Paper Prepared for the 32nd General Conference of
The International Association for Research in Income and Wealth

Boston, USA, August 5-11, 2012

The Distributional Impact of the Great Recession in Greece

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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 early assessment of whether (and to what extent) the latter is the case. More specifically, we distinguish between two inter-related factors: on the one hand, the austerity measures taken to reduce fiscal deficits; on the other hand, the wider recession. We attempt to quantify the distributional impact of both using the European tax-benefit model EUROMOD. With respect to the austerity measures, we focus on policy changes in income tax, public sector pay and pension benefits. With respect to the wider recession, we correct for the rise in unemployment using the latest Labour Force Survey data. We simulate the (*ceteris paribus*) first-order impact of these changes on the distribution of incomes, while also estimating how the total burden of the crisis is shared across income groups, taking into account tax evasion and benefit non take up. We conclude by discussing the methodological pitfalls and policy implications of our research.

Keywords

JEL classification

Acknowledgments

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1. Introduction

Since 2010 Greece has been in the throes of a severe financial and economic crisis – without doubt, the worst in living memory.

After a decade of fast growth, the underlying weakness of the Greek economy was made clear in October 2009, when the incoming government announced that earlier fiscal data had been misreported. Revised estimates raised the 2009 figures from 3.7% to 15.8% of GDP (deficit) and from 99.6% to 129.3% of GDP (debt).[1] The revised figures stunned public opinion at home and shocked markets abroad. 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 (i.e. 10 percentage 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, an unprecedented €110 billion rescue package was agreed in May 2010 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 bailout package and the austerity programme were revised at least twice. After the Greek Parliament approved a Mid-term Fiscal Strategy Framework (2012-2015), the Euro area summit of July 2011 improved the terms of the Greek programme by conceding lower interest rates and a longer repayment period (CEU 2011a). When the deal proved ineffective against the markets' bet that the country could not realistically service its foreign debt, and would therefore be forced to default, the European summit of October 2011 opened the way to a negotiated reduction in the nominal value of Greek government bonds, colloquially known as 'haircut', and a new loan. The two instruments, "accompanied by a strengthening of the mechanisms for the monitoring of implementation of the reforms", were hoped to help Greece reduce its public debt to 120% of GDP by 2020 (CEU 2011b).

Under the terms of the austerity policies, public sector pay and pension benefits were cut. Nominal reductions were compounded by rising inflation, caused by VAT hikes as well as rising oil prices internationally and product market rigidities domestically. In the context of tax reform, the government changed the schedule of personal income tax, raised the top rate and announced a clampdown on tax evasion. The policies were introduced when the Greek economy was already in recession, and made it deeper still: after negative growth (-3.2%) in 2009, GDP shrank by 3.5% in real terms in 2010 and a further 6.9% in 2011. As a result, jobs and earnings in the private sector also suffered considerably. By 2011 average earnings had been reduced by 14.8% in real terms relative to 2009, while the unemployment rate had climbed to 17.3% (from 9.5% in 2009). Self-employment earnings were also affected.

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[1] Note that the 2009 figures underwent six consecutive revisions, the latest in October 2011.

The crisis is expected to have caused poverty and inequality to rise. However, establishing the distributional effects of the crisis is not as straightforward as it may appear at first sight. Its 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, Jenkins et al. 2011).

In this paper we provide an early assessment of the distributional implications of the Greek crisis in 2011 relative to 2009. Our main results can be summarized as follows. We estimate that relative poverty rates barely moved (from 20.0% in 2009 to 19.8% in 2011). Nevertheless, the proportion of population living in 2011 on real incomes below the 2009 poverty line was as high as 30.5%. We also find that changes in inequality were less stark: indeed, on the basis of available evidence, the distribution of incomes seems to be more compressed now than it was before the onset of the crisis.

The structure of the paper is as follows. Section 2 describes the austerity policies and wider changes in income and employment. Section 3 explains the methodology of the study. Section 4 presents our estimates of the distributional effects of the crisis. Section 5 reflects on the policy implications of our findings, on the limitations of our approach and on issues for further research.

2. The Great Recession

The paper shows how the distribution of incomes in Greece changed in 2009-2011, i.e. in the first couple of years since the onset of the crisis.

Even though the Greek economy actually entered recession in 2009 (GDP change: -3.2%), real wages continued to grow (+3.3%), as they had throughout the decade (real change in average wages in 2000-2009: +23.3%). Real earnings began to fall in 2010 (-9.1%), and continued to do so in 2011 (-6.3%). This is not to say that the effects of the crisis were limited to these two years. At the time of writing (July 2012), the economy showed no signs of recovery. According to official figures (Bank of Greece 2012), average wages were forecast to have lost since the onset of the crisis as much as they had gained in the nine preceding years (real change in average wages in 2009-2012: -22.9%).[2] The impact of more recent developments on the distribution of incomes (among which the February 2012 reduction of the statutory minimum wage by 22% in nominal terms) is the subject of ongoing research, but falls outside the scope of the current paper.

For analytical purposes, the paper 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 making the distinction we take no position on the debate as to whether the Greek economy would have been in recession in the absence of the austerity policies.

In the above spirit, the term 'austerity policies' signifies policies specifically introduced by the government in an attempt to reduce fiscal deficits, either under the provisions or in the context of the Memorandum of Economic and Financial Policies and its regular reviews. 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.

As seen in Table 1, austerity policies in 2010 and 2011 combined VAT and other indirect tax increases, changes in personal income tax, introduction of new direct taxes, cuts in pensions

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[2] By comparison, annual gross average pay for all employees in the UK grew by 11.3% in 2000-2009, and fell by 8.5% in 2009-2011 (ONS 2012, and previous years; figures in real terms, using the Retail Price Index.

and public sector pay. At the same time, the fiscal squeeze affected other social benefits and public services.

Meanwhile, the 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. A few key figures are presented in Table 2.

3. Methodology

Our analysis relies on the European microsimulation model EUROMOD. In its standard version, the model provides estimates of first-order distributional effects, ignoring second-order behavioural responses (such as those related to consumption or labour supply). EUROMOD uses survey data on original incomes, labour market status, and other individual and household characteristics. It then combines such information with the tax and benefit rules in place in order to simulate entitlements to non-contributory cash benefits, and direct taxes and social insurance contributions due. The components of the tax-benefit system that cannot be simulated (e.g. those depending on prior contributions) are read off the data. 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 (e.g. Bargain 2006).[3]

The underlying micro data for Greece are drawn from the European (UDB) and the national (PDB) versions of the European Union Statistics on Income and Living Conditions (EU-SILC), which provides cross-sectional and longitudinal multi-dimensional data on income and living conditions. In this paper we use EU-SILC 2007.

In micro data, sampling errors and other biases can rarely be avoided. For instance, EU-SILC 2007 over-represents some population sub-groups (civil servants, banking employees), while it under-represents others (self-employed, farmers, pensioners). This introduces a composition bias. Re-weighting the sample, a seemingly obvious response, proved not to be a satisfactory solution: attempting to re-weight on the basis of the occupation of household heads made the demographic structure of the sample unrepresentative of the population, while attempting to re-weight on the basis of both occupation and demographics came up against the problem of small cell sizes. In view of that, and given that (unweighted) 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.

Estimating changes in the income distribution in 2009-2011 on the basis of a dataset originally reporting incomes earned in 2006 (even though, as explained below, updated to later years) may be seen as unsatisfactory. Due to the complexity of income surveys (including those like EU-SILC specifically designed to provide prompt information), income data only become available after considerable delay. For instance, data from the EU-SILC 2012 survey (reporting incomes earned in 2011) will be released in March and August 2014 (cross-sectional and longitudinal component respectively). In the meantime, microsimulation can fill the gap, providing timely evaluation of the first-order distributional implications of developments in 2010-2011. Moreover, even when actual data become available, EUROMOD has the additional advantage of allowing users to identify the distributional effects of each policy separately.

Updating the model to 2011 involves three separate steps: uprating tax and benefit policies, uprating underlying incomes and accounting for the rise in unemployment.

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[3] For further information see Sutherland (2007) and Lietz & Mantovani (2007). EUROMOD has undergone a major updating process, and is now run on European Union Statistics on Income and Living Conditions (EU-SILC) data in all EU-27 member states.

With respect to the first step, the Greek tax-benefit system was simulated for every single year from 2006 to 2011. In particular, we have been able to simulate the 2010-2011 austerity policies described in Table 1. Note that simulations may be imperfect when e.g. 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 (2012), were applied to account for earnings growth of employees by category in 2006-2011. On the other hand, farmers' earnings were uprated on the basis of data on gross value added by industry (El.Stat. 2012). As regards self-employment, given that no reliable information on earnings growth was available concerning the period of interest, we simply assumed that the relevant incomes moved in tandem with average incomes in the entire economy.

With respect to the third step, 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. Nevertheless, given the magnitude of the rise in unemployment in recent years in Greece, from 8.3% in 2007 to 12.5% in 2010 and 17.3% in 2011, assuming away such a change would clearly have been inappropriate for this research. Drawing on Figari et al. (2011) and Baldini & Ciani (2010), we accounted for the rise in unemployment by modifying the employment status of the required number of cases in the dataset. A detailed analysis of this process can be found in Appendix A1.

Accounting for tax evasion and benefit non take up

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 and non take up of benefits are present. In order to enhance the accuracy and credibility of our estimates, we have addressed tax evasion and benefit non take up.

Specifically, under-reporting of incomes for the purposes of tax evasion is known to be rife in Greece (OECD 2011). As a consequence, to ignore tax evasion when estimating the distributional impact of the crisis would be seriously to undermine the validity of our results. By assumption, and building on the findings of ongoing research (Matsaganis et al. 2012), we introduced rates of under-reporting equal to 1% for salaries and wages, 25% for self-employment earnings and 55% for farming incomes. As a sensitivity test, we allowed the rates of under-reporting to vary around these levels. A more detailed analysis can be found in Appendix A2.

Furthermore, we corrected for non take up of two income-tested benefits: *social pension*, aimed for persons 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. 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 (733 in 2009 and 1,850 in 2010) with the number of those eligible as simulated by EUROMOD (34,383 and 36,141 persons respectively). As a result of that, unemployment assistance was randomly assigned to 2% of eligible recipients in 2009 and 5% in 2010-2011.

Accounting for indirect taxation and benefits in kind

We were unable directly to account for VAT changes, as the underlying dataset provides no information on consumption patterns (EU-SILC is not an expenditure survey). However, as an indirect measure of the incidence of VAT hikes, we applied the methodology established in earlier work (Decoster et al. 2010), using the 2004 Household Budget Survey (HBS). 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 (Figure 4). Nevertheless, we could not account for the distributional effects of changes in VAT rates elsewhere in the paper. A more detailed analysis of the procedure is presented in Appendix A3.

The fiscal squeeze may also affect the quality and quantity of public services. 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 (Paulus et al. 2010), the relevant module is not available yet. In view of the above, changes in the provision of social benefits in kind (such as publicly-funded health care, education, care for the elderly, child care and so on) are ignored in this paper.

Inequality and poverty indicators

A final issue concerns the choice of indicators to assess distributional effects.

To assess inequality effects we use three indicators. The first is the Gini coefficient, probably the widest 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 & 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.

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. By construction, the standard poverty line goes up as median incomes improve, and (as in this case) goes down as median incomes fall. This is quite consistent with the concept of 'relative poverty', and may not matter much when income growth is slow either way.

Nevertheless, 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 adopts a different poverty threshold, fixing the poverty line at 60% of the 2009 median, adjusted for inflation. This indicator tries to capture the experience of those unable to purchase in 2010 and in 2011 the goods and services that were just affordable to someone with income equal to the 2009 poverty threshold.

4. Results

What were the first-round effects of the 2010-2011 austerity policies and the wider recession on the income distribution? Did they cause inequality and poverty to rise? Were income losses and the burden of austerity shared 'fairly' between income groups? In this section we attempt to provide some tentative answers to these questions.

Inequality

The estimated effect of austerity policies and the recession on income inequality is shown in Table 3. On all the indices we selected, inequality seems to have decreased. In the case of the Gini index and S80/S20, the change was relatively small in 2010 (-0.8% and -0.1% respectively), but became larger in 2011 (-1.6% and -3.0% respectively). The coefficient of

variation seems to have declined by 3.3% in 2010, then to have gone up by about 1% in 2011. Overall, our findings imply that the distribution of disposable income in 2011 had become somewhat less dispersed relative to 2009.

This rather surprising finding seems to be the combined effect of two opposing tendencies: on the one hand, changes that distributed the burden of austerity 'fairly' by design and/or affected social groups located towards the top of the income distribution tended to reduce inequality; on the other hand, changes that distributed the burden of austerity proportionally and/or affected households at the bottom of the income distribution tended to increase inequality. As discussed later, public sector pay cuts seem to have reduced inequality, while the rise of unemployment has made the income distribution more unequal.

Figure 1 presents changes in relative income share by decile. It can be seen that the poorest decile actually lost ground in relative terms, although as a proportion of total disposable income its loss was small (0.02 percentage points). The greatest loss was suffered by the top deciles 9-10 (0.30 and 0.34 percentage points respectively). Otherwise, income decile 8 also seems to have suffered some loss, while deciles 2-6 improved their relative position a little. Interestingly, while in 2010 the richest and poorest deciles appeared to have lost ground, both improved their relative position in 2011 at the expense of deciles 7-9. On the whole, changes in income shares were rather limited.

Poverty

Table 4 shows how our two poverty indicators were affected by the crisis. Results are shown by age, gender and employment status of the household head.

Using the standard poverty line (at 60% of median), the overall poverty rate seems to have risen, then fallen, a little: from 20.0% in 2009 to 20.6% in 2010 to 19.8% in 2011.[4] However, fixing the poverty line at 60% of the 2009 median (adjusted for inflation) drastically alters the picture: on that indicator, poverty appears to have increased by about 6 percentage points to 25.8% in 2010, and further by almost 5 percentage points to 30.5% in 2011.

The dramatic rise in poverty (relative to a fixed line) concerned every occupational category except liberal professions, public sector workers and banking employees. Households with an unemployed head were worst affected: they suffered an increase in poverty from an already very high 51.5% in 2009 to 67.5% in 2011. With respect to age, the rise in poverty was greatest for children (+13.4 percentage points) and persons aged 16-29 and 30-44 (+12.2 and +11.7 respectively), while it was relatively limited for those aged 45-64 (+9.2) and the elderly (+7.4 percentage points).

Focusing on ordinal poverty comparisons by testing for poverty dominance, we found that the FGT curves for $a = 0$ did not intersect at any point. Figure 2 offers a visual representation of the finding. It can be seen that the 2009 distribution always lies beneath the distribution in 2010-2011. In other words, regardless of the poverty threshold used, poverty was higher in the crisis years than it was in the base year.

Income loss

Figure 3 presents our estimates of the effects of the crisis by 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 2009, adjusted for inflation). Note that the composition of deciles was fixed at the base year, i.e. individuals were ranked according to their equivalised disposable income in 2009. Furthermore, our estimates focus on income alone: the effects of changes in indirect taxation are ignored.

In absolute terms, a rather steep gradient can be observed. In 2010, households in the top decile appear to have lost €5,049 per year per 'equivalent adult' (in 2009 prices), that is as

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[4] The difference between poverty rates in 2009 and 2011 was not statistically significant at the 5% level.

much as €10,603 per year for a couple with two children. By contrast, those in the poorest decile were left €343 worse off (€719 per year for a family of four). In relative terms the pattern of income loss looked a lot less progressive. Households in the two poorest deciles lost about 9% of their income. Around the middle of the distribution (deciles 3-7), relative income loss fluctuated around 10%. Further up, income loss reached 11.1% (decile 8), and peaked at 13.5% for households in the richest decile. In 2011, the income loss of households in the upper deciles increased further. The loss per 'equivalent adult' in the top decile reached €7,118 per year or 19% of its 2009 income. Deciles 8-9 were also heavily affected: average income loss there exceeded 18%. On the other hand, the losses of the two poorest deciles remained almost the same as in 2010.

The burden of austerity

We now turn to a crucial (and politically contested) question: how was the burden of austerity shared between income groups?

Figure 4 shows the relative contribution of each austerity policy (including changes in VAT) to the Greek government's fiscal consolidation effort by income decile. Positive bars represent the increase in revenues (or fall in expenditures) by decile, achieved by each policy, in euros per year per 'equivalent adult'. Negative bars show decrease in revenues (or rise in expenditures). Note that the recession weakened the deficit-reducing potential of austerity policies: because of increased unemployment, spending on benefits was higher, while the tax take was lower than would have been if private sector incomes had not been reduced. Such interactions have been taken into account in Figure 4.

As can be clearly seen, the most effective policy in terms of its contribution to fiscal savings was the increase in VAT rates. On the other hand, savings achieved by pension cuts were nearly offset by higher spending on unemployment benefits and lower income tax receipts.

In spite of changes in the structure of personal income tax and the introduction of solidarity contributions and emergency taxes, two factors combined to weaken their effectiveness in raising tax.[5] On the one hand, the austerity and the recession reduced taxable incomes. On the other hand, tax evasion continued to keep tax receipts low, and to distort the tax system's intended fiscal (and distributional) effect. Note also that even though the 2010 tax changes raised tax rates for taxpayers with taxable incomes over €32,000, those reporting less than €22,000 (i.e. the majority of taxpayers) paid less tax. Drastic cuts in personal tax allowances and tax relief in 2011 aimed to raise the tax burden for all taxpayers.

Focusing on distributional effects, the top three deciles accounted for an estimated 84% of all fiscal savings from public sector pay cuts. Similarly, pensioners' solidarity contribution hardly affected anyone in the bottom half of the income distribution.[6] To a lesser extent, this was also the case with cuts in pension benefits.[7]

On the whole, in 2010 those in the top quintile contributed 44.7% of all savings; those in the bottom quintile accounted for 7.8% of total savings. Since their relative income shares were 41.7% and 6.9% respectively (and leaving for a moment aside the objection that our estimate of the impact of VAT changes is indirect), the poor appeared to have contributed a greater share of their income to the government's fiscal consolidation effort than the rich. However, developments in 2011 seemed to distribute the burden of the crisis more fairly. The richest fifth of the population provided 45.7% of total fiscal consolidation; the poorest fifth 4.8%. Taking into account the relative income shares of each quintile (41.5% vs. 7.1% respectively),

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[5] All deciles apart from the 10th (and, by a tiny margin, the 2nd) paid less tax in 2010 compared to 2009.

[6] The estimated contribution of the top three deciles to all savings from the new pensioners' solidarity contribution was 77% (in 2011) and 78% (in 2010), while the richest decile alone accounted for 45% of all savings from that policy.

[7] An estimated 53% of total savings from cuts in pensions concerned the top three deciles. In contrast, the bottom three deciles accounted for only 7% of the relevant savings (in both 2010 and 2011).

it seems that the second year of the crisis cost the rich a greater share of their income than it did the poor.

Disaggregating the impact of austerity

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 contribution was explicitly targeted at younger pensioners on high pensions, while households towards the top of the income distribution were worst affected by cuts in public sector pay.[8]

Redistributive effects of each austerity measure can be more formally assessed by calculating the values of the Reynolds-Smolensky index. The index shows the difference between the counterfactual value of the Gini coefficient in the absence of changes in the policy assessed, and its actual value after the implementation of the policy (Duclos & Araar 2006). If the index value is positive (negative), the measure is progressive (regressive). The results for 2010 and 2011 are shown in Tables 5a & 5b respectively.

The values of the Reynolds-Smolensky index confirm that the redistributive impact of changes in direct taxation (personal income tax, solidarity contribution and emergency tax) and cuts in public sector pay was significantly progressive (especially in 2011). Cuts in pension benefits and the introduction of pensioners' solidarity contribution also seem to have had a (somewhat weaker) progressive effect. On the other hand, the redistributive effect of the emergency contribution levied on liberal professions and the self-employed was mildly regressive.

By contrast, VAT changes (analysed separately) were unambiguously regressive. This seems to be the combined effect of two factors. On the one hand, the structure of indirect taxes is largely proportional, even though different rates apply to different goods and services. On the other hand, the propensity to consume tends to rise as income falls, and may exceed 1 at low incomes (where families may spend more than they earn, either by borrowing or by drawing on past savings). As a result of both, poor households contribute a significant proportion of the total VAT take, which amounts to a very high proportion of their own income.[9]

Tables 6a & 6b show the impact of each austerity measure on poverty (fixing the poverty line at the 2009 median). In 2010, the largest increases in poverty seem to have been caused by cuts in pension benefits and the introduction of the contribution levied on the self-employed. Public sector pay cuts and changes in direct taxation had small effects on poverty, whereas the introduction of pensioners' solidarity contribution had almost no effect. In 2011, the largest increase in poverty (with respect to a fixed threshold) was caused by changes in income taxation, followed by pension benefits cuts and the self-employed contribution.

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

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[8] In fact, we found that 74% of civil servants and 65% of public utility workers were located in the top 30% of the income distribution (own calculations, available on request).

[9] Specifically, we found that the proportion of disposable income households spent to pay for the 2010 VAT hikes ranged from 2.5% for the richest decile to 6.5% for the poorest decile, rising monotonically as income fell. In terms of fiscal consolidation, the bottom three deciles contributed 18.6% of the total savings from VAT rate increases, while the poorest decile alone accounted for 5.1%. On the contrary, analysis of Household Budget Survey data suggests that, when deciles are constructed on the basis of expenditure rather than income, changes in VAT accounted for a rather flat proportion (around 2.5%) of each decile's total expenditure across the distribution (see Appendix A3).

of austerity policies (e.g. lower tax take, 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 2000-2005 to 13.7% in 2006-2008 (Bank of Greece 2012).

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 (heated) debate for some time. Meanwhile, distinguishing the distributional effects of the austerity (narrowly defined as a set of policies adopted by the government to reduce the budget deficit) from those of the wider recession may be of relevance and interest.

Table 7 shows the *ceteris paribus* first-order effects on poverty and inequality of austerity alone, which is equivalent to assuming that government policies cut public sector pay and pensions and raised taxation, but left nominal pre-tax incomes and jobs in the private sector at their 2009 level. It can be seen that the austerity policies compressed the income distribution, making it less unequal, and had little effect on poverty as conventionally defined. On the other hand, the direction in which the income distribution was compressed was downwards: an additional 10.5% of the population found itself below the 2009 poverty line (in real terms) as a result of the crisis: a true social emergency.

By way of a sensitivity test, and to check the robustness of our results to data concerning the effects of the recession used in the model, we examined the alternative assumption that the nominal change in self-employment earnings was -9.6% rather than -4.8% (remember that no reliable data on changes in such earnings are yet available). By reference to a conventional poverty threshold at 60% of median incomes, the poverty rate barely changed (from 20.0% to 20.7% rather than 20.6%). Using a poverty line fixed at its 2009 level, adjusted for inflation, caused the poverty rate to rise more markedly (to 26.5% rather than 25.8%). A further test examined the alternative assumption that the drop in average wages was twice as large as estimated by the Bank of Greece. Looking again at the fixed poverty line, this produced an estimated poverty rate of 26.4%. Finally, we tested the effect of excluding from our analysis one-off measures (e.g. the 1% emergency tax on high incomes); this made no difference whatsoever to our poverty estimates. On this evidence, our results seem quite robust.

5. Concluding remarks

Our results can be summarized as follows. As a result of the austerity policies and the wider recession, relative poverty in Greece (as measured conventionally, by reference to a poverty threshold of 60% of median incomes) increased from 20.0% in 2009 to 20.6% to 2010, then fell to 19.8% in 2011. Instead, when fixing the poverty line at 60% of 2009 median real incomes, poverty appears to have risen to 25.8% in 2010 and further to 30.5% in 2011. 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 and prices rise (as is currently the case).

Looking at poverty by category, the situation of households headed by unemployed workers emerges as clearly alarming. On the one hand, because of the sharp rise in unemployment among primary earners, the relative weight of such households in the population has increased considerably. On the other hand, the poverty rate for this group has risen further.

Considering that the maximum duration of unemployment insurance benefit is 12 months, 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 has become the new social question *par excellence*.

Changes in inequality were less pronounced, while their general direction was inequality-reducing: on the basis of available evidence, the income distribution in Greece became slightly more compressed as a result of the crisis. Income losses were far greater for the rich

than for the poor in absolute terms (i.e. in euros), even though in relative terms (i.e. as a share of their income) lower income groups also suffered a significant loss, especially in 2010.

Some of the government's austerity policies seem to have had a progressive effect: either because special care was taken to make a particular policy 'fair' by design (e.g. changes in income tax, introduction of pensioners' solidarity contribution), or because those worst affected were located towards the top of the income distribution (e.g. public sector pay cuts). This was only partly offset by the regressive effect of the self-employed contribution. Taking into account VAT hikes would tilt the balance decisively in the latter direction. On the whole, as a share of their income, the poor seem to have contributed to the government's fiscal consolidation effort more than the rich.

A certain amount of caution is called for when interpreting our results. The main issues, to do either with our approach or with our assumptions, are briefly discussed below.

Our approach to accounting for tax evasion, drawing on ongoing research (Matsaganis et al. 2012), is a clear improvement on standard practice (which is simply to ignore tax evasion). Nevertheless, it remains simplistic. Assuming that everyone's income from a given source is under-reported by same rate leaves much to be desired.

The same holds for the treatment of indirect taxation. In order to account for the impact of VAT changes, albeit in a rather crude manner, we have drawn on earlier findings (Decoster at al. 2010). This was inevitable to some extent, since EU-SILC is not an expenditure survey and contains no information on consumption patterns. Nonetheless, given the salience of indirect taxes in the Greek tax system, correctly estimating their distributional impact would greatly enhance the accuracy of our results.

On another register, the fiscal squeeze undermines the proper funding of the public sector, adversely affecting essential public services and the "social wage". However, social benefits in-kind (e.g. publicly-funded health care, child care, social care, education etc.) are ignored here. This issue has been addressed in recent work on non-monetary components in the context of EUROMOD (Paulus et al. 2010). However, we still know too little about the actual effect of funding cuts on the quality and quantity of social services. Collecting the relevant information, and relating inputs to outputs, would be impossible without a substantial amount of further research, even though the gains could also be substantial.

While we have made some progress 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: small businesses muddle through even when trade is less than brisk, while some of those whose businesses do fail are not classified as unemployed but either as involved in some other activity (e.g. in farming) or as inactive (e.g. pensioners).

While we are fully aware that these weaknesses affect the accuracy of our results, we are confident that our research offers a good 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, we believe that work based on microsimulation is a good alternative to waiting until future waves of EU-SILC are released. Furthermore, if the research question involves identifying the effect 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[10].

Our findings show that, in order to share the burden of austerity more equitably and to minimise losses for lower income groups, policies to reduce Greece's deficit need 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

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[10] For a good example of a recent application of microsimulation to estimating the impact of the austerity in the UK, see Browne & Levell (2010).

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 job and income losses have greatly increased the demand for social protection, but the response of the Greek welfare state has been inadequate (Matsaganis 2012). And yet, to prevent the economic crisis from turning into a social catastrophe, a concerted effort is needed to tighten the social safety net and to compensate the weakest groups from its adverse effects.

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Tables and figures

TABLE 1

Austerity policies

	2009	2010	2011
Public sector pay cuts	Wages and salaries (in the public and private sector) were paid in 14 monthly instalments annually.	13th and 14th monthly salaries of public sector workers were replaced by a flat-rate vacation allowance at €1,000 p.a. (payable only to those earning less than €3,000 per month). Special allowances for civil servants were reduced by 20%. Public utilities employees (no special allowances except family allowances), had their base pay cut by 10%. Public sector salaries were frozen at their 2009 level and capped at €5,981 a month.	No further changes
Pension cuts	Retirement pensions were paid in 14 monthly instalments annually.	13th and 14th monthly pensions were replaced by a flat-rate vacation allowance at €800 p.a. (payable only to pensioners aged over 60, receiving a pension below €2,500 per month).	No further changes
	Personal income tax		
Direct taxes	Tax bands: 5 Top tax rate: 40% Zero-tax bracket: €0-€12,000 p.a. for employees and pensioners; €0-€10,500 p.a. for all others. Tax allowances for installation of eco-friendly energy systems and private insurance contributions.	Tax bands: 9 Top tax rate: 45% Zero-tax bracket: €0-€12,000 p.a. for all. Tax credits for installation of eco-friendly energy systems and private insurance contributions; child tax allowance revised.	Tax bands: 8 Top tax rate: 45% Zero-tax bracket: €0-€9,000 p.a. for persons aged below 30 or above 65; €0-€5,000 p.a. for everyone else. Tax credits reduced by 50%; tax allowances (except child tax allowance) abolished.

TABLE 1 (cont'd)

Austerity policies

	2009	2010	2011
		Emergency tax	
	n.a.	1% tax levied on taxpayers with net incomes over €100,000 p.a.	n.a.
		Solidarity contribution	
	n.a.	1% - 4% tax levied on taxpayers with taxable incomes over €12,000 p.a.	1% - 4% tax levied on taxpayers with taxable incomes over €12,000 p.a.
		Pensioners' solidarity contribution (main pensions)	
	n.a.	3%-10% tax levied on main pensions over €1,400 per month	3%-10% tax levied on main pensions over €1,400 per month; 6%-10% additional tax on pensioners aged below 60 with main pensions over €1,700 per month
		Pensioners' solidarity contribution (supplementary pensions)	
	n.a.	n.a.	3%-10% tax levied on supplementary pensions over €300 per month
		Self-employed contribution	
	n.a.	€300 lump-sum tax	€500 lump-sum tax
Indirect taxes	VAT: standard rate 19%; reduced rate 9%; low rate: 4.5%	VAT: standard rate 23%; reduced rate 11%; low rate: 5.5%	No further changes
Social insurance contributions	n.a.	n.a.	Civil servants: +2%; other employees: +0.5%; self-employed: +€10 per month
Other benefits	n.a.	OEK rent benefit for private sector employees (the main housing benefit) suspended	OEK rent benefit resumed (but no arrears paid for 2010)

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TABLE 2

Key figures

	2006	2007	2008	2009	2010	2011
deficit (% GDP)	5.7	6.5	9.8	15.8	10.6	9.1
debt (% GDP)	106.1	107.4	113.0	129.3	144.9	165.3
GDP growth (%)	+5.5	+3.0	-0.2	-3.2	-3.5	-6.9
unemployment (%)	8.9	8.3	7.7	9.5	12.5	17.3
harmonised CPI (%)	3.3	3.0	4.2	1.4	4.7	3.1
earnings growth (%)	+2.4	+2.2	+1.9	+3.3	-9.1	-6.3

Sources: EUROSTAT, Bank of Greece, El.Stat.

TABLE 3

Inequality indices

	2009	2010	2011	change (%) 2011 vs 2009
Gini coefficient	0.3488	0.3459	0.3404	-0.83
coefficient of variation	0.7987	0.7720	0.7794	-3.33
S80/S20 income share ratio	6.0682	6.0605	5.8771	-0.13

Notes: Estimated year-on-year differences were statistically significant for the Gini coefficient and the coefficient of variation at the 5% level ($P<0.05$).

Sources: EUROMOD version F4.32, DASP V2.2.

TABLE 4

Poverty rates

	2009	conventional poverty line		fixed poverty line	
		2010	2011	2010	2011
all	19.96	20.61	19.83	25.83	30.49
gender					
men	18.92	19.73	19.34	24.91	29.87
women	20.94	21.44	20.30	26.70	31.07
age					
0-15	21.26	22.24	23.03	28.59	34.70
16-29	18.95	19.84	20.16	25.36	31.12
30-44	16.26	17.52	17.71	22.45	28.00
45-64	18.94	19.61	19.04	24.13	28.14
65+	24.58	24.18	20.19	29.41	32.02
household head is:					
unemployed	51.48	59.58	58.20	63.14	67.45
employee (public sector or banking)	0.31	0.42	0.75	1.39	4.16
employee (private sector exc. banking)	12.38	11.81	10.46	16.41	20.40
liberal profession	3.79	3.72	3.69	3.72	7.29
own account worker	16.63	18.08	17.33	22.96	25.10
farmer	46.88	45.48	43.37	51.79	54.96
pensioner	24.67	24.29	20.51	29.14	31.62
other	20.65	20.40	18.07	28.88	31.57

Notes: The conventional poverty threshold (60% of median) for a person living alone was €571 per month in 2009, €538 per month in 2010 and €507 per month in 2011. The fixed poverty threshold (60% of the 2009 median, adjusted for inflation) was €597 per month in 2010 and €616 per month in 201.

Using the fixed poverty line, all estimated differences in poverty rates were statistically significant at the 5% level ($P<0.05$). Using the conventional poverty line, differences in poverty rates were only statistically significant for 2010 vs. 2009.

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. 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

Sources: EUROMOD version F4.32, DASP V2.2.

TABLE 5a

Redistributive effect of austerity: 2010

	values of Gini coefficient		Reynolds-Smolensky index
	counterfactual	actual	
direct taxes		0.3488	+0.0045
pension benefits		0.3530	+0.0003
public sector pay	0.3533	0.3508	+0.0025
pensioners' solidarity contribution		0.3529	+0.0004
self-employed contribution		0.3536	-0.0003

TABLE 5b

Redistributive effect of austerity: 2011

	values of Gini coefficient		Reynolds-Smolensky index
	counterfactual	actual	
direct taxes		0.3439	+0.0081
pension benefits		0.3514	+0.0007
public sector pay	0.3520	0.3505	+0.0015
pensioners' solidarity contributions		0.3506	+0.0014
self-employed contribution		0.3524	-0.0003
social insurance contributions		0.3515	+0.0005

Notes: The Reynolds-Smolensky index shows the difference between the counterfactual value of the Gini coefficient in the absence of all austerity policies being assessed and its actual value after the implementation of each of the policies in question. Estimated differences in the Gini coefficient were all statistically significant at the 5% level ($P<0.05$).

Direct taxes included changes in personal income tax, the introduction of solidarity contribution and emergency tax (the latter in 2010 only). In 2011 pensioners' solidarity contributions included taxes levied on main and supplementary pensions.

Sources: EUROMOD version F4.32, DASP V2.2.

TABLE 6a

Impact of austerity on poverty: 2010

	counterfactual	actual	difference
direct taxes		25.22	+0.12
pension benefits		25.36	+0.26
public sector pay	25.10	25.27	+0.17
pensioners' solidarity contribution		25.12	+0.02
self-employed contribution		25.35	+0.25

TABLE 6a

Impact of austerity on poverty: 2011

	counterfactual	actual	difference
direct taxes		28.03	+1.33
pension benefits		27.14	+0.44
public sector pay	26.70	26.78	+0.08
pensioners' solidarity contribution		26.80	+0.10
self-employed contribution		26.88	+0.18
social insurance contributions		26.75	+0.05

Notes: Poverty rates were calculated by using the fixed poverty threshold (60% of the 2009 median, adjusted for inflation). The counterfactual scenario shows the poverty rate in the absence of all the austerity measures being assessed. The actual scenario shows poverty rates after the implementation of each of the measures in question. All estimated differences are statistically significant at the 5% level ($P<0.05$).

Direct taxes include changes in personal income tax, the introduction of solidarity contribution and emergency tax (the latter only in 2010). In 2011 pensioners' solidarity contributions include contributions levied on main, supplementary and high pensions.

Sources: EUROMOD version F4.32, DASP V2.2.

TABLE 7

Decomposing the effects of austerity vs. the recession

	2009	2010		2011	
		austerity alone	austerity + recession	austerity alone	austerity + recession
poverty					
poverty line: fixed	19.96	23.54	25.83	26.26	30.49
conventional		20.24	20.61	19.01	19.83
inequality					
Gini index	0.3488	0.3437	0.3459	0.3381	0.3404
coefficient of variation	0.7987	0.7763	0.7720	0.7824	0.7794
S80/S20 ratio	6.0682	5.9241	6.0605	5.7015	5.8771

Notes: 'Austerity alone' is equivalent to assuming that the government policies cut left nominal pre-tax incomes and jobs in the private sector at their 2009 level. Differences in poverty rates for the 'austerity alone' scenarios were statistically significant at the 5% level ($P<0.05$). The same holds for the Gini index and the coefficient of variation.
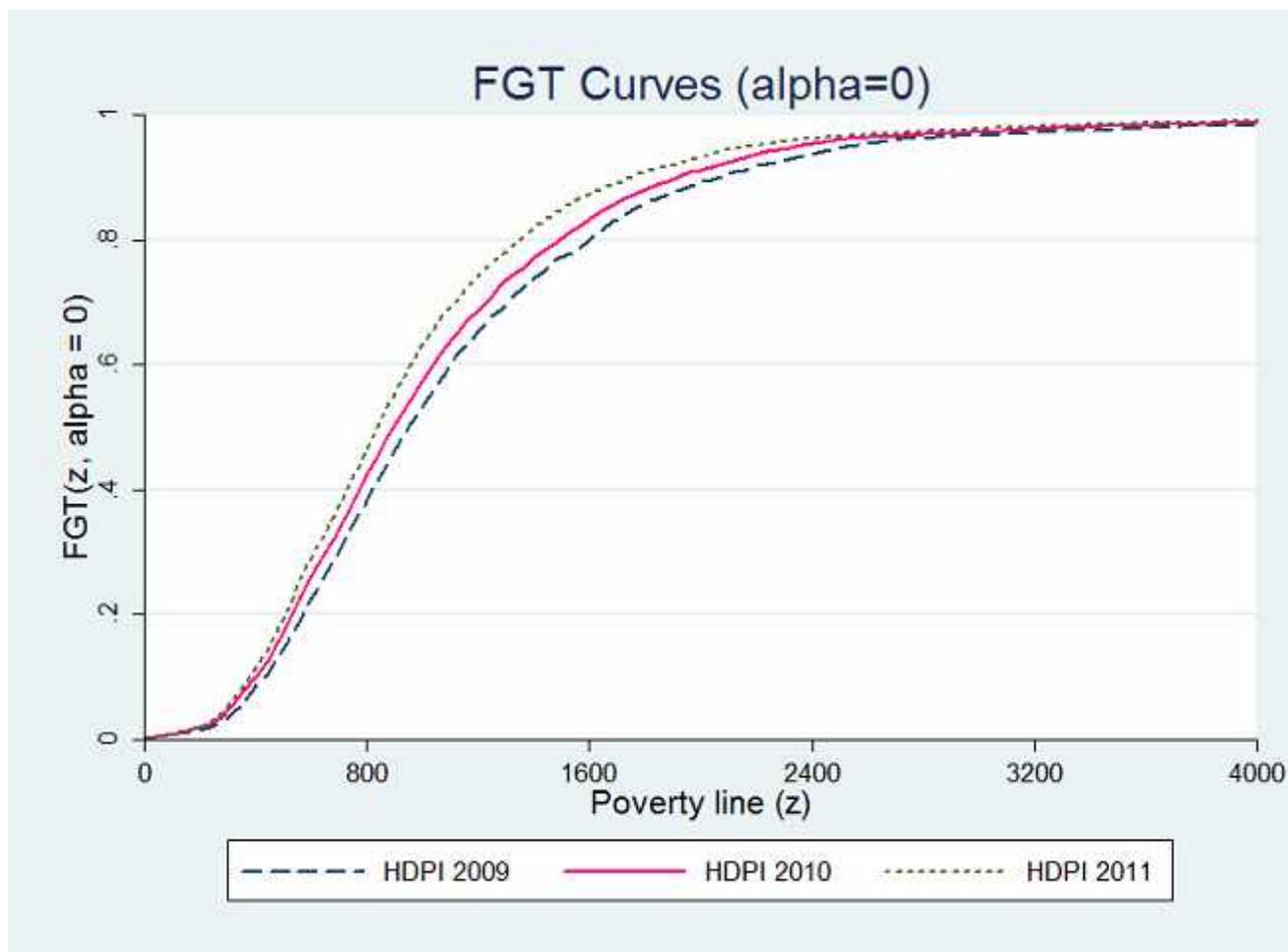
Sources: EUROMOD (version F4.32), DASP V2.2.

FIGURE 1

Change in relative income share

Notes: Income deciles were constructed according to the 'modified OECD' equivalence scale, on the basis of the 2009 income distribution.

Sources: EUROMOD version F4.32.

FIGURE 2

FGT curves

Source: DASP V.2.2

FIGURE 3

Absolute and relative income loss

Legend:
- absolute loss in 2010 compared to 2009 (left axis)
- absolute loss in 2011 compared to 2009 (left axis)
- relative loss in 2010 as percentage of 2009 income (right axis)
- relative loss in 2011 as percentage of 2009 income (right axis)

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 scale, on the basis of the 2009 income distribution.

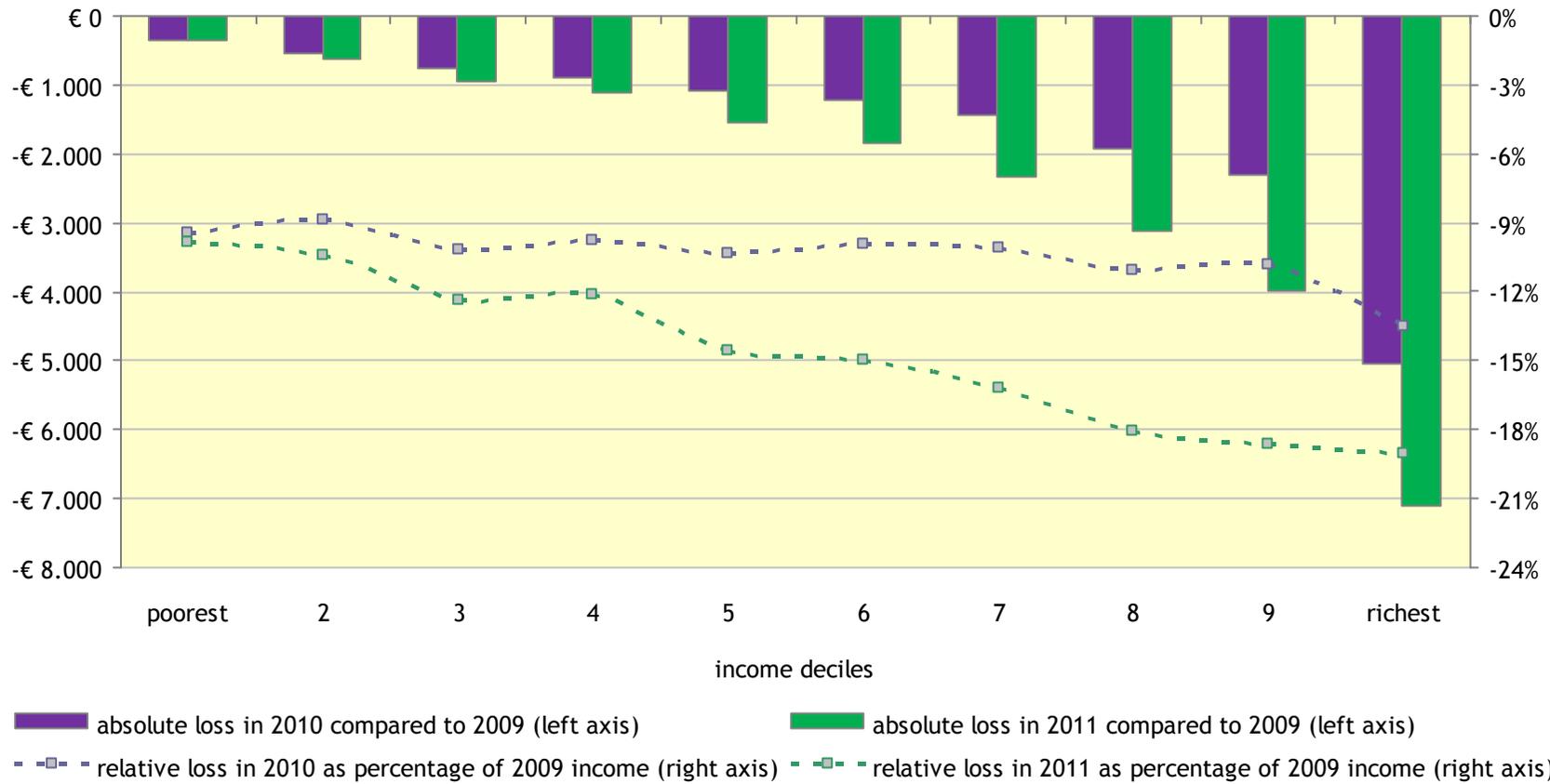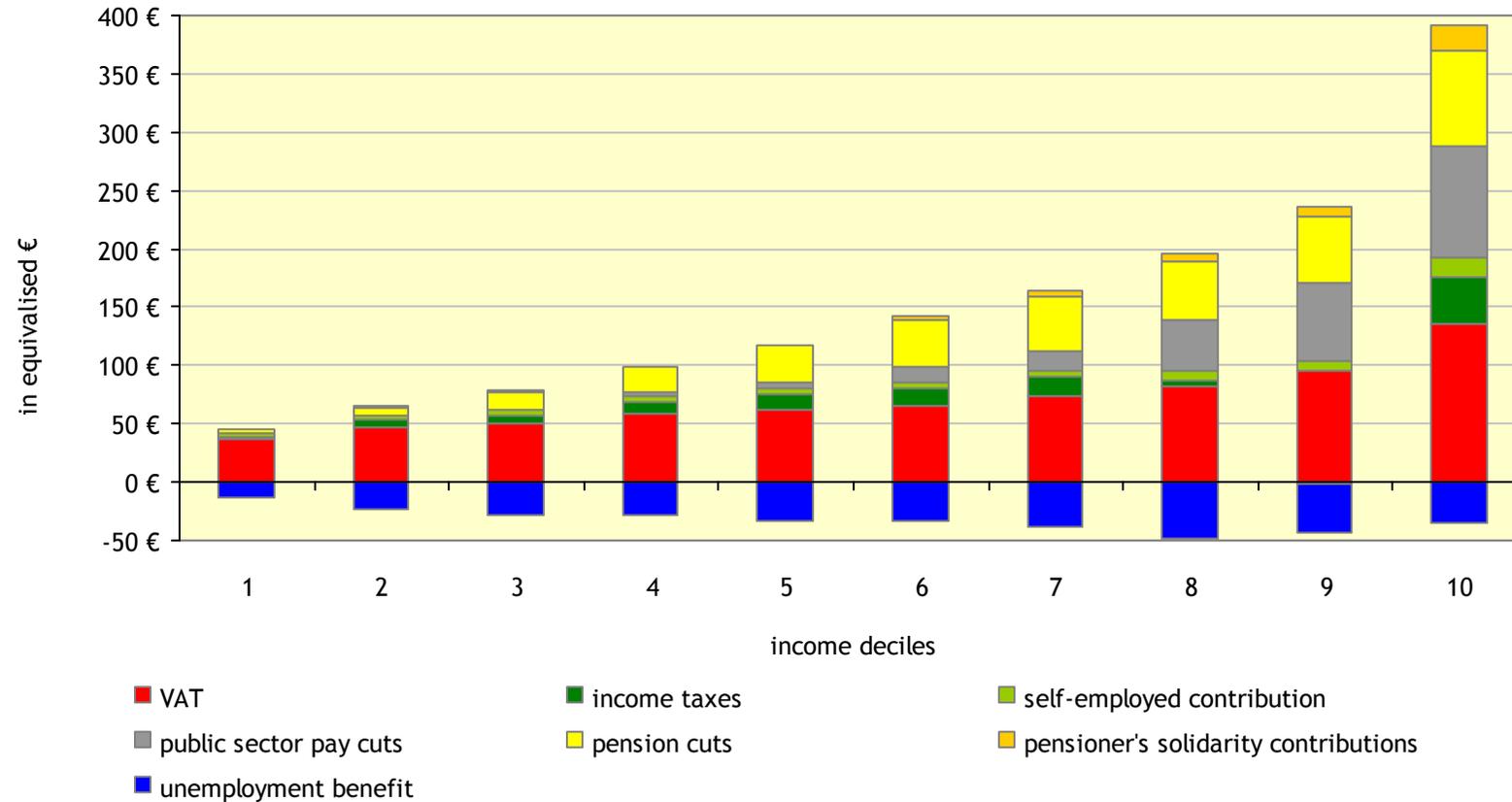Sources: EUROMOD version F4.32.

FIGURE 4

Distribution of fiscal savings

Notes: Income deciles were constructed according to the 'modified OECD' equivalence scale, on the basis of the 2009 income distribution. Income taxes also include emergency tax and solidarity contribution.

Sources: EUROMOD version F4.32.

Appendix

A1. **Accounting for the rise in unemployment**

We accounted for the rise in unemployment by first identifying the relevant sub-sample. This included workers in dependent employment other than tenured civil servants. Self-employed workers were also excluded. Then we split the sub-sample into 56 groups defined by gender, age and education. Furthermore, we 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 2010-2011 Labour Force Surveys.[11] In our dataset we set to zero the earnings of the newly unemployed. Some of these workers (depending on their previous employment record) would be eligible for unemployment benefit, which we also simulated.

An alternative way to deal with changes in employment status might have been to re-weight 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 re-weighting 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 the newly unemployed in 2010 and 2011 were quite different from the stock of unemployed workers in the base year.

A2. **Accounting for tax evasion**

In accounting for tax evasion in EUROMOD we assume that individuals reveal their real total net income (say *N*) to survey interviewers (in this case, EU-SILC). Let *G* denote individuals' real gross income (which includes the part of income which is not reported to the tax authorities), and *r* the rate of income under-reporting. Further, let *T(G)* denote the personal income tax function. In the presence of tax evasion, it follows that:

G = N + T((1-r)* G)

By solving this recursive problem iteratively and for each income source separately, we obtain the values of real gross income, *G*. The rates of under-reporting are then used to separate the reported from the unreported part of gross income. 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.

A3. **Accounting for indirect taxation**

EUROMOD's inability to simulate both direct and indirect taxes results from the lack of datasets combining information on income and expenditure. The solution proposed by Decoster et al. (2010) was the enrichment of EUROMOD's dataset with data coming from consumption surveys (for the case of Greece, Household Budget Survey 2005, reporting incomes earned in 2004). First, a list of variables was identified that was common to both the EUROMOD and the expenditure dataset. Then, expenditures per aggregate category were estimated upon these common variables in the expenditure survey. Since disposable income belongs to the list of common variables, the estimations obtained were Engel curves. The estimated models were used for predicting expenditures in the EUROMOD dataset.

Finally, indirect tax payments were estimated as a percentage of the households' initial equivalised disposable income by decile, both by using the old and the new VAT rates. The results are presented in Table A1. The data of the last column of the Table, showing the change in the burden of indirect taxes as a percentage of disposable income by decile, were

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[11] Unlike income surveys, data from labour force surveys are usually released within three months from collection.

incorporated into our analysis of the relative contribution of each austerity measure to overall fiscal consolidation achieved in 2010.

TABLE A1

Indirect tax payments as percentage of equivalised disposable income

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 2005 Household Budget Survey.

In Table A2 indirect tax payments were estimated as a percentage of the households' initial expenditure by decile, both by using the old and the new VAT rates. As can be seen, the increase in VAT corresponded to around 2.6% of each decile's total consumption expenditure across the distribution.

TABLE A2

Indirect tax payments as percentage of expenditure

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: Expenditure by decile is calculated by using the 2005 Household Budget Survey.