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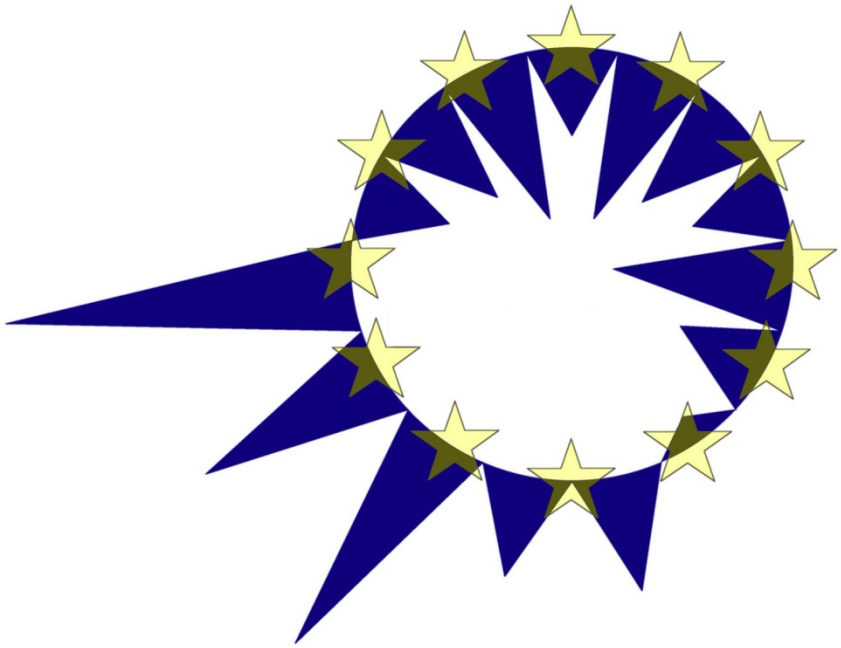

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Distributional Implications of the Crisis in Greece in 2009-2012

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DISTRIBUTIONAL IMPLICATIONS OF THE CRISIS IN GREECE IN 2009-2012[1]

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Abstract

The severe economic crisis affecting Greece since 2009 is having an unprecedented impact in terms of job and income losses, and is widely perceived to have a comparably significant effect in terms of greater inequality and increased poverty. We provide an assessment of whether (and to what extent) the latter is the case. More specifically, we use the European tax-benefit microsimulation model EUROMOD in order to quantify the impact of the austerity (i.e. fiscal consolidation policies) and the recession (i.e. negative developments in the wider economy) on the distribution of incomes in 2009-2012, and estimate how the burden of the crisis has been shared across income groups. We conclude by discussing the policy implications of our research.

JEL: C81, I3, H55

Keywords: austerity, Greece, poverty, inequality, microsimulation

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[1] This paper used EUROMOD version 4.0. EUROMOD is continually being improved and updated and the results presented here represent the best available at the time of writing. Any remaining errors, results produced, interpretations or views presented are the author's responsibility. This paper uses data from EU-SILC provided by EUROSTAT supplemented by variables from the national SILC dataset provided by the Greek statistical office. The usual disclaimers apply.

1. Introduction

The Greek crisis started off in 2009 as a fiscal crisis, soon turned into a sovereign debt crisis, and finally mutated into a full-blown recession. At the time of writing (summer 2013), the Greek economy had been posting negative growth figures for five consecutive years (since the third quarter of 2008), and showed few signs of recovery. Based upon the latest official figures (Bank of Greece, 2013), by the end of 2013 the size of the economy would have contracted by 23.5% in real terms relative to 2007. So deep and drawn out a recession had simply no precedence in the economic history of any advanced economy at peacetime.

The story of the country's crisis began in the end of 2009, when the incoming government announced that earlier fiscal data had been misreported. Revised estimates raised the 2009 figures from 3.7% to 15.6% of GDP (deficit) and from 99.6% to 129.4% of GDP (debt). Coming not long after the onset of the international financial crisis, and coinciding with sluggish growth worldwide, the Greek case assumed unanticipated dimensions. Markets reacted by increasing spreads (that is, interest rate differentials from German government bonds), and by lowering credit ratings (Meghir et al., 2010; Featherstone, 2011).

In an effort to bring public finances back under control, the government announced a first round of austerity policies in March 2010. This failed to placate the markets: in April 2010, the rating agency Standard & Poor downgraded Greece's credit rating to below investment grade (i.e. junk status), while spreads on 10-year government bonds continued to rise sharply to 1,000 basis points, from 200 basis points three months before. At that point, Greece effectively lost access to the international financial markets, and a sovereign debt crisis threatened to develop into a solvency crisis.

After much procrastination on all sides, in May 2010 a €110 billion loan was agreed with the European Commission, the European Central Bank and the International Monetary Fund, designed to cover Greece's borrowing requirements for the next three years. In return for that, the government signed a Memorandum of Economic and Financial Policies. The Memorandum committed the government to sweeping spending cuts and steep tax increases, aiming to reduce the country's public deficit below 3% of GDP by 2014 (IMF, 2010; EC, 2010). To prove the government's trustworthiness, at the same time a second austerity package was also announced.

Since then, the provisions of what is often referred to as 'the Greek Programme' have been revised several times. After the Greek Parliament approved the 'Mid-term Fiscal Strategy Framework of 2012-2015', the Euro area summit of July 2011 improved the terms of the programme by conceding lower interest rates and a longer repayment period (CEU, 2011). When the deal proved ineffective against the markets' bet that the country could not realistically service its foreign debt, the European summit of October 2011 opened the way to a negotiated reduction in the nominal value of Greek government bonds and a new €158 billion loan. In December 2012 the Council of the European Union agreed to grant Greece two additional years to bring its government deficit below 3% of GDP. The latest review of the programme (EC, 2013) specified fiscal consolidation measures to the tune of 6.5% of GDP in 2013-2014.

Under the terms of austerity policies, public sector pay, pensions, minimum wage and other social benefits have been severely cut. Nominal reductions were not compensated by falling prices: inflation, caused by VAT hikes as well as rising oil

prices internationally and product market rigidities domestically, jumped to almost 5% in 2010 and then fell to 1% in 2012. At the same time, as a result of higher tax rates in a context of falling incomes and no apparent change in tax evasion, the fiscal pressure increased.

The policies were introduced when the Greek economy was already in recession, and made it deeper still. As the demand for goods and services fell, many businesses went bankrupt, others relocated, while most of those staying afloat resorted to layoffs and/or pay arrears. As a result, unemployment rose sharply from 7.7% in 2008 to 24.3% in 2012. Moreover, official figures (Bank of Greece, 2013) reveal that average real gross earnings for employees lost more ground since the onset of the crisis than they had gained in the decade before that, with their level by the end of 2013 expected to be 9.2% below what it had been in 2000.

Due to the complexity of income surveys, relevant income data only become available after considerable delay. Microsimulation can fill this gap by providing timely estimates of the impact of the crisis on the income distribution. In addition, it enables analysts to disentangle the impact of different policy measures, taking into account the interactions of changes in labour income with social benefits and the tax system.

Our research is an attempt to estimate the changes in income distribution associated with both the austerity measures and the wider recession in Greece. By covering the period to 2012, we extend and update previous work on the distributional impact of the Greek crisis in 2010 (Matsaganis and Leventi, 2013). Our analytical tool for conducting this research is the European tax-benefit microsimulation model EUROMOD. The model applies data from income surveys to the rules of the tax and benefit system currently in force, in order to simulate entitlements to social benefits, and liabilities for direct taxes and social insurance contributions.

Our main results can be summarised as follows. We estimate that relative poverty (as measured conventionally, by reference to a variable poverty threshold at 60% of median incomes) increased moderately to 21.3% in 2012 (from 20.0% in 2009). Instead, when fixing the poverty line at 60% of 2009 median real incomes, poverty appears to have risen dramatically (to 37.0% in 2012). The rise in inequality began a year after the onset of the crisis, and gathered speed as the recession deepened. The main driver of growing inequalities was the recession, especially rising unemployment rather than austerity policies per se.

The structure of the paper is the following. Section 2 introduces the austerity policies and the main aspects of the recession. Section 3 explains the methodology of the study. Sections 4 and 5 present our tentative estimates of the distributional effects of the crisis. Section 6 concludes by summarising the most important findings and reflecting on the policy implications of our research.

2. The crisis

The paper shows how the distribution of household incomes in Greece changed over the period 2010-2012 relative to 2009.

The year 2010 is widely regarded as a watershed. Even though the Greek economy was already in recession in 2009 (GDP change: -3.1%), real wages continued to grow (+3.3%), as they had throughout the decade (real change in average wages in 2000-

2009: +23.3%). It was in 2010 (the year of the first bailout package and the associated austerity policies) that earnings began to fall. Besides, it was in 2010 that the government's fiscal consolidation effort was most successful: indeed, at about 5% of GDP, "no other OECD country has achieved such a fiscal improvement in a single year over the past three decades" (OECD, 2011).

The fact that the analysis examines the changes in income distribution up to 2012 is not to say that at that point the Greek crisis came to an end. At the time of writing, the economy showed no significant signs of recovery. The impact of more recent developments on the distribution of incomes in 2013 and beyond is the subject of ongoing research, but falls outside the scope of this paper.

For analytical purposes, the study distinguishes between austerity policies and the wider recession. This distinction is to some extent artificial. For example, the fact that the incomes of civil servants and pensioners were cut contributed to lowering the demand for goods and services provided by private firms, as a result of which private sector workers' wages and self-employment earnings declined, while unemployment rose. In the above spirit, the term '*austerity*' signifies policies specifically introduced by the government either under the provisions or in the context of the Greek Programme. In contrast, the '*wider recession*' indicates other changes in the economy, not directly under the government's control, i.e. those affecting jobs or wages in private firms and self-employment earnings.

2.1 Austerity policies

Specifically, the 2010-2012 austerity measures that affected the household side of the economy were a combination of increases in indirect taxes, introduction of new direct taxes, personal income tax reform, cuts in public sector pay, pensions and social benefits and changes in labour laws.

Public sector pay

Until 2009, wages and salaries in Greece (in the public as well as in the private sector) were paid in 14 monthly instalments. In 2010, the 13th and 14th salaries paid to civil servants and public enterprise workers were abolished. In their place, flat-rate vacation allowances totalling €1,000 a year were introduced for public sector workers earning less than €3,000 per month. Moreover, special allowances paid to civil servants[2] were reduced by 20%. Public enterprise workers, whose special allowances other than family allowances are part of base pay, had the latter cut by 10%. Public sector salaries were frozen at their 2009 level and capped at €5,981 a month. The overall civil servants' and public enterprise workers' earnings growth that was used in EUROMOD for the simulation of the public sector pay cuts is shown in Table 1

.

[2] Family allowances, and extra allowances for seniority, post-graduate studies and in case of hard and arduous occupation, were not affected by the cuts.

Table 1. Average nominal gross earnings growth (%)

	2009	2010	2011	2012
civil servants	+5.2	-7.7	-0.5	-3.8
public enterprise workers	+7.7	-5.5	-7.9	-9.5

Source: Bank of Greece (2013).

Pension benefits[3]

Retirement pensions in Greece also used to be payable in 14 monthly instalments. The 13th and 14th pensions were abolished[4] in 2010 and replaced by flat-rate vacation allowances totalling €800 a year (payable only to pensioners aged over 60 receiving a pension below €2,500 per month).

In January 2013 flat-rate vacation allowances were also abolished.[5] This measure, however, falls outside the scope of this analysis.

Direct taxation

i. Personal income tax

In 2010-2012 personal income tax was restructured three times (April 2010, October 2011 and December 2012). The most important changes introduced by the 2010 and 2011 reforms are depicted in Table 2. The 2012 reform falls outside the scope of the analysis as it will only affect incomes earned in 2013 and beyond.

Table 2. Changes in personal income tax

	2009	2010	2011-12
tax bands	5	9	8
max tax rate	40% (for annual incomes over €75,000)	45% (for annual incomes over €100,000)	same as in 2010
zero tax bracket	€12,000 for employees and pensioners €10,500 for all others	€12,000 for all	€9,000 for persons aged below 30 or above 65 €5,000 for all others

[3] The pension reform law, approved by Parliament in July 2010, is not discussed here, as its effects on pension incomes will be felt in future years.
[4] Invalidity pensions, social pensions and farmers' basic pensions were exempted.
[5] The 13th and 14th monthly installments of invalidity pensions, social pensions and farmers' basic pensions were also abolished.

increase in zero income tax bracket due to children	1st child: €1,000 increase 2nd child: €2,000 increase 3rd child: €10,000 increase	1st child: €1,500 increase 2nd child: €3,000 increase 3rd child: €11,500 increase	1st child: €2,000 increase 2nd child: €4,000 increase 3rd child: €7,000 increase
tax allowances / credits	spending on private insurance / installation of eco-friendly energy systems eligible for tax allowance	spending on private insurance / installation of eco-friendly energy systems eligible for tax credit	tax credits: 50% reduced tax allowances: abolished

Notes: 1. In 2009 a further €1,000 increase in the lowest income bracket is applicable for each subsequent child after the 3rd. In 2010 (2011-12) a further €2,000 (€3,000) increase in the lowest income bracket is applicable for each subsequent child after the 3rd.
2. Since 2010 the tax base was extended to include unemployment benefits, large family benefits and non-contributory disability benefits, when taxable income exceeded €30,000 a year.

ii. Emergency tax on large incomes

In 2010 personal incomes over €100,000 earned in 2009 were made subject to a one-off emergency tax at 1%.

iii. Solidarity contribution

Solidarity contribution was an emergency tax introduced in 2010, paid by individuals with (net) incomes exceeding €12,000 per year. The contribution's rates are shown in Table 3. If the contribution reduces the income below the lower threshold of tax bands 3-5, it is calculated by using the tax rate that corresponds to the lower income threshold. Moreover, taxable income is not allowed to fall below €12,000.

Table 3. Solidarity contribution (since 2010)

tax band	income bracket (€ per year)		tax rate (%)
1	0	12,000	0
2	12,001	20,000	1
3	20,001	50,000	2
4	50,001	100,000	3
5	100,001	…	4

Note: The tax rates apply to the entire amount of income (not just the part exceeding the threshold).

iv. Self-employed and liberal professions contribution

This is a special levy on self-employed and liberal professions. In 2010 the tax was set to €300 per year. In 2011 it amounted to €500 for those self-employed and liberal professionals working more than five years in areas with population exceeding 200,000 inhabitants and €400 for those working more than five years in areas with population between 500 and 200,000 inhabitants. No tax was levied for self-employed and liberal professionals working in areas with less than 500 inhabitants. In 2012 the

amount was raised to €650 per year for all self-employed and liberal professionals living in areas with more than 500 inhabitants.

v. Pensioners' solidarity contributions

The first special levy on pension incomes (labelled "Pensioners' solidarity contribution") was introduced in August 2010. Since then, main old-age pensions exceeding €1,400 per month are subject to taxation as shown in Table 4.

Table 4. Pensioners' solidarity contribution

			2010	2011-12
tax band	pension bracket (€ per month)		tax rate (%)	
1	0	1,400	0	0
2	1,401	1,700	3	3
3	1,701	2,000	4	6
4	2,001	2,300	5	7
5	2,301	2,600	6	9
6	2,601	2,900	7	10
7	2,901	3,200	8	12
8	3,201	3,500	9	13
9	3,501	…	10	14

Notes: 1. The tax rates apply to the entire pension amount.
2. The 2011-12 tax rates were implemented in August 2011 (before that, the 2010 rates were applicable).

An additional levy on main old-age pensions was introduced in August 2011. The contribution applies to pensioners below 60 (except from mothers of underage children) with main pensions exceeding €1,700 per month. The contributions' rates are shown in Table 5.

Table 5. Additional pensioners' solidarity contribution

tax band	pension bracket (€ per month)		tax rate (%)
1	0	1,700	0
2	1,701	2,300	6
3	2,301	2,900	8
4	2,901	…	10

Notes: The tax rates apply to the entire pension amount minus the 'pensioners' solidarity contribution'.

Since November 2011 all pensioners below 55 with main old-age pensions exceeding €1,000 are subject to 40% taxation. Persons aged above 55 with main old-age pensions exceeding €1,200 are subject to 20% taxation. The tax rates apply to the pension amount exceeding the above thresholds after all other solidarity contributions concerning main pensions have been deducted.

Since January 2012 all main old-age pensions exceeding €1,300 are subject to an extra 12% taxation. The tax rate applies to the pension amount exceeding €1,300 after the deduction of all the above mentioned solidarity contributions. Pensions are not allowed to fall below €1,300.

Since August 2011 supplementary pensions exceeding €300 per month are also subject to taxation. In January 2012 an additional tax for supplementary pensions was introduced. The rates of the two taxes are shown in Tables 6 and 7.

Table 6. Pensioners' solidarity contribution for supplementary pensions

Tax band	Pension bracket (€ per month)		Tax rate (%)
1	0	300	0
2	301	350	3
3	351	400	4
4	401	450	5
5	451	500	6
6	501	550	7
7	551	600	8
8	601	650	9
9	651	…	10

Note: The tax rates apply to the entire pension amount.

Table 7. Additional pensioners' solidarity contribution for supplementary pensions

tax band	pension bracket (€ per month)		tax rate (%)
1	0	250	10
2	250.01	300	15
3	301.01	…	20

Note: The tax rates apply to the entire pension amount minus the solidarity contribution for supplementary pensions.

vi. Emergency property tax

Since 2011, all persons who own commercial or residential property in Greece are subject to an emergency property tax. Its amount, varying from €3 to €16 per square meter, depends on the size and the cadastral value of the building. A specific factor varying from 1 to 1.25 according to the age of the building is also applicable (property tax = tax rate * square meters * age factor).

A reduced rate of €0.50 per square meter applies to some vulnerable population categories (i.e. people with more than three children with taxable income less that €30,000 per year or persons suffering from disability over 67%). Long term unemployed or recipients of unemployment benefit for more than 6 months, with family income not exceeding €12,000 per year (plus €4,000 for every dependent child) are exempted from the tax.

In EUROMOD the age factor was set to 1 for all of the tax payers due to lack of information about the age of buildings. The tax rates per square meter used were the average rates for urban and rural/ semi-rural areas according to a large tax data sample provided by the Greek authorities (i.e. €5.3 per square meter for those residing in urban areas and €3.7 per square meter for those residing in rural/ semi-rural areas). The detailed distributions of the properties' cadastral values are presented in the Appendix of this paper (Table A.1).

Indirect taxation

The standard rate of VAT was raised from 19% to 23% in two steps between March and May 2010. Base and reduced rates were increased from 4.5% to 5.5% and from 9% to 13% respectively. Excise duty on alcohol, tobacco, luxury items, and especially heating oil, also went up. The way that changes in indirect taxation were accounted for in this study is thoroughly explained in section 3.4.

Social insurance contributions

In August 2011 private sector employees' and employers' social insurance contributions for unemployment protection were increased by 0.5%. The corresponding civil servants', self-employed workers' and liberal professionals' contributions were increased by 2%, €10 and €31.15 per month respectively.

Social benefits

Funding cuts, in some cases aggravated by a significant drop in social insurance organisations' income from contributions, undermined the regular payment of social benefits. In one instance (*OEK* rent benefit for private sector employees, the main housing benefit in Greece), the benefit's payment was entirely suspended for 2010. In two other instances (*EKAΣ*[6] and social pension[7]), the effort to weed out ineligible claimants intensified, with the inevitable result that some eligible recipients had their benefit suspended. The 13th and 14th payment of *EKAΣ* was also abolished. Furthermore, since March 2012 the unemployment insurance benefit was reduced by 21% (from €454 to €360).

Labour laws

In 2010 entry wages for workers aged below 25 were allowed to be set 20% below the statutory minimum for a maximum duration of one year.

Since February 2012 minimum wage was reduced by 22% for workers aged above 25 and 32% for workers aged below 25. Its rates for white-collar workers in 2009-2012 are presented in Tables 8 and 9. In EUROMOD the drop in minimum wages was captured in an indirect way by using the Bank of Greece estimates for employment income growth by economic sector in 2012. The full list of factors used for the uprating of employment incomes can be found in the Appendix (Table A.2).

Table 8. Minimum wage of white-collar workers above 25

gross minimum monthly wage (€)	2009-11	2012
seniority	unmarried	
up to 3 years	739.56	586.08
4 to 6 years	801.17	644.69
7 to 9 years	874.01	703.30
more than 9 years	946.84	761.90

[6] An income-tested supplement aimed at recipients of old age and survivor pension.
[7] A non-contributory, income-tested pension, reserved for people over 65 years of age who lack independent means of support.

gross minimum monthly wage (€)	2009-11	2012
seniority	unmarried	
seniority	married	
up to 3 years	813.52	644.69
4 to 6 years	875.13	703.30
7 to 9 years	947.96	761.91
more than 9 years	1,020.80	820.51

Note: The wages provide are those valid in 30th June of each respective year.

Table 9. Minimum wage of white-collar workers below 25

gross minimum monthly wage (€)	2009-11	2012
seniority	unmarried	
up to 3 years	739.56	510.95
more than 3 years	801.17	562.05
seniority	married	
up to 3 years	813.52	562.05
more than 9 years	875.13	613.15

Note: The wages provide are those valid in 30th June of each respective year.

2.2 The recession

Meanwhile, the Greek economy plunged into deep recession. As the demand for goods and services fell, a large number of businesses went bankrupt, while many of those staying afloat resorted to layoffs. Some firms, mostly in light manufacture and typically in North Greece, relocated to the Balkans, where labour costs and taxes were lower. As a result of that, unemployment rose sharply, and private sector wages were significantly reduced. Self-employment earnings also declined – even in the case of the affluent 'liberal professions' of medical doctors, law practitioners and engineers. Rising prices, partly due to VAT hikes, further eroded families' purchasing power. Some key economic and budgetary figures are presented in Table 10. The way that the aspects of the recession are accounted for in this study is thoroughly explained in section 3.

Table 10. Key economic and budgetary figures

	2007	2008	2009	2010	2011	2012
deficit (% GDP)	6.5	9.8	15.6	10.7	9.4	6.6[f]
debt (% GDP)	107.4	112.9	129.7	148.3	170.6	161.6[f]
real GDP growth (%)	+3.5	-0.2[p]	-3.1[p]	-4.9[p]	-7.1[p]	-6.4[p]
unemployment (%)	8.3	7.7	9.5	12.5	17.7	24.3
harmonised CPI (%)	3.0	4.2	1.4	4.7	3.1	1.0
nominal earnings growth (%)						
total economy	5.2	6.2	4.6	-4.6	-1.7	-6.6
private sector workers	6.1	6.5	2.8	-2.9	-1.7	-9.3

Notes: p: provisional data (provided by EUROSTAT); f: forecast by the EC (2013).
Unemployment data (provided by El.Stat) are seasonally adjusted.
Sources: EUROSTAT, El.Stat., Bank of Greece.

3. Methodology

While crises are widely thought to cause poverty and inequality to rise, establishing their distributional effects is less straightforward than appears at first sight. Their consequences may vary substantially, depending on the interaction between the (reduced) earnings of those affected, the income and employment status of other members of the same households, and the capacity of the tax-benefit system to absorb macroeconomic shocks (Atkinson, 2009; Nolan, 2009). In turn, the aggregate redistributive effect of a tax-benefit system depends on its overall size, as well as on the progressivity and relative weight of the policies it comprises (Rawdanowicz, 2013). Distributional effects may also look different depending on the dimension considered. For example, average living standards typically decline in a crisis, but inequality need not rise, while the estimated effect on poverty will be less pronounced when the relevant threshold is set as a proportion of average (or median) incomes than when it is held constant in purchasing power terms (Jenkins et al., 2013).

Furthermore, the policy content and the distributional impact of austerity policies need not necessarily be regressive. As a recent survey of fiscal consolidation programmes in 29 OECD countries in 1971-2009 by Kaplanoglou et al. (2013) has demonstrated, fiscal adjustments can be fair: "ameliorating the effects of adjustment, by supporting the weaker parts of society, is crucial for the success of fiscal consolidations and […] may provide the double dividend of enhancing the probability of success of the adjustment and of promoting social cohesion."

Our analysis relies on the European microsimulation model, EUROMOD. The model uses survey data on original incomes, labour market status and other characteristics of the individuals and households concerned, which it then applies to the tax and benefit rules in place in order to simulate direct taxes, social insurance contributions and entitlements to non-contributory cash benefits. The components of the tax–benefit system that cannot be simulated (for example, those depending on prior contributions) are read off the data.[8] EUROMOD has been validated at micro level (i.e. case-by-case validation) and at macro level (Figari et al., 2012). Furthermore, it has been tested in numerous applications – for a comprehensive overview, see Sutherland and Figari (2013).

The key advantages of using microsimulation in general, and EUROMOD in particular, are two. The first is timeliness. Due to the complexity of income surveys, relevant income data only become available after considerable delay. For instance, data from the EU-SILC 2013 survey (reporting incomes earned in 2012) will be released in March and August 2015 (cross-sectional and longitudinal component respectively). In the meantime, microsimulation can bridge the gap, providing an early evaluation of the distributional impact of the Greek crisis up to 2012.

The second advantage is attribution. EUROMOD enables the analyst to disentangle changes in the income distribution, and to identify the effects of each policy (for example, changes in personal income tax) or other development (for example, the rise in unemployment) separately, taking into account the complex ways in which taxes

[8] For more information see Sutherland and Figari (2013). EUROMOD has recently undergone a major updating process and now covers policy systems up to 2012 for all EU-27 countries now runs on European Union Statistics on Income and Living Conditions (EU-SILC). Most of EUROMOD input data are derived from the EU-SILC data.

interact with benefits and with each other. A direct analysis of actual data, when these become available, cannot do this as well.

Naturally, these advantages come at a price. In its standard version, EUROMOD only provides estimates of first-order distributional effects, ignoring second-order behavioural responses (such as those related to consumption or labour supply). To the extent that these are deemed to be significant, this will bias our estimates of distributional effects.

Moreover, there is no doubt that the fiscal squeeze has severely affected the quality and quantity of public services provided. Capturing the distributional impact of social benefits in kind is not a standard feature of most tax–benefit models. Although substantial progress has been made towards incorporating non-monetary components into EUROMOD,[9] the relevant module is not available yet. In view of the above, changes in the provision of social benefits in kind (publicly-funded health care, education, care for the elderly, childcare and so on) are ignored in this study.

Microsimulation has been extensively used as a tool for establishing the distributional impact of the recent economic downturn in a number of affected countries. Callan et al. (2011) used microsimulation to examine the effects of the public sector pay cuts introduced in Ireland in 2009-10. Given that the country's public employees are mostly located in the middle and upper parts of the income distribution, the impact of the package of public sector pay cuts was shown to be progressive relative to a counterfactual of a universal 4% cut in pay rates in both the public and private sectors. Nolan et al. (2013) expanded the analysis to include the overall distributional impact of tax and welfare changes over the period 2009–2011, and again found the result to be highly progressive.

In Italy, Brandolini et al. (2013) built a microsimulation model to replicate employment dynamics in 2007-2010 and estimate the related variations in income flows. In the light of their findings they argued that the impact of the recent recession on inequality and poverty in the country has been fairly limited, despite the considerable fall in average income. Elderly households appear to have been better protected from the adverse effects of the crisis than non-elderly households.

In the UK, where the government has embarked on a far-reaching austerity programme, Browne and Levell (2010) examined the distributional effect of tax and benefit reforms to be introduced between June 2010 and April 2014. Their analysis showed that the results are likely to be regressive, with the biggest losers being the low income households of working age. Brewer et al. (2011) used a static microsimulation model augmented with forecasts of key economic and demographic characteristics to forecast poverty among children and working-age adults. Their findings suggest that relative child poverty, having remained broadly constant between 2009-2010 and 2012-2013, will rise slightly in 2013-2014. Relative working-age adult poverty rises slightly between 2009-2010 and 2012-2013, before rising faster in 2013-2014. Both absolute child and working-age adult poverty rise continuously, and by more than relative poverty, over this period. Joyce and Sibieta (2013) studied the effects of reforms to the tax and benefit system between 2008–2009 and 2010–2011, and found that those with the lowest incomes lost the most from these reforms relative to their income. More recently, Brewer et al. (2013) projected

[9] For more information see Paulus et al. (2010).

the distribution of income to 2015–16, and concluded that the timing of the recession's impact varies widely across income groups: for those in the middle and upper parts of the distribution, falls in real income mostly took place between 2009–10 and 2011–12 whereas for those towards the bottom of the distribution, real income falls will mostly occur between 2010–11 and 2015–16.

In a comparative setting, Avram et al. (2012) simulated the distributional effects of fiscal consolidation measures up to 2012 in nine EU countries. The study showed that the burden of austerity was shared differently across the income distribution in these countries: in Greece, Spain, Italy, Latvia, Romania and the UK the rich lost a higher proportion of their incomes than the poor, whereas in Estonia, the opposite seemed to be the case. The burden of the Lithuanian and Portuguese fiscal consolidation fell more heavily on the poorer and the richer than it did on people located in the middle of the income distribution. The incorporation of the effect of the VAT hikes reduced the progressive effect (or enhanced the regressive effect) of policy changes in all nine countries.

We believe that our research adds to the existing literature in many ways. To start with, it is part of a sustained research effort (the only one available to date) on the impact of the recent crisis in Greece. Moreover, we simulate the full effects of the crisis. This is in contrast to Brandolini et al. (2013), where all changes in the income distribution are driven by the flows into and out of employment (as wages, self-employment earnings and pension entitlements are assumed not to have changed during the period under examination), but also to Avram et al. (2012), where the cumulative effect of all austerity policies is assessed on the 2012 income distribution. Finally, unlike most of the studies reviewed above, by simulating the effects of specific policy changes taking place at the same time we are able to distinguish between progressive and regressive items within the same policy package.

The underlying micro data for Greece are drawn from the 2007 European (UDB) and the national (PDB) versions of the European Union Statistics on Income and Living Conditions (EU-SILC), a dataset which is specifically designed to provide detailed and multidimensional information on income distribution and social inclusion. The use of the PDB version allows us to exploit all information collected in the national questionnaires, which is closer to the level of detail required for accurate tax and benefit simulations.

In micro data, sampling errors and other biases can rarely be avoided. For instance, the Greek EU-SILC 2007 over-represents certain population subgroups (civil servants, banking employees), while it under-represents others (self-employed, farmers, pensioners). To deal with possible composition bias, we reweighted the EU-SILC dataset by occupational status, as revealed by social insurance affiliation, using data from administrative surveys (Ministry of Employment and Social Protection, 2008) and applying the algorithm developed by Gomulka (1992).[10] We then repeated our analysis on the reweighted dataset. We found that poverty rates showed no significant change. In view of that, and given that non-reweighted EU-SILC data are routinely used in research and official publications all the same, we have decided merely to note the issue but take no further action.

[10] For a thorough overview of this procedure and its limitations, see Brewer et al. (2006).

The non-availability, at the time of writing, of 'real' data for the time period in question implied that a synthetic income distribution had to be created for these years. As is standard practice in microsimulation, updating the model involved two separate steps: simulating tax and benefit policies and uprating the dataset's underlying incomes, from EU-SILC's income reference period (2006) to the latest policy year (2012). To these, we added a further step: accounting for the rise in unemployment. The way that changes in unemployment were accounted for in this study is thoroughly explained in section 3.1.

With respect to the first step, the Greek tax–benefit system was simulated for every single year from 2006 to 2012. In particular, we have been able to simulate all the austerity policies described in Section 2.1, apart from the changes in excise duties. Note that simulations may be imperfect when, for example, income tax rules are too complex to be accurately simulated, or when eligibility for means-tested benefits depends on income in previous years. In our case, the level of detail encompassed in the PDB dataset allowed us to simulate complex direct taxation rules with a high degree of accuracy.

Uprating incomes need not amount to assuming that everyone's income from a given source has changed by the same rate over the relevant period. That would clearly be unrealistic and would understate distributional changes. In this paper, earnings growth was disaggregated by occupational category. Workers in dependent employment were divided into four categories: civil servants, public utility workers, banking employees and workers in the (non-banking) private sector. Specific uprating factors, based on Bank of Greece estimates (2013), were applied to account for earnings growth of employees by category in 2006–12. On the other hand, farmers' earnings were uprated on the basis of data on gross value added by industry (El.Stat., 2013). As regards self-employment, given that no reliable information on earnings growth was available concerning the period of interest, we assumed that the relevant incomes moved in tandem with average incomes in the entire economy. The full list of factors used for the uprating of original incomes and non-simulated benefits from 2006 to 2012 can be found in the Appendix of this paper (Table A.2).

In order to enhance the accuracy and credibility of estimates, an effort has been made in order to address the issues of tax evasion, benefit and non take-up, and account for VAT changes, albeit in an indirect way. The way that these issues were accounted for is explained in detail in sections 3.2, 3.3 and 3.4 respectively.

3.1 Accounting for the rise in unemployment

Standard practice in microsimulation is simply to ignore changes in the demographic composition or in the labour market characteristics of the relevant population. This is less unwise than it may seem, since such changes are likely to be negligible in the short term over which policy changes are typically assessed. However, since the onset of the crisis, unemployment in Greece rose by sixteen percentage points, from 8.3% in 2007 to 24.3% in 2012. Given the magnitude of this rise, assuming away such a change would clearly have been inappropriate for this research.

Drawing on Baldini and Ciani (2010) and Figari et al. (2011), we accounted for the rise in unemployment by modifying the employment status of the required number of cases in the dataset. The relevant subsample included workers in dependent employment other than tenured civil servants. In the absence of relevant information,

self-employed workers were also excluded from the subsample. By doing so, we have implicitly assumed that the reduced demand for goods and services provided by the self-employed has resulted in loss of earnings but not in loss of jobs. To some extent, this is a reasonable assumption; according to the own account and self-employed workers' social insurance fund (OAEE), the number of OAEE contributors has been kept relatively stable during the crisis (OAEE, 2013).[11] Then we split the subsample into 56 groups defined by gender, age and education. After that, we randomly moved a number of cases within each group from employment to unemployment in order to replicate as closely as possible the pattern of unemployment shown in the Greek Labour Force Survey (LFS) of 2010, 2011 and 2012 (Q1-Q3 average). The earnings from dependent employment of those made unemployed in the dataset were set to zero.

The LFS unemployment rates and the unemployment rates achieved in the adjusted EU-SILC dataset are depicted in Tables 11 and 12.

Table 11. LFS unemployment rates by age, gender and education attainment (%)

	2009	2010	2011	2012
men all (aged 20-64)	6.8	9.9	14.9	20.7
20-24	18.8	25.4	36.9	46.0
25-29	12.1	16.4	26.1	34.5
30-44	5.6	8.7	13.2	19.2
45-64	4.6	6.8	10.3	14.8
PhD or Master's	5.6	6.7	10.3	12.1
university	4.8	6.1	9.0	12.5
technical and post secondary	7.1	10.3	15.3	21.4
upper secondary	7.2	10.2	15.9	21.8
lower secondary	8.4	12.2	17.2	22.7
primary (completed)	6.2	10.0	16.1	24.6
incomplete primary / no schooling	14.1	19.0	33.1	36.4
women all (aged 20-64)	13.0	15.6	21.4	27.3
20-24	32.5	39.7	49.5	60.4
25-29	18.8	23.0	33.8	39.7
30-44	12.4	15.0	20.3	26.3
45-64	7.6	9.1	12.4	18.1
PhD or Master's	9.7	9.4	10.2	13.4
university	8.4	10.5	16.3	20.1
technical and post secondary	15.2	19.2	25.2	31.7
upper secondary	14.8	17.7	24.7	30.5
lower secondary	15.8	17.7	23.5	32.4
primary (completed)	11.7	13.4	16.6	23.7
incomplete primary / no schooling	13.9	18.3	30.3	40.5

Source: LFS 2009-2012 (2012: Q1-Q3 average).

[11] From 828,517 contributors in 2009 to 811,714 contributors in 2011.

Table 12. EU-SILC 2007 unemployment rates by age, gender and education attainment (%)

	original dataset	adjustment for 2010	adjustment for 2011	adjustment for 2012
men all (aged 20-64)	6.3	10.0	15.2	21.3
20-24	20.2	26.1	36.1	44.5
25-29	12.0	15.3	24.0	31.8
30-44	3.7	8.4	13.2	19.6
45-64	4.9	7.1	10.8	15.6
PhD or Master's	4.2	7.1	10.1	11.7
university	4.7	6.1	8.9	12.5
technical and post secondary	8.0	10.3	15.2	21.3
upper secondary	6.7	10.2	15.8	21.8
lower secondary	6.4	12.2	17.2	22.7
primary (completed)	6.1	10.0	16.0	24.6
incomplete primary / no schooling	8.3	18.7	31.0	35.7
women all (aged 20-64)	13.0	15.7	20.8	27.3
20-24	38.1	40.6	45.7	55.0
25-29	18.6	24.3	32.5	39.7
30-44	11.7	13.8	19.2	25.6
45-64	6.0	8.3	11.8	17.5
PhD or Master's	22.5	22.5	22.5	22.5
university	7.6	10.5	15.0	20.1
technical and post secondary	13.3	19.2	25.2	31.7
upper secondary	15.5	17.7	24.7	30.5
lower secondary	16.7	17.7	23.5	32.4
primary (completed)	11.4	13.4	15.4	23.7
incomplete primary / no schooling	6.4	14.2	27.2	40.5

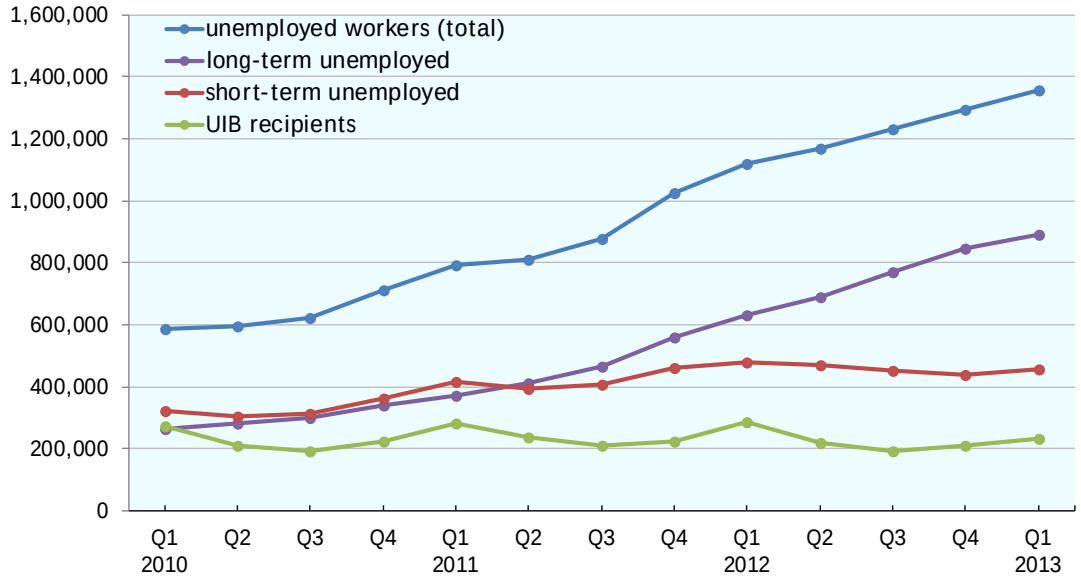
Notes: Due to its close proximity to the 2009 LFS unemployment rates, the original EU-SILC dataset was used for accounting for the pre-crisis (i.e. 2009) unemployment.

Source: EU-SILC 2007.

An alternative way to deal with changes in employment status might have been to reweight the EU-SILC sample by increasing the weights of households containing unemployed workers at the time of the survey, while at the same time reducing the weights of other households so as to keep constant the composition of the dataset (Immervoll et al., 2006). The drawback with that approach is that reweighting would amount to implicitly assuming that the characteristics of those losing their job at the onset of the crisis are similar to those already unemployed at the time of the survey. In the case of Greece, this can be quite misleading, as all available evidence indicates that the characteristics of workers made unemployed in 2010-2012 were quite different from those of workers made unemployed in earlier years.

Some of the workers that lost their jobs would be eligible for unemployment insurance benefit (UIB), depending on their previous employment record. Figure 1 shows the official number of unemployed workers (both long-term and short-term), and people in receipt of the UIB. In 2010 long-term unemployed represented 47.2% of total unemployed workers; in 2012 they represented 61.0% of the total unemployed population. As the maximum duration of UIB is 12 months (i.e. the long-term unemployed are not covered), the percentage of the unemployed population in receipt of the benefit follows a steady downward trend: from 36% in 2010 to 28% in 2011 and 19% in 2012. These rates, combined with data on the age and gender profile of the unemployment benefit recipients, were used when simulating the benefit in EUROMOD in order to capture as closely as possible the size and the characteristics of this population group.

Figure 1. Unemployed workers versus unemployment benefit recipients



Source: El.Stat., Manpower Employment Organization (OAEΔ).

3.2 Accounting for tax evasion

In common with most tax–benefit models, EUROMOD works under the default assumption of full compliance (i.e. that tax and benefit rules are fully adhered to). This is an obvious oversimplification – most clearly so when tax evasion is present and known to be rife (OECD, 2011). As a consequence, to ignore tax evasion when estimating the distributional impact of the crisis in Greece would be seriously to undermine the validity of results.

In accounting for tax evasion we use the assumption that individuals reveal their real net income (say N_i) to survey interviewers. We focus on three income sources: salaries and wages, farming income and self-employment earnings. Let r_i denote the stylised rates of income under-reporting. The rates applied here, drawn from Matsaganis and Flevotomou (2010), were set to 1% for salaries and wages, 25% for self-employment earnings and 55% for farming incomes. Let G_i denote individuals' real gross income (which includes the part of income which is not reported to the tax

authorities) and $T(G_i,r_i)$ denote the personal income tax function. In the presence of tax evasion, it follows that:

$G_i = N_i + T((1-r_i)* G_i)$

By solving this recursive problem iteratively and for each income source separately, we obtain the values of real gross income, G_i. The rates of under-reporting are then used to separate the reported from the unreported part of gross income. In the 'tax evasion' scenario EUROMOD treats the former as subject to income tax and social insurance contributions (and as used in resource assessment for means-tested benefits), while it adds the latter to individuals' disposable income. In the 'full compliance' scenario the obtained gross income is assumed to be fully declared to the tax authorities.

As a sensitivity test, the rates of under-reporting were allowed to vary by 20% around these levels. The results for 2010 are presented in the Appendix (Table A.3). On this evidence, our results seem quite robust to the way tax evasion was accounted for in the study.

3.3 Accounting for benefit non take-up

Furthermore, we corrected for non take-up of two income-tested benefits: social pension, aimed for people aged over 65 with insufficient contributions for a social insurance pension; and unemployment assistance for older workers, a small-scale programme targeted at the long-term unemployed aged over 45 on low income.[12] In the former case, the social pension was only assigned to people who declared receipt in the original dataset. In the latter case, non-take-up rates were calculated by comparing administrative data on benefit recipients as simulated by EUROMOD. As a result of that, unemployment assistance was randomly assigned to a fraction of eligible recipients, as depicted in Table 13.

Table 13. Non take-up rates of unemployment assistance for older workers benefit

	2009	2010	2011	2012
actual recipients	733	1,850	3,003	20,196
simulated recipients in EUROMOD	34,383	36,141	61,659	190,390
non take-up rate	2.1%	5.1%	4.9%	10.6%

Source: Manpower Employment Organization (ΟΑΕΔ), EUROMOD (version F4.0).

3.4 Accounting for changes in VAT rates

Since EU-SILC provides no information on consumption, we were unable to estimate directly the distributional impact of the VAT hikes. We therefore estimated the distributional effects of the 2010 VAT hikes indirectly, drawing on the findings of Decoster et al. (2010). The authors estimated consumption expenditures (and hence indirect taxes paid) as a function of individual and household characteristics, using

[12] In 2012 the income threshold increased from €5,000 to €12,000 per year.

data from consumption surveys – in the case of Greece, the 2005 Household Budget Survey (HBS).

We therefore simulated the 2010 VAT changes on data from HBS 2005. We first estimated VAT paid as a proportion of household equivalised disposable income, under the old and new VAT rates. We were thus able to incorporate, albeit indirectly, VAT increases in our analysis of the relative contribution of each austerity measure to overall fiscal consolidation, and of their incidence by income decile (see Figure 4). Nevertheless, we could not directly account for the distributional effects of changes in VAT rates elsewhere in the paper. On the evidence of Table 14, it appears that the distributional effect of the rise in VAT was unambiguously regressive, with the extra tax as a share of income ranging from 6.5% for the poorest decile to a mere 2.5% for the richest decile.

We then estimated VAT paid as a proportion of household equivalised expenditure by (income) decile, before and after the hike. On the evidence of Table 15, it seems that the distributional effect of the rise in VAT was proportional, with the extra tax as a share of expenditure fluctuating very narrowly around 2.5% across the distribution.

Table 14. VAT paid as percentage of equivalised disposable income

decile	at 2009 VAT rates	at 2010 VAT rates	difference
1	28.6	35.1	6.5
2	22.6	27.6	5.0
3	19.2	23.5	4.3
4	18.8	22.9	4.1
5	17.7	21.6	3.9
6	16.2	19.7	3.5
7	15.8	19.2	3.4
8	14.9	18.2	3.2
9	14.2	17.2	3.0
10	11.9	14.4	2.5

Note: Disposable income by decile is calculated by using the HBS 2005.

Table 15. VAT paid as percentage of equivalised expenditure

decile	at 2009 VAT rates	at 2010 VAT rates	difference
1	10.5	12.9	2.4
2	11.4	14.0	2.5
3	11.6	14.2	2.6
4	11.9	14.6	2.6
5	11.7	14.3	2.6
6	11.9	14.4	2.6
7	12.1	14.7	2.6
8	11.8	14.4	2.5
9	11.9	14.5	2.5
10	11.6	14.0	2.4

Note: Disposable income by decile is calculated by using the HBS 2005.

How can these findings be reconciled? First of all note that, in HBS 2005, expenditure was consistently higher than income (by 34.0% on average). To some extent, this can

be attributed to the steep decline in private net savings that reached its peak in the mid-2000s (i.e. at the time of the survey).

But what drives our contradictory findings on the distributional effect of the rise in VAT is that, in the HBS 2005 data set, expenditure rose with income, but at a slower rate. Specifically, while the poorest decile seemed to overspend its income by 171.3%, the corresponding figure for the richest decile was only 2.7%.

This pattern can be attributed partly to consumption smoothing over the life cycle and partly to the fact that the marginal propensity to consume falls as income rises. To the extent that the latter also holds in terms of lifetime income, we conclude that the effects of indirect taxes in general (and of the 2010 rise in VAT in particular) must be regressive.

4. Results

This section focuses on the analysis of the overall effects of the 2010-2012 austerity policies and the wider recession on inequality and poverty. It also attempts to measure the yearly income losses of each income decile of the population, both in absolute and in relative terms. More disaggregated analysis is provided in Section 5.

Note that some of the poverty and inequality results for 2009-2010 provided in Matsaganis and Leventi (2013) slightly differ from the ones presented below. This is due to the fact that the Bank of Greece has recently updated its estimates on civil servants', public utility workers' and banking employees' earnings growth for this period. El.Stat. has also updated its estimates on gross value added by industry, which is used in order to uprate farmers' earnings.

4.1 Inequality

To assess inequality effects, we use three indicators. The first is the Gini coefficient, probably the most widely used inequality indicator, taking values ranging from 0 (total equality) to 1 (total inequality). The second inequality indicator is the coefficient of variation, a measure of income dispersion (Duclos and Araar, 2006). The third indicator is the S80/S20 income quintile share ratio, measuring the (equivalised disposable) income received by the richest 20% of the population divided by that received by the poorest 20% of the population. Note that the Gini coefficient is highly sensitive to inequalities in the middle of the income distribution, whereas the S80/S20 is sensitive to changes at the two ends of the distribution.

The estimated effect of austerity policies and the recession on income inequality is shown in Table 16. On all the indices we selected, inequality seems to have increased. In terms of the Gini index, it appears that inequality fell somewhat in 2010, went back to just above its 2009 level in 2011, and rose more decisively in 2012. The coefficient of variation moved in a similar way: after falling by 3.3% in 2010, it rose by 3.5% in 2011 and by an additional 3.5% in 2012. In terms of the S80/S20 index, the rise in inequality was substantial in 2011 (+6.2%) and outright spectacular in 2012 (+17.2%).

The different performance of our three indicators implies that changes were more significant at the two ends of the income distribution, than was the case around the

middle. This finding is also depicted in Figure 2. The disaggregated impact of each austerity policy on inequality as well as the (separate) impact of the recession is discussed in Sections 5.2 and 5.3.

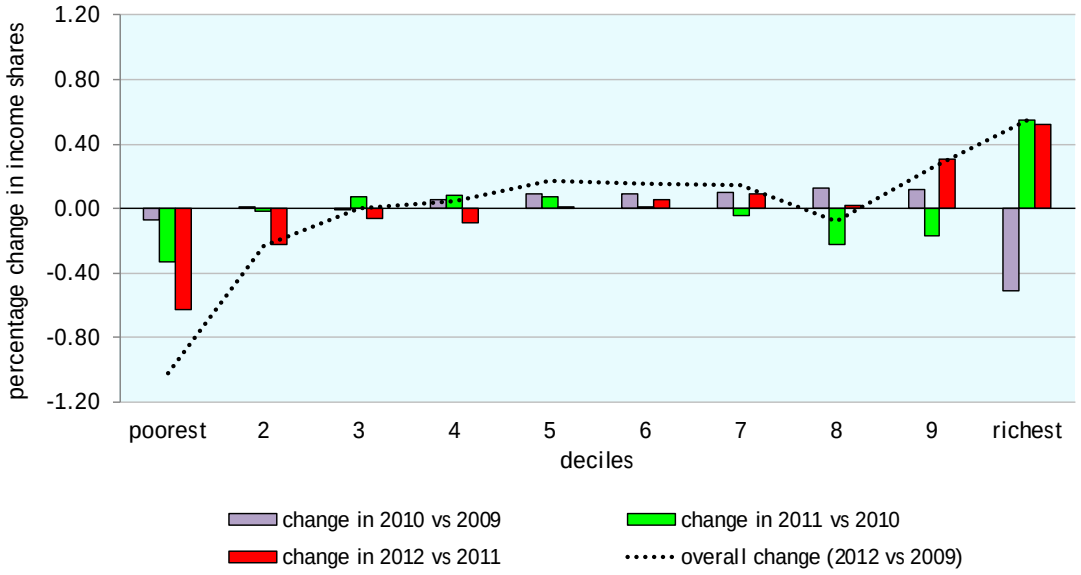
Table 16. Inequality indices

	2009	2010	2011	2012
Gini coefficient	0.3499	0.3471	0.3526	0.3678
(95% confidence interval)	*(±0.0066)*	*(±0.0063)*	*(±0.0067)*	*(±0.0069)*
coefficient of variation	0.7924	0.7665	0.7934	0.8211
(95% confidence interval)	*(±0.0383)*	*(±0.0348)*	*(±0.0383)*	*(±0.0384)*
S80/S20	6.0668	6.0628	6.4394	7.5442

Notes: The estimated differences in the Gini coefficient and in the coefficient of variation are statistically significant at the 5% level (P<0.05).
Source: EUROMOD (version F4.0), DASP V2.2.

Figure 2 offers a visual representation of changes in relative income share by decile. It can be seen that the richest decile actually gained ground in relative terms (from 26.7% to 27.3% of total income). The greatest loss was suffered by the poorest decile (from 2.6% to 1.6% of total income) followed by decile 2 (from 4.3% to 4.1% of total income). Otherwise, income deciles 3-9 seem to have improved their relative position a little or to have kept it relatively stable. On the whole, apart from the poorest and the richest decile, changes in income share were rather limited.

Figure 2. Changes in relative income share



Notes: Income deciles were constructed according to the 'modified OECD' equivalence scale. Household disposable income is defined as total income, from all sources, of all household members, net of taxes and social insurance contributions.
Source: EUROMOD (version F4.0)

4.2 Poverty

To assess poverty effects, we use two different indicators. The first is the standard poverty rate, measured in terms of the proportion of the population with an equivalised income below 60% of the median equivalised disposable income.[13] By construction, the standard poverty line goes up as median incomes improve, and goes down as median incomes fall: in our case, from €570 per month in 2009 to €458 in 2012. This is quite consistent with the concept of 'relative poverty', and may not matter much when income growth is slow either way.

However, at times of rapid change in living standards, individuals may compare their material circumstances not only with those of 'the average person' in the society in which they live, but also with their own in a previous period. To approximate that, our second indicator fixes the poverty line at 60% of the 2009 median; this threshold moves up with inflation: here, from €570 per month in 2009 to €622 in 2012. In other words, the second indicator tries to capture the experience of those unable to purchase in 2010-2012 (the 'crisis years') the goods and services that were just affordable to those with income equal to the 2009 poverty threshold (i.e. on the eve of the Greek crisis).

Tables 17 and 18 show how our two poverty indicators moved during the crisis. Results are shown by gender, age, area, tenure, and employment status.

Using the standard poverty line, the relative poverty rate seems to have risen moderately: from 20.0% in 2009 to 21.3% in 2012, with the biggest rises being observed in the unemployed population, people living in rented dwellings or paying mortgages and in the age group of 30-44. However, fixing the poverty line at its pre-crisis level in real terms drastically alters the picture: on that indicator, poverty appears to have almost doubled to 37.0% in 2012. The unemployed suffered an increase in poverty from an already high 32.2% in 2009 to 57.8% in 2012 and are now facing the most alarming poverty rates. The rise in poverty was also substantial for students, private sector employees, own account workers and farmers. On the other hand, compared to all the other professional categories, public sector workers, banking employees and liberal professionals have kept their poverty rates relatively low.

With respect to age, the deterioration was more pronounced for children aged 0-17 (+20.7 percentage points), persons aged 30-44 (+20.6 percentage points) and persons aged 18-29 (+20.2 percentage points). Our results suggest that the rise in poverty is affecting families with children more than other household types. In particular, using the conventional poverty line, the elderly seem to have improved their relative position in terms of income. This is because older persons on low incomes, though not fully protected, suffered relatively lower income losses (e.g. cuts in pensions) than most other social groups. Note, however, that funding cuts and other changes in health

[13] In order to reflect differences in a household size and composition, the total disposable household income is divided by the number of "equivalent adults", using the OECD-modified scale. This scale assigns a value of 1 to the household head, of 0.5 to each additional household member aged 14 and over and of 0.3 to each child aged under 14. The resulting figure is called equivalised household disposable income (HDI) and it is equally attributed to each household member. Note that household head is defined as the person owning or renting the household's dwelling. If two or more persons share this responsibility, the head of household is the person with the highest disposable income.

care (not taken into account here) raised the costs of services and others barriers to access for those depending on them, among which the elderly feature prominently.

Regarding tenure status, the crisis seems to have levelled the differences in poverty between those renting and owning a dwelling, with the former being more severely affected by poverty. Note that the majority of the Greek population (73.9% according to EU-SILC 2007 data) live in privately owned dwellings. An equivalent pattern was observed with respect to gender, with men being relatively more affected by poverty than women.

On the whole, the crisis seems to have reversed the traditional pattern of lower poverty rates among younger households in urban areas than older households in rural areas: the former, under a combination of fixed housing costs and falling incomes, seem now to be struggling more.

Table 17. Poverty rates: relative poverty line

	2009	2010	2011	2012
all	20.00	20.59	20.39	21.29
(95% confidence interval)	*(±0.68)*	*(±0.68)*	*(±0.66)* (*)	*(±0.66)*
gender				
men	18.94	19.68	19.90	21.15
women	21.00	21.45	20.86	21.42
age				
0-17	21.83	22.66	23.50	26.75
18-29	17.96	18.82	20.05	22.69
30-44	16.31	17.52	17.87	21.48
45-64	18.98	19.56	19.58	19.86
65+	24.58	24.19	21.35	17.14
area				
Athens	15.80	16.67	17.44	18.12
other cities	21.97	22.34	20.81	21.72
rural/semi-rural areas	21.43	21.95	21.66	22.66
tenure				
rent or mortgage	16.18	18.27	19.65	22.72
no housing costs	21.34	21.41	20.65	20.79
labour market status				
unemployed	32.22	35.73	36.36	41.08
employee (private excl. banking)	9.25	9.08	9.21	10.66
employee (public incl. banking)	0.19	0.25	0.25	0.65
liberal profession	4.53	4.01	4.01	4.20
own account worker	13.37	14.81	14.28	14.96
farmer	38.89	37.71	34.58	31.87
pensioner	23.43	22.88	20.51	17.02
student	22.10	22.57	22.87	26.24
others not in the labour force	25.60	24.24	22.01	21.73

Notes: The conventional poverty threshold (60% of median) for a person living alone was €570 per month in 2009, €539 per month in 2010, €498 per month in 2011 and €458 in 2012. Individuals are ranked according to their household disposable income, equivalised by the "modified OECD" equivalence scale. Household disposable income is defined as total income, from all sources, of all household members, net of taxes and social insurance contributions.
(*) The change in the index (compared to its previous level) is not statistically significant at the 5% level (P>0.05).

Source: EUROMOD (version F4.0), DASP V2.2.

Table 18. Poverty rates: fixed poverty line

	2009	2010	2011	2012
all	20.00	25.83	31.13	36.95
(95% confidence interval)	*(±0.68)*	*(±0.81)*	*(±0.86)*	*(±0.89)*
gender				
men	18.94	24.91	30.48	36.50
women	21.00	26.70	31.75	37.37
age				
0-17	21.83	29.19	35.22	42.55
18-29	17.96	24.04	30.51	38.11
30-44	16.31	22.45	28.64	36.87
45-64	18.98	24.13	28.62	33.85
65+	24.58	29.41	33.43	35.06
area				
Athens	15.80	21.88	27.63	33.79
other cities	21.97	28.34	33.45	39.28
rural/semi-rural areas	21.43	27.00	32.15	37.79
tenure				
rent or mortgage	16.18	23.60	28.53	36.29
no housing costs	21.34	26.61	32.05	37.18
labour market status				
unemployed	32.22	41.87	48.32	57.80
employee (private excl. banking)	9.25	13.25	17.35	23.93
employee (public incl. banking)	0.19	0.84	1.88	3.63
liberal profession	4.53	4.53	6.96	8.65
own account worker	13.37	18.90	22.60	27.35
farmer	38.89	44.28	46.75	52.02
pensioner	23.43	27.89	31.45	33.51
student	22.10	29.80	36.38	42.91
others not in the labour force	25.60	30.31	35.77	38.97

Notes: The fixed poverty threshold (60% of the 2009 median, adjusted for inflation) was €597 per month in 2010, €616 per month in 2011 and €622 in 2012. Individuals are ranked according to their household disposable income, equivalised by the "modified OECD" equivalence scale. Household disposable income is defined as total income, from all sources, of all household members, net of taxes and social insurance contributions. For the adjustment of the poverty line for inflation, harmonised CPI was used. All estimated yearly differences in the overall poverty rates are statistically significant at the 5% level ($P<0.05$).

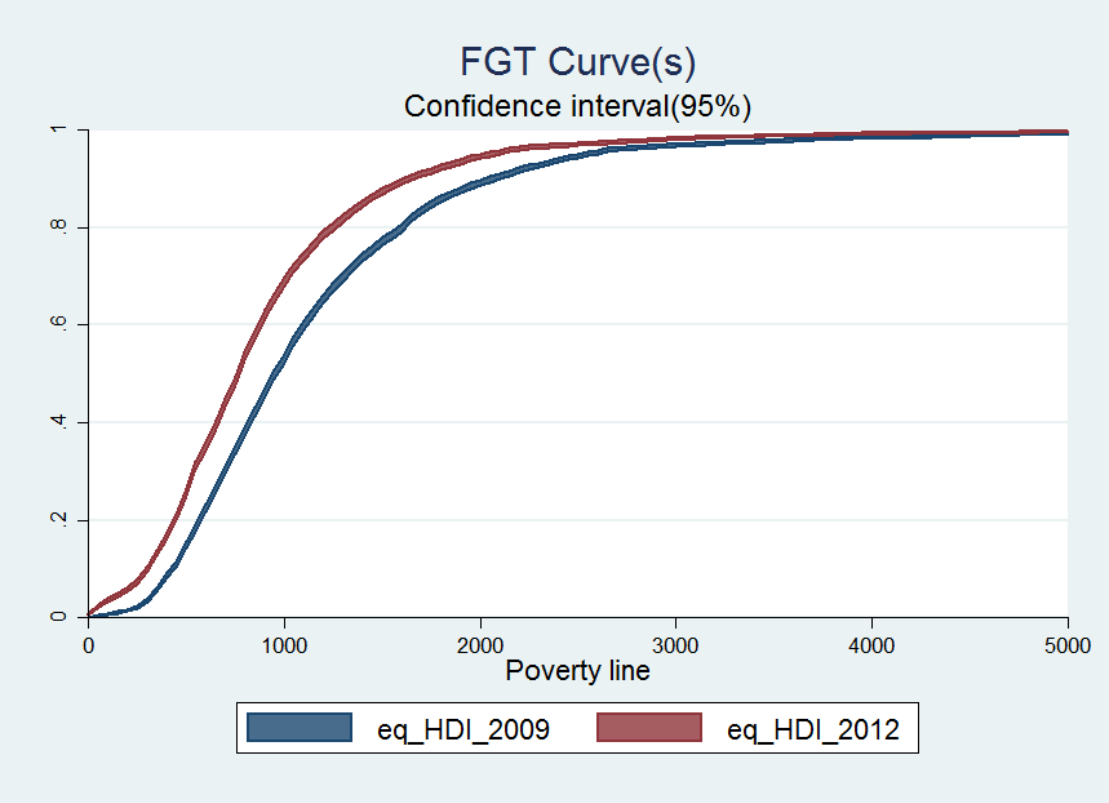
Source: EUROMOD (version F4.0), DASP V2.2.

The Foster-Greer-Thorbecke (FGT) approach was used in order to test for first order poverty dominance (Duclos and Araar, 2006). We allowed the poverty lines to vary between 0 and €5,000 per month (in equivalised terms). This slight restriction[14] was necessary in order to avoid comparisons of poverty dominance curves over ranges

[14] The richest 0.05% of the population was excluded.

where there is too little information. Figure 3 shows that for this wide range of poverty lines the 2009 and 2012 FGT curves for α=0 (i.e. poverty headcount) did not intersect at any point. Regardless of the poverty threshold used, poverty in Greece was higher in 2012 than in 2009.

Figure 3. Testing for first order poverty dominance



Source: DASP V2.2.

4.3 Income loss

Figure 4 presents yearly changes in household disposable income per income decile, both in absolute terms (in equivalised euros per year, in 2009 prices) and in relative terms (as a proportion of a decile's disposable income in the previous year). Note that the estimates focus on income alone, i.e. the effects of changes in indirect taxation are ignored. Figure 4 comes in two parts: in Figure 4a the composition of income deciles was kept fixed at the base year, i.e. individuals were ranked according to their equivalised household disposable income in 2009; in Figure 4b the composition of deciles was allowed to change, based on the income distribution of each respective year.[15] The difference between the two is due to re-ranking effects. Indeed, it can be clearly seen that allowing the composition of deciles to vary has the effect of severely overstating losses at the bottom of the distribution. The data on which the two figures rely are presented in the Appendix (Tables A.4a, A.4b).

[15] Note that the figures are drawn to different scales, but the interval between gridlines on each of them is the same.

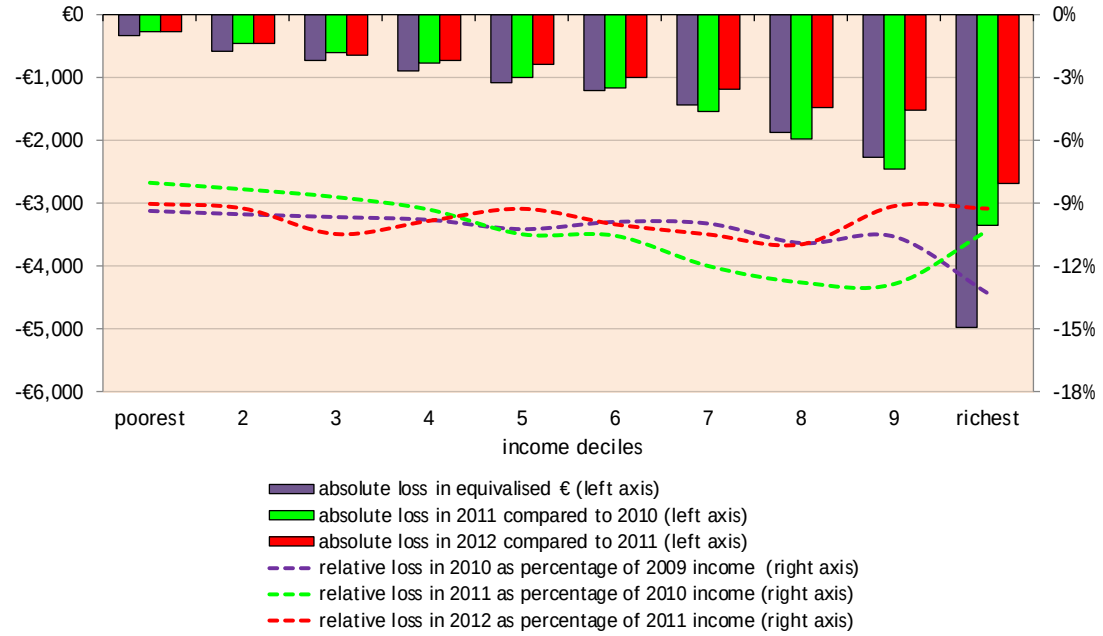
Looking at Figure 4a, a rather steep gradient can be observed in absolute terms. In 2010, households in the top decile appear to have lost €4,972 per year per 'equivalent adult', that is as much as €10,441 per year for a couple with two children. By contrast, those in the poorest decile were left €341 worse off (€715 per year for a family of four). Nevertheless, in relative terms the pattern of income loss looked less progressive. Households in the two poorest deciles lost about 9.5% of their income. Around the middle of the distribution (deciles 3-7), relative income loss fluctuated around 10%. Further up, income loss reached 10.9% (decile 8), and peaked at 13.3% for households in the richest decile.

In 2011, the pattern of relative income loss became U-shaped. The yearly income loss of households in the richest decile was reduced, amounting to €3,344 or 10.3% of their 2010 income. Deciles 5-9 were more heavily affected: average income loss reached 11.7% (versus 10.3% in 2010). The yearly losses of the four poorest deciles were slightly reduced (8.6% versus 9.6% in the previous year). Finally, in 2012 the losses for deciles 5-10 were somewhat constrained (by 1.6 percentage points). On the other hand, the losses for deciles 1-4 were slightly amplified (by 1.1 percentage points).

Examining the overall income loss of households during the period of 2010-2012 compared to 2009, we note that the richest decile has lost €11,009 per 'equivalent adult' or 29.4% of its pro-crisis income. Households located in the poorest decile have lost €897 per 'equivalent adult'; this amount corresponds to a far from negligible 24.2% of their pro-crisis income.

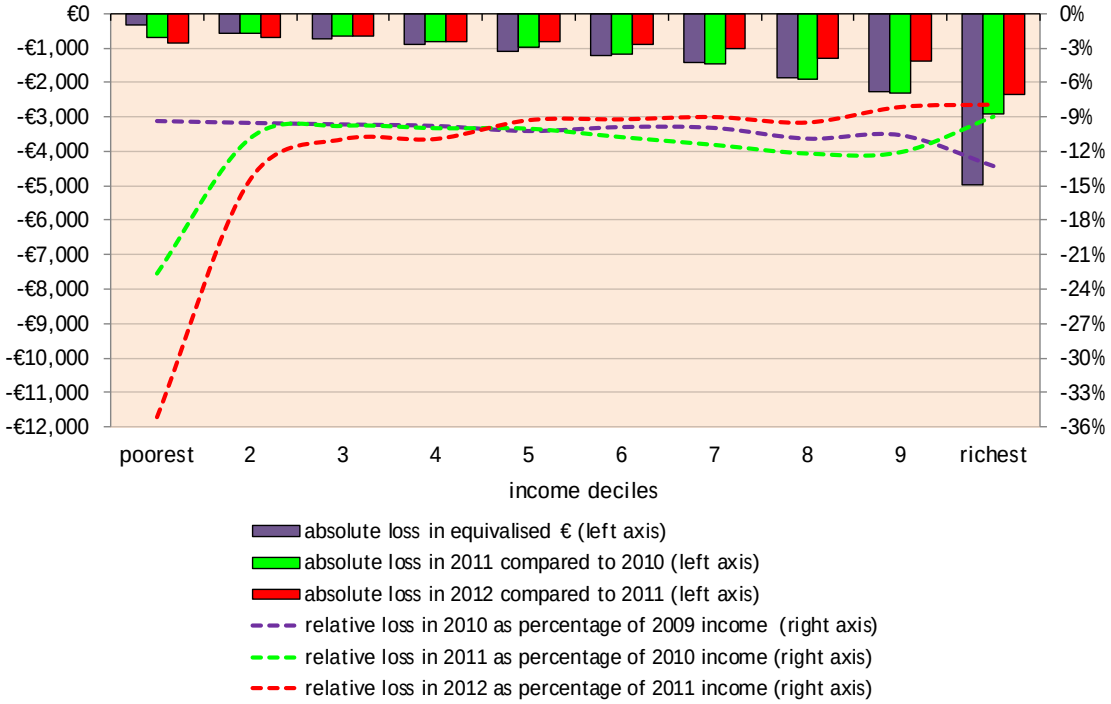
Allowing the composition of deciles to vary (Figure 4b) revealed an outright regressive pattern. The difference is most significant in the case of the poorest decile: its overall income loss rises from 24.2% to 56.5% of its 2009 income. Clearly, this reflects changes in the composition of the population in poverty. Those in poverty before the crisis (e.g. pensioners in rural areas) were not entirely protected, but lost less than the average Greek (at least in monetary terms). On the other hand, those in poverty under the crisis (e.g. unemployed workers with children) fell below the poverty line because they lost a massive proportion of their income. Keeping with standard practice, in the rest of the paper we analyse income changes by decile as fixed at the base year, i.e. individuals are ranked according to their equivalised disposable income in 2009.

Figure 4a. Absolute and relative income loss (decile fixed in 2009)



Notes: Income loss is measured in real terms (i.e. adjusted for inflation), averaged for each decile. Income deciles were constructed according to the 'modified OECD' equivalence squale, on the basis of the 2009 income distribution.
Source: EUROMOD (version F4.0).

Figure 4b. Absolute and relative income loss (decile not fixed)



Notes: Income loss is measured in real terms (i.e. adjusted for inflation), averaged for each decile. Income deciles were constructed according to the 'modified OECD' equivalence squale. Their composition is allowed to vary across years.
Source: EUROMOD (version F4.0).

5. The burden of austerity

This section tries to enlarge upon the way that the burden of austerity was distributed between income groups. It also attempts to disaggregate the distributional impact of each policy, and distinguish the effects of austerity from those of the wider recession.

5.1 Distribution of fiscal savings by income decile

Figure 5 shows the relative contribution to the Greek government's fiscal consolidation effort of the main austerity policies, including changes in VAT, by income decile, as a proportion of total savings. All bars (positive minus negative) sum up to 100% of fiscal consolidation achieved in 2012 compared to 2009. Positive (negative) bars represent the percentage increase (decrease) in total revenues or decrease (increase) in total spending by decile, achieved by each policy.

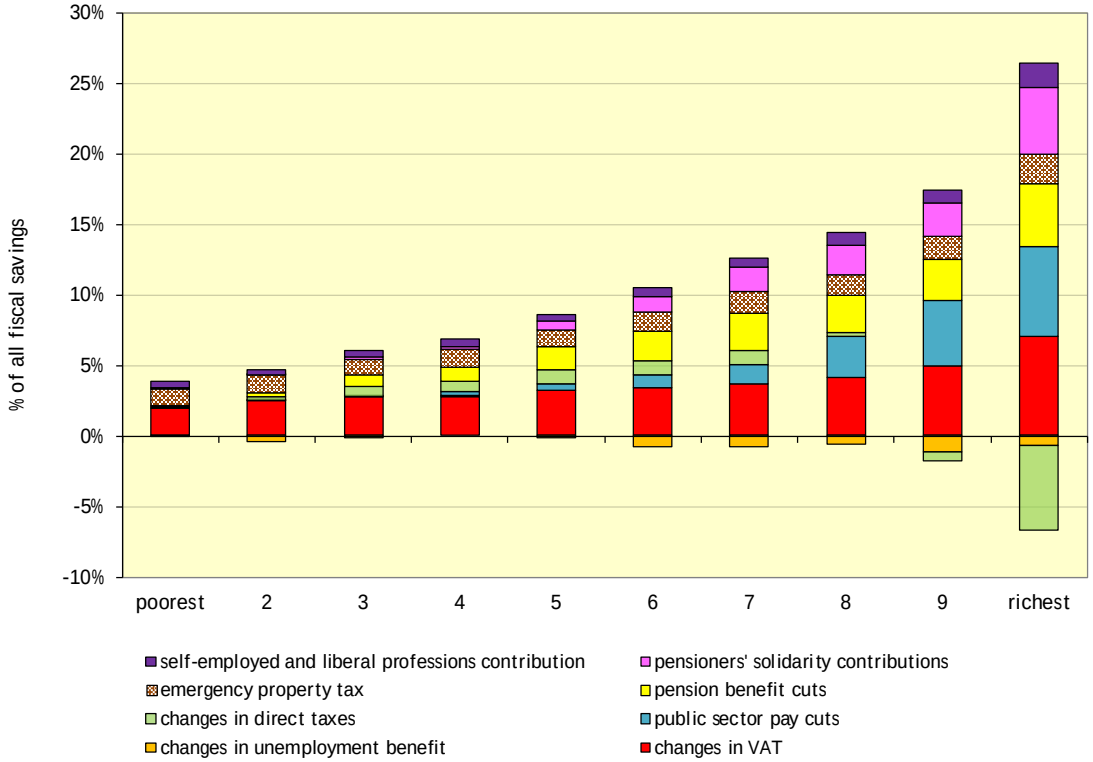
As can be clearly seen, the most effective policy in terms of its contribution to fiscal consolidation was the increase in VAT rates (36.4% increase in total revenues). The second more fiscally efficient measure was cuts in pension benefits (18.6% decrease in total spending), followed by public sector pay cuts (16.8% decrease in total spending). Emergency property tax, pensioners' solidarity contributions and self-employed and liberal professions contribution amounted to 14.2%, 13.1% and 7.0% of the increase in total revenues respectively.

In spite of changes in the structure of personal income tax and the introduction of solidarity contribution,[16] two factors combined to weaken their effectiveness in raising tax (1.6% decrease in total revenues). On the one hand, the austerity and the recession reduced or completely vanished taxable income in cases of persons hit by unemployment. On the other hand, tax evasion continued to keep tax receipts low, and distort the tax system's intended fiscal (and distributional) effect.

Finally, the rise in unemployment benefit recipients was the main reason behind the 4.6% increase in total spending for unemployment insurance benefits, despite their provision at reduced rates.

[16] Changes in the structure of personal income tax and the introduction of solidarity contribution resulted in an estimated increase in the number of people paying non-zero income tax by 38.6%.

Figure 5. Distribution of fiscal savings by decile



Notes: Changes in direct taxes include changes in personal income tax and the introduction of solidarity contribution. Analytical description of all policy changes is provided in Section 2.1. Income deciles were constructed according to the 'modified OECD' equivalence scale, on the basis of the 2009 income distribution.

Source: EUROMOD (version F4.0).

Focusing on the distributional effects of the measures that had a positive impact on fiscal consolidation achieved in 2012 (compared to 2009) the top three deciles accounted for an estimated 82.5% of all fiscal savings achieved by public sector pay cuts. Similarly, pensioners' solidarity contribution hardly affected anyone in the bottom half of the income distribution: the estimated contribution of the top three deciles to all savings from the measure was 69.7% whereas the richest decile alone accounted for 35.9% of all savings. To a lesser extent, this was also the case with cuts in pension benefits: an estimated 53.7% of the total savings from cuts in pensions concerned the top three deciles. On the other hand, the bottom three deciles bore a significant part of the fiscal consolidation achieved by the introduction of the emergency property tax, the VAT hikes and the self- employed and liberal professions contribution, accounting for 24.6%, 19.6% and 18.4% of these policies' total fiscal savings respectively. More specifically, as can be seen in Table 19, the emergency property tax affected in an almost uniform way people located in deciles 1-9.

Table 19. Percentage increase (decrease) in total revenues (spending) per policy by income decile

	percentage increase (decrease) in total revenues (spending)					
income deciles	VAT changes	pensions benefit cuts	public sector pay cuts	pensioners' solidarity contributions	self-employed & liberal professions contribution	emergency property tax
1	5.3	0.8	0.0	0.3	6.5	8.2
2	6.8	1.8	0.1	0.4	5.3	8.5
3	7.5	4.3	0.4	1.5	6.6	7.8
4	7.5	5.3	1.6	1.4	7.8	9.1
5	8.9	8.8	2.5	4.7	6.6	8.3
6	9.4	11.2	5.2	8.4	8.9	9.7
7	10.2	14.0	7.7	13.7	8.5	10.7
8	11.5	14.2	17.3	15.6	12.9	10.7
9	13.6	15.8	27.4	18.1	11.9	11.8
10	19.4	23.7	37.9	35.9	25.0	15.1

Notes: Income deciles were constructed according to the 'modified OECD' equivalence scale, on the basis of the 2009 income distribution.
Source: EUROMOD (version F4.0).

On the whole, the rich appear to have shouldered most of the burden of fiscal consolidation: those in the top decile contributed 19.7% of all savings; those in the next richest decile 15.6%. Nonetheless, the contribution of lower incomes was nothing but insignificant: those in the bottom decile accounted for 3.8% of total savings; those in the next poorest decile for 4.3%. Since the relative pre-crisis income shares of the two lowest and two highest income deciles were 6.9% and 42.1% respectively (and leaving for a moment aside the objection that the estimate of the impact of VAT changes is indirect), we can conclude that the poor contributed a greater share of their income to the government's fiscal consolidation effort than the rich.

5.2 Disaggregating the impact of austerity policies

As mentioned earlier, the distributional impact of a given policy depends partly on its design and partly on the location on the income scale of those affected. For instance, pensioners' solidarity contributions were explicitly targeted at pensioners on high pensions, while households towards the top of the income distribution were worst affected by cuts in public sector pay.[17]

Redistributive effects of each austerity measure can be more formally assessed by calculating the values of the Reynolds-Smolensky index (Duclos and Araar, 2006). The index shows the difference between the counterfactual value of the Gini coefficient in the absence of all austerity measures being assessed, and its actual value after the implementation of each of these policies in turn. If the index value is positive

[17] In fact, we found that 75% of civil servants and 66% of public utility workers were located in the top 30% of the income distribution. For more information, see Table A.5 of the Appendix.

(negative), the measure is progressive (regressive). The results are presented in Table 20.

Table 20. Redistributive impact of austerity measures

	Reynolds-Smolensky index		
	2010	2011	2012
direct taxes	+0.0046[i]	+0.0075[ii]	no change in policy
public sector pay	+0.0024	+0.0004	+0.0013
pension benefits	+0.0003	no change in policy	no change in policy
pensioners' solidarity contributions	+0.0004	+0.0009	+0.0023
social insurance contributions	no change in policy	+0.0005	+0.0004
self-employed and liberal professions contribution	-0.0003	-0.0004	-0.0007
emergency property tax	n/a	-0.0031	no change in policy
unemployment insurance benefit	no change in policy	no change in policy	-0.0016

Notes: The Reynolds-Smolensky index shows the difference between the counterfactual value of the Gini coefficient in the absence of all austerity measures presented in the Table (i.e. on the basis of previous year's policies) relative to its value after the implementation of the austerity measure in question.
All estimated differences in the Gini coefficients are statistically significant at the 5% level (P<0.05).
i. Changes in personal income tax, introduction of solidarity contribution and emergency tax on large incomes.
ii. Changes in personal income tax.
Analytical description of all policy changes is described in Section 2.1.

Source: EUROMOD (version F4.0), DASP V2.2.

Table 20 shows that the redistributive impact of changes in direct taxation was significantly progressive. This result confirms that the decrease in tax revenues raised by the richest decile in 2012 cannot be explained by the new structure of the personal income tax, but by the severe reduction in the decile's taxable incomes. We also find that, as in the case of Ireland (Callan et al., 2011; Nolan et al., 2013), public sector pay cuts were rather progressive. Moreover, the introduction of pensioners' solidarity contributions, the increase in social insurance contributions and the cuts in public pension benefits also seem to have had a progressive (albeit weaker) effect.

Other policies, such as the 2012 cut in unemployment benefit, or the self-employed and liberal professions contribution had a regressive effect. But the strongest regressive effect was associated with the (highly-contested) emergency property tax. Interestingly, the tax, introduced in 2011, not only provided for a higher rate for larger properties in more affluent areas, but actually exempted recipients of unemployment benefit and the long-term unemployed, and charged a reduced rate to poor families with more than three children. However, these exemptions only affected a small

proportion of income-poor (but not necessarily asset-poor) households. As a result of that, although partly designed to be progressive vis-à-vis the distribution of wealth, the emergency property tax turned out to be regressive vis-à-vis the distribution of income.

The distributional effect of indirect taxes in general, and the 2010 VAT hike in Greece in particular, depends on the relative strength of two factors. On the one hand, consumption smoothing over the life cycle implies that the provisionally poor borrow, or draw on past savings, while the provisionally rich tend to be net savers. This seems to be borne out when the extra VAT due is calculated as a proportion of expenditure rather than income. Indeed, we found that the distributional effect of the rise in VAT in terms of household expenditure was almost fully proportional. Given that the structure of VAT is almost flat (although different rates apply to different goods and services), this was rather expected. On the other hand, the propensity to consume tends to rise as income falls. As a result of that, poor households contribute a significant proportion of the total VAT take, which amounts to a high proportion of their own income. To the extent that this is true in terms of lifetime income as well as of income as observed at any given time, we must conclude that the effects of the 2010 rise in VAT have been regressive (also see Section 3.4).

5.3 Distinguishing the effects of austerity vs. the recession

As mentioned earlier, isolating the distributional effects of the austerity policies from those of the wider recession is to some extent artificial. In fact, there is little doubt that the two are closely connected: on the one hand, austerity policies caused aggregate demand to fall and therefore led firms catering for the domestic market to reduce output, cut salaries and lay off personnel; on the other hand, the recession weakened the deficit-reducing potential of austerity policies (for example, lower tax take and higher spending on benefits) and led to the adoption of harsher measures. Nevertheless, other factors have also contributed to the recession. For instance, the steady slide of Greek firms down the competitiveness league table preceded the crisis, as implied by the steep increase of the current account deficit from an average of 6.9% of GDP in 2000–05 to 13.7% in 2006–08. Moreover, given the size of the country's budget deficit in 2009 (15.6% of GDP), it is difficult to see how fiscal adjustment, and hence austerity, could have been avoided at all.

We note, however, that international agencies involved in the design of austerity measures had seriously underestimated the output loss associated with austerity. As a recent study by top IMF economists (Blanchard and Leigh, 2013) conceded, early forecasts assumed a 'fiscal multiplier' of about 0.5 (i.e. that reducing the budget deficit by €10 would lead to a drop in GDP of €5), while the actual effect turned out to be about 1.5 (i.e. a deficit reduction of €10 may have led to a fall in output of €15) or more. This appears to be especially the case in the early phases of a recession, and in countries where the size of fiscal consolidation is large - which seems a fair description of Greece in 2010.

Indeed, the exact extent to which the crisis was caused by the austerity policies relative to other factors is bound to remain a matter of debate for some time. Meanwhile, distinguishing the distributional effects of the austerity from those of the wider recession may be of relevance and interest. For doing so, we draw on the decomposition approach developed by Bargain and Callan (2010). In assessing the

impact of tax-benefit policy changes on income distribution over time, we make use of counterfactual simulations; the (ceteris paribus) first-order effects on poverty and inequality of the 'austerity alone' scenario is equivalent to assuming that government policies[18] cut public sector pay, pensions and benefits and raised taxation, but left nominal pre-tax incomes and jobs in the private sector as in the previous year.

Table 21 shows that the austerity policies of 2010 and 2011 compressed the income distribution and caused a slight reduction in inequality indices. Nevertheless, the direction in which the income distribution was compressed was downwards: of the additional population that found itself below the fixed poverty line in 2010 and 2011, 63.3% did so as a consequence of austerity policies alone. In 2012, the austerity measures caused a smaller increase in poverty: of the additional population that fell below the fixed poverty line, only 21.8% did so as a consequence of austerity policies alone. On the other hand, the combination of austerity measures with the wider recession, and especially with the steep rise in unemployment (by 6.7 percentage points), caused poverty and inequality to rise sharply. The latter was mostly due to the large drop in the income share of the poorest 10% of the population.

Table 21. Disaggregating the redistributive effect of austerity vs. the recession

		2010		2011		2012	
	2009	austerity alone	austerity + recession	austerity alone	austerity + recession	austerity alone	austerity + recession
poverty							
fixed	20.00	23.54	25.83	29.34	31.13	32.40	36.95
conventional	20.00	20.21	20.59	20.04	20.39 (*)	20.05	21.29
inequality							
Gini coefficient	0.3499	0.3449	0.3471	0.3448	0.3526	0.3533	0.3678
coefficient of variation	0.7924	0.7701	0.7665 (*)	0.7758	0.7934	0.8006	0.8211
S80/S20	6.0668	5.9285	6.0628	5.9820	6.4393	6.4920	7.5442

Notes: 'Austerity alone' is equivalent to assuming that the government austerity measures left nominal pre-tax incomes and jobs in the private sector as in the previous year.
(*) The change in the index (compared to its previous level) is not statistically significant at the 5% level (P>0.05).

Source: EUROMOD (version F4.0), DASP V2.2.

By way of sensitivity analysis, and to test the robustness of the results to data concerning the effects of the recession used in the model, we examined the alternative assumption that the change in self-employment earnings was –10% rather than –4.8% in 2010 (remember that no reliable data on changes in such earnings are yet available). Focusing on the fixed poverty line, this caused the poverty rate to rise to

[18] The analysis comprises all policies included in Table 20. VAT is out of the scope of this analysis.

26.2% (from 25.8%). On this evidence, the results seem quite robust to the way the recession was accounted for in the study.

5.4 Reasons for caution

Can these findings be trusted? A certain amount of caution is called for when interpreting the above results. The main issues, to do either with the approach or with the assumptions used, are briefly discussed below.

Using a tax-benefit model allows us to simulate the effect of policy changes in the light of what we know about the distribution of pre-tax incomes, the composition of households, the labour market and demographic characteristics of household members, and other relevant information. And yet, for all the effort put into capturing as much detail as possible, simulations remain a simplification of the complexity of real life.

Furthermore, the approach used to accounting for indirect taxes leaves much to be desired. Given their salience in the Greek tax system, and the recourse to sharp increases in indirect taxes (VAT in 2010, heating oil tax in 2013) as a devise to boost tax receipts in a crisis, correctly estimating their distributional impact would greatly enhance the accuracy of any study trying to gauge the distributional effects of austerity policies.

On a slightly different note, the fiscal squeeze undermines the proper funding of the public sector, adversely affecting essential public services – what was once called 'the social wage'. Such effects are routinely ignored in a study such as this, focusing on income alone. However, there can be little doubt that the disruption of publicly-funded health care, education, child care or elderly care over the last three years has caused serious financial stress, even when income loss as such has not been particularly large. For instance, the elderly seem to have lost a smaller proportion of their income than other categories as a result of the crisis, they now have to pay out of pocket for prescriptions and consultations far more than used to be the case.

Although significant progress has been made towards accounting for the rise in unemployment, much remains to be done in order to capture the impact of the recession more fully. In particular, in the absence of relevant information, we have implicitly assumed that the reduced demand for goods and services provided by the self-employed has resulted in loss of earnings but not in loss of jobs. To some extent, this is a reasonable assumption, as some of those whose businesses do fail are not classified as unemployed but either as involved in some other activity or as inactive. However, as for some self-employed the loss of jobs has not been avoided, the results presented for this occupational group have to be considered as lower bound estimates.

Keeping in mind all the above mentioned caveats, this research offers a sound approximation of the first-order distributional impact of austerity policies and the wider recession in Greece. Given the topicality of the questions addressed, and the public interest in the answers, research based on microsimulation is a good alternative to waiting until official statistics are made available. More importantly, if the research question involves trying to identify the effects of different changes taking place at the same time, distinguishing between progressive and regressive items within the same policy package (as is the case here), there is no alternative to microsimulation.

6. Concluding remarks

The results presented above can be summarized as follows. In Greece, as a result of austerity and the recession relative poverty (as measured conventionally, by reference to a variable threshold at 60% of median equivalent income) increased moderately from 20.0% in 2009 to 21.3% in 2012. Instead, when fixing the poverty line at pre-crisis levels in real terms, poverty appears to have risen dramatically to 37.0% in 2012. While both indicators reveal different parts of the same picture, the latter is arguably better suited to periods of rapid change in living standards, capturing the sense of impoverishment when nominal incomes fall while prices keep rising (as is currently the case).

Turning to poverty rates by category, the situation of unemployed workers emerges as clearly alarming. Considering that the maximum duration of unemployment insurance benefit is 12 months, that in 2012 it was received by a mere 19% of the unemployed population, that unemployment assistance has narrow eligibility conditions and suffers from massive non take up, and that the (long-term) unemployment rate is expected to remain high in the foreseeable future, poverty among the unemployed is destined to become the new social question par excellence.

The extension of findings presented in Matsaganis and Leventi (2013) suggests that the rise in inequality began in earnest in 2011, and gathered speed as the recession deepened. The main driver of growing inequalities was the recession, especially rising unemployment, rather than austerity policies per se. Indeed, some of the latter seem to have had a progressive effect: either because special care was taken to make a particular policy 'fair' by design (as in the case of pensioners' solidarity contributions), or because those worst affected were located towards the top of the income distribution (as in the case of public sector pay cuts). However, this was partly offset by the regressive effect of the emergency property tax, the reduction in the unemployment insurance benefit, and the self-employed and liberal professions contribution. Taking into account the 2010 VAT hikes would further weaken the inequality-reducing effect of progressive policies.

Our findings demonstrate that the answer to the question of whether the rich have become relatively richer (and the poor relatively poorer) in recent years hinges on how the income distribution is analysed. When income deciles are fixed in 2009 (i.e. not allowing for re-ranking), we find that by 2012 those in the poorest decile in 2009 had on average lost a slightly smaller proportion of their 2009 equivalised household disposable income than those in the richest decile in 2009 (24.2% vs 29.4% in real terms). On the contrary, when deciles are recalculated each year (i.e. allowing for re-ranking), we find that those in the poorest decile in 2012 had lost as much as 56.5% of their 2009 income, i.e. much more than the average loss of 28.4% in real terms. This reflects substantial changes in the composition of the population in poverty. Before the onset of the crisis, the low unemployment rates for 'male breadwinners' (i.e. men aged 30-44) ensured that unemployment did not directly translate into poverty. Clearly, the crisis seems to have reversed this traditional pattern.

While the impact of austerity (as distinct from the recession) on inequality can be described as moderate, this is far from saying that all is well with 'the Greek Programme'. Firstly, as the controversy over 'fiscal multipliers', discussed above, shows, the content and timing of austerity policies can exacerbate the recession. Secondly, while austerity policies per se may have not caused inequality to increase

more than the recession has, they certainly failed to correct the inequality-increasing effects of rising unemployment. Thirdly, while it could be argued that preventing inequality to rise might have been too difficult in the context of mass unemployment and harsh fiscal constraints, preventing poverty to rise by enhancing the social safety net was entirely feasible – and yet, it was not done. As shown earlier, the number of people whose income fell below the 2009 poverty line (adjusted for inflation) rose steadily with each round of austerity policies, and increased further still as the effects of the recession (chiefly, the rise in unemployment) were also felt.

The findings of this paper suggest that, in order to share the burden of austerity more equitably and to minimise losses for lower income groups, the composition of the spending-oriented consolidation packages needs to be redesigned. In particular, the importance of fighting tax evasion cannot be overstated: it is crucial from a fiscal point of view (improving tax collection would help reduce budget deficits), as well as from a political point of view (restoring distributional justice would go a long way towards making austerity policies more acceptable).

Recent employment and income losses have greatly increased the demand for social protection, but the response of the Greek welfare state has been inadequate. Despite the rhetoric of political actors at home and international organisations abroad as to the priority that must be afforded to softening the social effects of the economic crisis, the record so far can only be described as disappointing. And yet, to prevent the economic crisis from turning into a social catastrophe, a concerted effort is needed to link fiscal consolidation with growth-enhancing structural reform, to tighten the social safety net and compensate the weakest groups from the adverse effects of the crisis.

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Appendix

Tables

Table A.1 Properties' cadastral values by degree of urbanisation (2008)

cadastral value (€)	% of properties in urban areas	% of properties in rural/semi-rural areas
up to 500	5.03	50.89
501-1,000	19.15	29.12
1,001-1,500	47.06	16.52
1,501-2,000	19.55	2.79
2,001-2,500	6.45	0.52
2,501-3,000	1.29	0.12
3,001-4,000	0.89	0.02
5,001-5,000	0.32	0.01
more than 5,000	0.26	0.01

Source: Own calculations from a large tax return dataset provided by the General Secretary for Information Systems (ΓΓΠΣ).

Table A.2 EUROMOD uprating factors

	2007	2008	2009	2010	2011	2012
employment income						
dependent employment income	1.052	1.117	1.169	1.115	1.096	1.024
public sector employees	1.038	1.112	1.170	1.079	1.074	1.033
private sector employees outside banking	1.061	1.130	1.162	1.128	1.109	1.006
banking employees	1.089	1.089	1.129	1.109	1.110	1.027
workers in public enterprises	1.071	1.159	1.248	1.179	1.086	0.983
self-employed income						
farmers	1.026	0.965	0.927	0.894	0.951	0.916
own account workers/ other self-employed	1.052	1.117	1.169	1.115	1.096	1.024
liberal professions	1.052	1.117	1.169	1.115	1.096	1.024
investment - property income						
investment income	1.031	1.119	1.089	1.164	1.269	1.368
property income – rent	1.045	1.086	1.125	1.152	1.162	1.138
other income						
private transfers	1.052	1.117	1.169	1.115	1.096	1.024
non-cash income	1.052	1.117	1.169	1.115	1.096	1.024
income received by people aged under 16	1.052	1.117	1.169	1.115	1.096	1.024
retirement pensions/ benefits						
main old age pension	1.040	1.071	1.071	1.071	1.071	1.071
supplementary old age pension	1.040	1.071	1.071	1.071	1.071	1.071
other minor pensions	1.040	1.071	1.071	1.071	1.071	1.071
survivors pension	1.040	1.071	1.071	1.071	1.071	1.071

	2007	2008	2009	2010	2011	2012
orphans pension	1.040	1.071	1.071	1.071	1.071	1.071
pensioners' social solidarity benefit	1.219	1.436	1.436	1.436	1.436	1.436
social pension	1.220	1.449	1.449	1.581	1.581	1.581
private pension	1.030	1.074	1.088	1.139	1.175	1.187
unemployment benefits						
unemployment insurance	1.181	1.299	1.459	1.459	1.459	1.156
unemployment assistance for older workers	1.000	1.000	1.000	1.000	1.000	1.000
minor unemployment benefits	1.181	1.299	1.459	1.459	1.459	1.156
family benefits						
3rd child benefit	1.029	1.069	1.091	1.119	1.106	1.106
large family benefit	1.029	1.069	1.091	1.119	1.106	1.106
lifetime pension for mothers of many-children	1.029	1.069	1.091	1.119	1.106	1.106
civil servants family benefit	1.000	1.000	1.000	1.000	1.000	1.000
income support to families with children in compulsory education	1.000	1.000	1.000	1.000	1.000	1.000
minor family benefits	1.000	1.000	1.000	1.000	1.000	1.000
sickness – maternity benefits						
contributory maternity benefits	1.052	1.117	1.169	1.115	1.096	1.024
health benefits	1.052	1.117	1.169	1.115	1.096	1.024
other benefits/ pensions/ taxes						
disability pensions	1.040	1.071	1.071	1.071	1.071	1.071
disability benefits	1.045	1.127	1.218	1.318	1.423	1.423
housing benefits	1.000	1.000	1.000	1.000	1.000	1.000
scholarships and grants	1.000	1.000	1.000	1.000	1.000	1.000
minor social assistance benefits	1.000	1.000	1.000	1.000	1.000	1.000
large property tax	1.000	1.000	1.000	1.000	1.000	1.000
assets						
loan value	1.030	1.074	1.088	1.139	1.175	1.186
financial capital	1.030	1.074	1.088	1.139	1.175	1.187
expenditure items						
rent paid	1.045	1.086	1.125	1.152	1.162	1.138
education expenses	1.030	1.074	1.088	1.139	1.175	1.187
housing cost	1.031	1.119	1.089	1.164	1.269	1.368
interest on mortgage payment	1.030	1.074	1.088	1.139	1.175	1.187
other housing costs	1.031	1.119	1.089	1.164	1.269	1.368
medical expenses	1.030	1.074	1.088	1.139	1.175	1.187
expenses for setting up new heating systems	1.030	1.074	1.088	1.139	1.175	1.187
alimony expenditure	1.033	1.082	1.107	1.120	1.132	1.123
other maintenance payments	1.033	1.082	1.107	1.120	1.132	1.123

	2007	2008	2009	2010	2011	2012
expenditure on private pensions	1.030	1.074	1.088	1.139	1.175	1.187
nominal GDP deflator	1.033	1.082	1.107	1.120	1.132	1.123
harmonised consumer price index	1.030	1.074	1.088	1.139	1.175	1.187

Source: El.Stat., Bank of Greece, various benefit providing agencies.

Table A.3 Tax evasion: sensitivity analysis

	2009	2010
baseline: r_w = 1%; r_{se} = 25%; r_f = 55%		
poverty rate	20.00	25.83
Gini index	0.3499	0.3471
more tax evasion: r_w = 1.2%; r_{se} = 30%; r_f = 66%		
poverty rate	20.00	25.83
Gini index	0.3512	0.3486
less tax evasion: r_w = 0.8%; r_{se} = 20%; r_f = 44%		
poverty rate	20.03	25.83
Gini index	0.3485	0.3456

Notes: r_w: income under-reporting factor for employment income.
r_{se}: income under-reporting factor for self-employment income.
r_f: income under-reporting factor for farming income.
Poverty rates were calculated by using the fixed poverty threshold (60% of the 2009 median, adjusted for inflation).

Table A.4a Average equivalised household disposable income - deciles fixed in 2009 (€ per year, in 2009 prices)

income deciles	2009	2010	2011	2012
1	303.2	274.8	252.8	230.0
2	504.8	456.7	418.7	380.0
3	631.9	570.9	521.2	466.7
4	760.1	685.7	621.9	560.8
5	885.9	795.3	712.0	646.0
6	1,026.1	924.7	827.2	744.4
7	1,194.9	1,075.8	946.8	847.6
8	1,440.1	1,283.2	1,119.3	996.6
9	1,785.1	1,596.0	1,391.1	1,264.1
10	3,119.5	2,705.2	2,426.5	2,202.0
average	1,164.8	1,036.5	923.4	833.6

Source: EUROMOD (version F4.0).

Table A.4b Average equivalised household disposable income - deciles not fixed in 2009 (€ per year, in 2009 prices)

income deciles	2009	2010	2011	2012
1	303.2	262.9	203.3	131.9
2	504.8	449.0	400.1	342.1
3	631.9	562.0	507.1	451.6
4	760.1	683.0	614.8	547.6
5	885.9	796.7	716.8	650.2
6	1,026.1	924.3	824.8	748.8
7	1,194.9	1,072.2	949.5	863.9
8	1,440.1	1,291.1	1,133.7	1,026.1
9	1,785.1	1,605.5	1,411.7	1,296.7
10	3,119.5	2,721.8	2,477.4	2,280.9
average	1,164.8	1,036.5	923.4	833.6

Source: EUROMOD (version F4.0).

Table A.5 Income position by occupational group (%)

	low income	middle income	high income
unemployed	46.3	40.5	13.2
employees (private excl. banking)	16.0	44.8	39.2
banking employees	0.0	23.4	76.6
civil servants	1.4	23.2	75.3
public enterprises	0.0	33.8	66.2
liberal professions	5.2	14.4	80.5
own account workers	21.1	36.6	42.3
farmers	50.7	37.3	12.0
pensioners	34.2	45.0	20.7
students	33.6	36.7	29.6
others not in the labour force	39.8	42.0	18.3

Notes: Low income: deciles 1-3, middle income: deciles 4-7, high income: deciles 8-10. Income deciles were constructed according to the 'modified OECD' equivalence scale, on the basis of the 2009 income distribution.

Source: EUROMOD (version F4.0).