1231	4.559
% change wrt to Market income		2.5%	-67.1%	-64.3%	% change wrt to Market income		122.4%	-65.5%	-61.9%
p - value		0.000	0.000	0.000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-67.9%	-65.2%	% change wrt to Net Market income			-84.5%	-82.9%
p - value			0.0000	0.0000	p - value			0.0000	0.0000

Source: Own calculations based on LIS data

Table C.3: 90/10 Index - Per capita variables

Benchmark Case: pensions are part of market income (household equivalised)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.3951	0.3468	0.3131	0.3255	Gini	0.3909	0.3446	0.3093	0.3181
% change wrt to Market income		-12.2%	-20.8%	-17.6%	% change wrt to Market income		-11.8%	-20.9%	-18.6%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-9.72%	-6.14%	% change wrt to Net Market income			-10.2%	-7.7%
p - value			0.000	0.000	p - value			0.000	0.000
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.3778	0.3265	0.2899	0.3082	Gini	0.3775	0.3449	0.2988	0.3172
% change wrt to Market income		-13.6%	-23.3%	-18.4%	% change wrt to Market income		-0.0326	-0.0787	-0.0603
p - value		0.0000	0.0000	0.0000	p-value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-11.2%	6.3%	% change wrt to Net Market income			-13.4%	-8.0%
p - value			0.000	0.000	p - value			0.000	0.000
Sensitivity Analysis: pensions are part of transfers (household equivalised)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.576	0.3468	0.3131	0.3255	Gini	0.5779	0.5674	0.3043	0.3155
% change wrt to Market income		-39.8%	-45.6%	-43.5%	% change wrt to Market income		-1.8%	-48.2%	-86.2%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-9.7%	4.0%	% change wrt to Net Market income			-46.4%	-44.4%
p - value			0.000	0.000	p - value			0.000	0.000
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Gini	0.4695	0.4405	0.2937	0.3134	Gini	0.4909	0.4924	0.3017	0.3221
% change wrt to Market income		-6.2%	-37.4%	-33.2%	% change wrt to Market income		0.3%	-38.5%	-34.4%
p - value		0.0000	0.0000	0.0000	p - value		0.4933	0.0000	0.0000
% change wrt to Net Market income			-33.3%	-28.9%	% change wrt to Net Market income			-38.7%	-34.6%
p - value			0.000	0.000	p - value			0.000	0.000

Source: Own calculations based on LIS data

Table C.4: Gini - Equivalised variables

Benchmark Case: pensions are part of market income (equivalised)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.2833	0.2129	0.1843	0.2000	Theil	0.2611	0.1989	0.168	0.1777
% change wrt to Market income		-0.0704	-0.099	-0.0833	% change wrt to Market income		-0.0622	-0.0309	0.0097
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income					% change wrt to Net Market income				
p - value					p - value				
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.2518	0.1848	0.1466	0.1655	Theil	0.2552	0.21	0.1614	0.1829
% change wrt to Market income		-26.6%	-41.8%	-34.3%	% change wrt to Market income		-17.7%	-36.8%	-28.3%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-20.7%	-10.4%	% change wrt to Net Market income			-23.1%	-12.9%
p - value			0.000	0.000	p - value			0.000	0.000
Sensitivity Analysis: pensions are part of transfers (equivalised)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.563	0.424	0.188	0.2078	Theil	0.5402	0.3955	0.1691	0.182
% change wrt to Market income		-24.7%	-66.6%	-63.1%	% change wrt to Market income		-26.8%	-68.7%	-66.3%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-55.7%	-51.0%	% change wrt to Net Market income			-57.2%	-54.0%
p - value			0.000	0.000	p - value			0.000	0.000
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
Theil	0.3662	0.3006	0.1507	0.1714	Theil	0.4036	0.3753	0.1646	0.1881
% change wrt to Market income		-17.9%	-58.8%	-53.2%	% change wrt to Market income		-7.0%	-59.2%	-53.4%
p - value					p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-49.9%	-43.0%	% change wrt to Net Market income			-56.1%	-49.9%
p - value			0.000	0.000	p - value			0.000	0.000

Source: Own calculations based on LIS data

Table C.5: Theil Index - Equivalised variables

Benchmark Case: pensions are part of market income (equivalised)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure	6.7168	5.4823	4.196	4.5705	90/10 measure	7.0548	5.8018	4.3183	4.5706
% change wrt to Market income		-18.4%	-37.5%	-32.0%	% change wrt to Market income		-17.8%	-38.8%	-35.2%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-23.5%	-16.6%	% change wrt to Net Market income			-25.6%	-21.2%
p - value					p - value				
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure	0.3862	0.3438	0.306	0.3207	90/10 measure	5.8004	5.3404	3.632	4.0009
% change wrt to Market income		-11.0%	-20.8%	-17.0%	% change wrt to Market income		-7.9%	-37.4%	-31.0%
p - value		0.0000	0.0000	0.0000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-11.0%	-6.7%	% change wrt to Net Market income			-32.0%	-25.1%
p - value			0.0000	0.0000	p - value			0.0000	0.0000
Sensitivity Analysis: pensions are part of transfers (equivalised)									
GERMANY / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GERMANY / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure					90/10 measure				
% change wrt to Market income					% change wrt to Market income				
p - value					p - value				
% change wrt to Net Market income					% change wrt to Net Market income				
p - value					p - value				
GREECE / 2007	Market income	Net Market Income	Disposable income	Post-fiscal income	GREECE / 2010	Market income	Net Market Income	Disposable income	Post-fiscal income
90/10 measure	5.7667	4.5847	3.5805	3.9568	90/10 measure	13.0729	28.2346	3.7286	4.1178
% change wrt to Market income		-20.5%	-37.9%	-31.4%	% change wrt to Market income		116.0%	-71.5%	-68.5%
p - value		0.000	0.000	0.000	p - value		0.0000	0.0000	0.0000
% change wrt to Net Market income			-21.9%	-13.7%	% change wrt to Net Market income			-86.8%	-85.4%
p - value			0.0000	0.0000	p - value			0.0000	0.0000

Source: Own calculations based on LIS data

Table C.6: 90/10 Index - Equivalised variables

D. Incidence Analysis - Sensitivity analysis

(a) Greece 2007

Greece 2007		Direct Taxes	Net Market Income	All Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Quintile	1	1.4%	-37.2%	0.0%	96.8%	-84.1%	65.4%	-82.7%
	2	-30.0%	-18.5%	0.0%	32.2%	-42.3%	16.0%	-72.3%
	3	-50.4%	-20.5%	13.8%	9.1%	-31.6%	-2.5%	-82.0%
	4	-68.9%	-23.1%	66.6%	-4.9%	-28.0%	-14.2%	-96.8%
	5	-96.6%	-30.6%	86.1%	-20.6%	-18.8%	-26.7%	-115.5%
Total Population		-72.7%	-26.4%	58.7%	-2.7%	-27.8%	-12.3%	-100.5%

(b) Greece 2010

Greece 2010		Direct Taxes	Net Market Income	Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Deciles	1	-30.0%	3.6%	0.0%	143.5%	-77.5%	110.0%	-358.4%
	2	-44.9%	32.6%	0.0%	55.0%	-40.6%	38.4%	-190.4%
	3	-51.2%	28.4%	37.1%	22.8%	-32.2%	10.7%	-162.9%
	4	-60.3%	18.4%	99.5%	4.8%	-28.4%	-4.9%	-147.1%
	5	-82.7%	-9.7%	113.0%	-13.3%	-21.4%	-19.5%	-125.9%
Total Population		-67.5%	6.9%	84.3%	7.9%	-28.3%	-1.9%	-141.9%

(c) Germany 2007

Greece 2007		Direct Taxes	Net Market Income	All Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Quintile	1	1.4%	-37.2%	0.0%	96.8%	-84.1%	65.4%	-82.7%
	2	-30.0%	-18.5%	0.0%	32.2%	-42.3%	16.0%	-72.3%
	3	-50.4%	-20.5%	13.8%	9.1%	-31.6%	-2.5%	-82.0%
	4	-68.9%	-23.1%	66.6%	-4.9%	-28.0%	-14.2%	-96.8%
	5	-96.6%	-30.6%	86.1%	-20.6%	-18.8%	-26.7%	-115.5%
Total Population		-72.7%	-26.4%	58.7%	-2.7%	-27.8%	-12.3%	-100.5%

(d) Germany 2010

Greece 2010		Direct Taxes	Net Market Income	Direct Transfers	Disposable Income	Indirect Taxes	Post-Fiscal Income	All Taxes (Direct and Indirect)
Deciles	1	-30.0%	3.6%	0.0%	143.5%	-77.5%	110.0%	-358.4%
	2	-44.9%	32.6%	0.0%	55.0%	-40.6%	38.4%	-190.4%
	3	-51.2%	28.4%	37.1%	22.8%	-32.2%	10.7%	-162.9%
	4	-60.3%	18.4%	99.5%	4.8%	-28.4%	-4.9%	-147.1%
	5	-82.7%	-9.7%	113.0%	-13.3%	-21.4%	-19.5%	-125.9%
Total Population		-67.5%	6.9%	84.3%	7.9%	-28.3%	-1.9%	-141.9%

Source: Own calculations based on LIS Data

Table D.1: Incidence - Sensitivity Analysis

Declaration of Authorship

I, Karin GARCIA MORENO, declare that this thesis titled, *Fiscal consolidation and rising inequality in Europe: An empirical assessment* is my own. I confirm:

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