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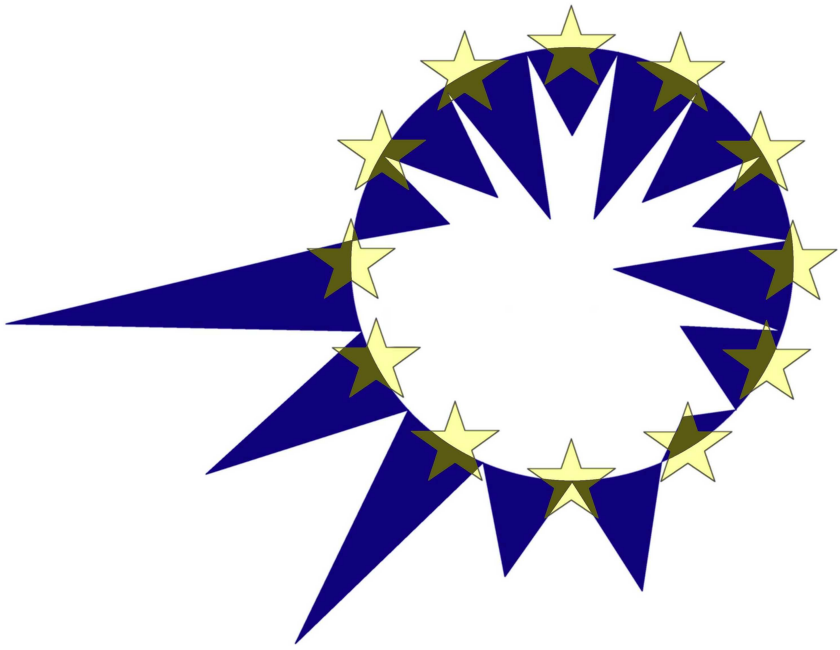

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THE DISTRIBUTIONAL IMPACT OF THE CRISIS IN GREECE

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The Distributional Impact of the Crisis in Greece[1]

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Abstract

The severe economic crisis affecting Greece is widely expected to have a significant social impact in terms of greater inequality and increased poverty. We provide an early assessment of whether (and to what extent) this 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. Using the European tax-benefit model EUROMOD we attempt to quantify the distributional implications of both. With respect to the austerity measures, we focus on the changes introduced in spring 2010 affecting income tax, pension benefits and public sector pay. With respect to the wider recession, we model the effects of rising unemployment and inflation, as well as of lower earnings for self-employed workers and for employees of private firms. In simulating the impact of these changes on the distribution of incomes (and in estimating how the total burden of the crisis is shared across income groups), we take into account tax evasion and benefit non take up. We end by discussing the methodological pitfalls and policy implications of our research.

JEL Classification: C81, H55, I3

Keywords: Austerity, Greece, inequality, poverty, microsimulation

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[1]This paper uses EUROMOD version F4.0. 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 authors' responsibility. This paper uses data from the EU Statistics in Incomes and Living Conditions (SILC) made available by Eurostat. We are grateful to El.Stat., and especially to George Ntouros, for providing us with the data of the national version of EU-SILC.

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The distributional impact of the crisis in Greece

1. Introduction

From the beginning of 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 evident in October 2009, when the incoming government announced that earlier fiscal data had been misreported. The fiscal deficit and public debt estimates for 2009 were radically revised[1]. Financial markets reacted by increasing spreads on Greek 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 measures in March 2010, followed by tax reform in April 2010. When these failed to placate the markets, in May 2010 the government negotiated an unprecedented €110 billion rescue package with the EU, the ECB and the IMF. In return for the rescue package, the government signed up to a three-year Memorandum of Economic and Financial Policies, which commits the Greek government to sweeping spending cuts and revenue increases (IMF 2010). At the same time, a second round of austerity measures was also announced.

Under the terms of the austerity measures, 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 measures took place when the Greek economy was already in recession, and made it deeper still. After a negative growth (-2.0%) in 2009, GDP shrank by a further 4.5% in real terms in 2010. As a result, jobs and wages in the private sector suffered considerably. The estimated reduction in employee compensation in private firms outside banking in 2010 was 7.3% on average in real terms, while the official unemployment rate was forecast to climb to 14.6% in 2011 (from 7.7% in 2008). Furthermore, self-employment earnings have also been affected.

The crisis (taken here to signify both austerity measures and the economic recession) are widely expected to cause poverty and inequality to rise. However, predicting the distributional effects of the crisis is not as straightforward as it may appear at first sight. Its consequences on the most vulnerable individuals may vary substantially, depending on the interaction between their labour market participation, the income and employment status of other household members, and the capacity of the tax-benefit system to absorb macroeconomic shocks (Atkinson 2009, Nolan 2009).

In this paper we provide an early assessment of whether (and to what extent) this is the case. Specifically, we attempt to quantify the distributional implications of the crisis using the European tax-benefit model EUROMOD. The paper's structure is as follows. Section 2 introduces the austerity measures and wider changes in incomes and employment. Section 3 discusses the various methodological issues. Section 4 presents our tentative 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.

[1] Deficit and debt projections have been revised from 3.7% to 15.4% of GDP and from 99.6% and to 126.8% of GDP respectively (Bank of Greece 2011).

2. The crisis

The focus of this paper is on changes in the income distribution in 2010 (the year of austerity measures and the bailout package) relative to 2009 (the last year before the onset of the crisis). This is not to say that the effects of the crisis were limited to the year 2010. At the time of writing (June 2011), the economy showed no signs of recovery as GDP fell once again and unemployment continued to rise, while a further round of austerity measures was being debated in Parliament under the terms of the Medium-Term Fiscal Plan (2012-2015) negotiated with the EU, the ECB and the IMF. The impact of more recent developments on the distribution of incomes in 2011 falls outside the scope of the current paper, but is the subject of ongoing research.

For analytical purposes, the paper distinguishes between austerity measures 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 measures. Where we refer to the effects of austerity measures we imply first-order rather than full effects (i.e. excluding those mediated by the recession).

In the above spirit, the term "austerity measures" covers policies 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 agreed with the EU, the ECB and the IMF in May 2010. In contrast, the wider recession indicates other changes in the economy, not directly under the government's control, such as those affecting jobs and wages in private firms.

2.1. The austerity

Specifically, the austerity measures of spring 2010 were a combination of increases in indirect taxes, introduction of new direct taxes, personal income tax reform, cuts in public sector pay and in pensions. Later in the year, the fiscal squeeze affected other social benefits and public services.

Public sector pay

Until recently, 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 utilities employees 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 utilities employees, 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. As a result of the above, average gross earnings in 2010 declined in real

[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.

terms relative to 2009 by an estimated 13.6% for civil servants and 9.7% for workers in public enterprises (Bank of Greece 2011).

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 also increased from 4.5% to 5.5% and from 9% to 11% respectively. Other indirect taxes also went up: excise duty on tobacco, alcohol and fuel by 30%, taxes on luxury items by 20%.

Direct taxation

Personal income tax was restructured in April 2010. The new schedule is rather more progressive (with 9 tax bands instead of 5), and provides for a personal tax allowance of €12,000 per year and a higher top rate of 45% (for annual incomes over €100,000). Moreover, the tax base was extended to include unemployment benefits, large family benefits and non contributory disability benefits, when taxable income exceeds €30,000 a year. Various tax allowances and credits were also revised. Also, personal incomes over €100,000 in 2009 were made subject to a one-off emergency tax at 1%, while a similar (and much resented) tax was retrospectively levied on firms who had registered large profits in 2009.

Pensioners' solidarity contribution

A special levy on pension incomes (labelled "Pensioners' solidarity contribution") was introduced in May 2010. Pensions under €1,400 per month were exempted. Above that level, tax rates rise steeply from 3% to 10% (the latter applies to pensions over €3,500 a month).

Pension benefits[3]

Retirement pensions in Greece also used to be payable in 14 monthly instalments. The 13th and 14th pensions have now been abolished[4], 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). Pensions were also frozen at their 2009 level.

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 (*ΟΕΚ* rent benefit for private sector employees, the main housing benefit in Greece), payment of benefit was entirely suspended for 2010. In another instance (pensioners social solidarity supplement *ΕΚΑΣ*), the effort to weed out ineligible claimants intensified, with the inevitable result that some eligible recipients had their benefit suspended.

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[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. For more information and an analysis, see Matsaganis & Leventi (2011).

[4] Invalidity pensions, social pensions and farmer basic pensions were exempted.

Public services

As a result of the fiscal squeeze, health and personal social services (such as child care and social care for the elderly), as well as education, have also suffered funding cuts, which to some extent have affected the quantity and quality of services provided.

Labour law

Finally, changes in labour law allowed collective agreements at industry- and firm-level to set lower wages than those agreed under the National General Collective Wage Agreement, while entry wages below the statutory minimum were introduced for workers aged below 21.

2.2. The recession

In 2010 the Greek economy plunged into deep recession (GDP growth -4.5% compared to -2.0% the year before). The most significant developments were as follows:

Unemployment

The overall unemployment rate has risen sharply from 7.7% in 2008 (and 9.5% in 2009), to 12.5% in 2010 (and a forecast 14.6% in 2011). Until very recently, labour market institutions and norms in Greece appeared to favour primary earners, especially male breadwinners, at the expense of secondary earners. For instance, unemployment among men aged 30-44 in 2008 was a mere 3.9%, while for women aged 20-29 it was as high as 20.5%. One implication of the traditional pattern was that unemployment and poverty rarely overlapped, affecting different population groups.

As a result of the current crisis, unemployment has risen across the board: to 8.2% for men aged 30-44, and to 29.0% for women aged 20-29 in 2010. The significant rise in unemployment among primary earners introduces a new pattern, more reminiscent of that in western and northern Europe. It also constitutes *prima facie* evidence that the unemployed (especially households with unemployed head) account for a higher share of the population in poverty. We will return to this point later on in the paper.

Private sector wages

In 2010 average gross earnings in private firms declined in real terms, relative to 2009, by an estimated 6.2%% in banking, and by 7.3% outside banking (Bank of Greece 2011).

Business closures

An unknown number of small businesses had to close as a result of the recession. Also, some larger employers, mostly in light manufacture and typically in North Greece, relocated to other Balkan countries where labour costs and taxes are lower.

Self-employed earnings

Many more small businesses stayed afloat, muddling through even though trade was less than brisk. As a result, earnings from self employment (including the more prestigious "liberal professions" of medical doctors, engineers and lawyers, were lower than before the recession.

Inflation

In spite of the recession, VAT hikes plus rising oil prices abroad and product market rigidities at home caused the harmonised Consumer Price Index to rise to 4.7% in 2010 (from 1.4% in 2009).

3. **Methodology**

Our analysis makes use of EUROMOD, a multi-country tax-benefit microsimulation model that provides measures of direct taxes, social contributions, cash benefits and market incomes in a comparable way across EU member states. EUROMOD simulates non-contributory cash benefit entitlements, direct tax and social insurance contribution liabilities on the basis of the tax-benefit rules in place and information available in the underlying datasets. The components of the tax-benefit systems that cannot be simulated (e.g. those depending on prior contributions) are taken from the data along with information on original incomes[5]. Baseline systems in EUROMOD have been validated at micro level (i.e. case-by-case validation), as well as at macro level (Figari et al. forthcoming). Furthermore, the model has been tested in numerous applications (e.g. Bargain 2006).

EUROMOD enables us to compute the disposable income of individuals under different scenarios, taking account of the operation of tax-benefit systems and the way these interact with market incomes and personal/household characteristics. In this paper, the underlying micro data for Greece are provided by both the European (UDB) and the national (PDB) version of EU-SILC 2007. The use of the national 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.

Estimating the effects of the crisis on the income distribution in 2010 using a dataset (EU-SILC 2007) originally reporting incomes earned in 2006 is clearly 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, the EU-SILC 2011 survey data (reporting incomes earned in 2010) will not be released before March 2013 (cross-sectional component) and August 2013 (longitudinal component).

A tax-benefit model like EUROMOD can fill the gap, providing timely estimates of the effects of the crisis on the income distribution. To do so, it is necessary to update the model to 2010. This involves three separate steps: (a) updating tax and benefit policies, (b) uprating incomes, and (c) accounting for changes in the characteristics of the population, namely the rise in unemployment.

[5] For further information see Sutherland (2007) and Lietz & Mantovani (2007). EUROMOD is currently undergoing a major updating process. The aim is to have EUROMOD run on EU-SILC in all EU-27 member states by 2012.

Furthermore, EUROMOD, in common with most tax-benefit models, 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.

Other issues we have also considered concern indirect taxation and benefits in kind.

A final issue concerns the choice of the poverty and inequality indicators we used to assess distributional effects.

Below we explain how we dealt with the above issues in turn.

Updating tax and benefit policies

We simulated the tax-benefit system of Greece for every single year from 2006 to 2010. In particular, we directly simulated as many of the policy changes described in section 2 as was possible. These changes included cuts in public pensions *via* the elimination of the 13th and 14th monthly payments, their replacement by pensioners' vacation allowances, the introduction of pensioners' solidarity contribution, the new personal income tax schedule, the 1% one-off emergency tax on high incomes, the extension of the tax base, and most changes in tax credits and allowances (e.g. changes in tax relief for dependent children, for installation of eco-friendly power systems, and for private insurance contributions).

Furthermore, we took full account of the fact that provision of *OEK* rent subsidy, a contributory income-tested housing benefit for dependent workers, was suspended in 2010.

Uprating incomes

We separately modelled the fall in earnings suffered by different groups of workers. We accounted for the cuts in public sector pay by uprating civil servants' and public utility workers' incomes from dependent employment on the basis of the latest estimates of average rates of income growth provided by the Bank of Greece. With respect to changes in private sector wages, we used the average rates of growth in the relevant incomes over the relevant period (from 2006 to 2010), separately for banking and non-banking firms, as estimated by the Bank of Greece (2011). Farmers' earnings were uprated on the basis of data on gross value added by industry provided by El.Stat. As regards self-employment earnings, no reliable information is available on recent changes. In view of that, we assumed that incomes from self employment moved *in tandem* with incomes from dependent employment (i.e. -5%)[6]. We uprated all other market incomes (such as property incomes, investment incomes and the like) on the basis of the most reliable information available. All uprating factors can be seen in the Appendix (Table A.1)[7].

[6] Later in the paper, we discuss the impact of assuming that the reduction in self-employment earnings was twice as large as the reduction in income from dependent employment, i.e. -10% rather than -5% (see section 4).

[7] Note that the nominal rates of income growth shown in Table A.1 are exactly equivalent to the real rates reported in section 2.

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. Nevertheless, given the magnitude of the rise in unemployment in recent years in Greece, from 8.3% in the data year (2007) to 12.5% in the year of interest (2010), assuming away such a change would clearly have been inappropriate for this paper.

We accounted for the rise in unemployment by changing the employment status of the required number of cases in the dataset. In other words, our approach draws on Figari et al. (2011)[8]. Specifically, we first identified the relevant sub-sample (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 Labour Force Survey[9]. The earnings from dependent employment of those made unemployed in the dataset were set to zero. Some of these workers (depending on their previous employment record) would be eligible for unemployment benefit, which we simulated. Finally, we assumed no changes in labour supply. The resulting adjustment is shown in Table A.2.

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 those made unemployed in 2010 are quite different from the characteristics of those made unemployed in earlier years.

Accounting for tax evasion

Under-reporting of personal incomes for the purposes of tax evasion is known to be rife in Greece (OECD 2009). 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 an earlier study of tax evasion in 2004 (Matsaganis & Flevotomou 2010)[10], we introduce rates of under-

[8] For a similar technique, see Baldini & Ciani (2010).

[9] Unlike income surveys, labour force surveys usually release data within two or three months from collection.

[10] We implicitly assume that patterns of income under-reporting for tax evasion did not change between 2004 and 2010. As a matter of fact, it is widely thought that tax evasion intensified under conservative rule (2004-2009), and that was kept in check in 2010 as the incoming socialist government made threatening noises against suspected tax evaders. However, no hard evidence exists on the real extent of tax evasion in recent years. We are currently involved in on-going research analyzing a large panel of income tax returns since 2005.

reporting equal to 1% for salaries and wages, 0% for public pensions, 25% for self-employment earnings and 55% for farming incomes (see Table A.3).

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.

Accounting for benefit non take up

EUROMOD by default assumes full benefit take up. However, not all social benefits are claimed by those eligible. Recent evidence shows that the extent of non take up in many countries (including Greece) is considerable[11].

In this paper, correction for non take up was carried out for two income-tested benefits: *social pension*, aimed for non-recipients of a contributory pension aged over 65; and *unemployment assistance for older workers*, targeted at the long-term unemployed on low income.

In the former case, the social pension was only assigned to people who declared receipt in the original dataset (part simulation). Regarding unemployment assistance for older workers, the benefit was randomly assigned to 5% of eligible recipients[12] (see Table A.4).

Accounting for indirect taxation

We could not directly account for VAT changes, as the underlying dataset does not include information on consumption patterns (EU-SILC is not an expenditure survey). To provide an indirect measure of the incidence of VAT hikes, we applied the methodology established in earlier work (Decoster et al. 2010), using data from the 2004 Household Budget Survey. 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 quantile (Figure 3). Nevertheless, we were unable to account for the distributional effects of changes in VAT rates elsewhere in the paper.

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[11] For a recent analysis of non take up in Greece and in Spain, see Matsaganis et al. (2010). For a review of non take up in several other EU countries, see Matsaganis et al. (2008).

[12] In the original EU-SILC dataset, eligibility rules for unemployment assistance for older workers (under the assumption of full take up) appeared to be met in 38 cases, whereas receipt was reported by only 2. The latter, projected from the sample to the population, is roughly equivalent to the known number of actual recipients from administrative data. The implicit non take up rate (2/38) is approximately equal to 5%.

(Not) accounting for benefits in kind

A significant aspect of the austerity is that the fiscal squeeze may affect the quality and quantity of public services. Capturing the distributional impact of social benefits in kind is not a common feature of most tax-benefit models. In spite of the substantial progress made recently towards incorporating non-monetary components into EUROMOD (see Paulus et al. 2010), the relevant module is not yet generally available. 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 indicators

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 (max. 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[13].

Poverty indicators

To assess poverty effects we use three so-called Laeken poverty indicators (Atkinson et al. 2002). The first indicator 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[14]. The second indicator may be termed the extreme poverty rate, measured in terms of the proportion of the population with an equivalised income below 40% of the median equivalised disposable income.

Both of the above indicators measure poverty by reference to a poverty line that is a function of median incomes. In other words, it goes up as median incomes improve, and it 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 condition not so much with that of "the average person" in the society in which they live, but with their own condition in a previous period.

In view of that, it may be more appropriate to use an indicator measuring poverty by reference to a poverty threshold anchored at a fixed moment in time. Accordingly, our third indicator reports the proportion of population with equivalised income in 2010 below 60% of the median of the 2009 distribution, adjusted for inflation[15]. By

[13] In the terminology of the European Commission, the S80/S20 income quintile share ratio is a structural indicator (key indicator 12), and an OMC indicator. The latter are "instruments for monitoring the overarching objectives within the Open Method of Coordination on social protection and social inclusion". See EC (2010).

[14] The standard poverty rate (At-risk-of-poverty rate after social transfers) is a structural indicator (key indicator 13b), and an OMC indicator).

[15] The proportion of population with equivalised income in 2010 below 60% of the median of the 2009 distribution, adjusted for inflation, is a specification of another OMC indicator (At-risk-of-poverty rate anchored at a fixed moment in time).

introducing this indicator, we classify as poor all those with income above the standard poverty threshold in 2010, but with purchasing power below the standard poverty threshold of 2009. In other words, we try to capture the experience of those unable to purchase in 2010 the goods and services which were affordable to someone with income exactly equal to the poverty threshold in 2009. Arguably, a poverty threshold anchored at a fixed moment in time is better suited to periods of rapid change in living standards. In this sense, our third indicator may be thought better to approximate the experience of impoverishment when nominal incomes fall and prices rise.

4. Results

What were the effects of the 2010 austerity measures and the wider recession on the income distribution? Did they cause inequality and poverty to rise? How equitably was the burden of the crisis shared between income groups? In this section we attempt to provide some tentative answers to these questions.

Inequality effects

The estimated effect of austerity measures and the recession on income inequality is shown in Table 1. On two out of the three indices we selected, inequality seems to have increased. In the case of the Gini index, the increase is a mere 0.05%. In terms of the S80/S20 index, the income share of the richest 20% of the population appears to have risen (relative to that of the poorest 20%) from 6.11 in 2009 to 6.19 in 2010, or by 1.4%. On the contrary, the coefficient of variation seems to have actually declined by 1.7%, implying that the distribution of disposable income in 2010 became somewhat less dispersed relative to 2009 (i.e. pre-crisis).

Figure 1 offers a visual representation of changes in relative income share by decile. It can be seen that the two poorest deciles actually lost ground in relative terms, even though as a proportion of total disposable income their loss was small (less than 0.1%). The greatest loss was suffered by the top decile (from 26.8% to 26.5% of total income). Otherwise, income deciles 5-9 seem to have improved their position a little. On the whole, changes in relative income share were rather limited.

Poverty effects

Tables 2-4 show how our three poverty indicators were affected by the crisis. Results are shown by age and by employment status of the household head[16].

Using the standard poverty line (at 60% of median), the overall poverty rate seems to have risen a little: from 20.1% in 2009 to 20.9% in 2010. Looking at effects on specific population sub-groups, poverty rates vary widely; from nearly 0% for households whose head worked in the public or banking sector, to over 40% for households whose head was unemployed or a farmer. Households with an unemployed head appeared to be worst hit by the crisis: their poverty rate went up by 9 percentage points (from 51.1% to 60.1%). With respect to age, the rise in poverty was more pronounced for

[16] 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.

persons aged 30-44, the age group worst affected by the rise in unemployment (see Table 2).

With reference to a lower poverty standard at 40% of median equivalised disposable incomes, our results reveal a similar pattern: overall poverty increased from 7.3% in 2009 to 8.0% in 2010 (Table 3). In the case of households with an unemployed head, the extreme poverty rate reached 38.5% (from 34.8% in 2009).

Using a poverty threshold anchored at a fixed moment in time (at 60% of the median of the 2009 distribution, adjusted for inflation), alters results quite drastically (Table 4). Overall poverty rises by more than 5 percentage points to 25.5%. The increase is pronounced for all age groups, and for most occupational categories. Once again, households whose head was unemployed[17] fared worst, experiencing an increase in their poverty risk from an already very high 51.1% in 2009 to 63.7% in 2010.

By way of a quasi sensitivity analysis, we tested the impact of assuming that the drop in self-employment earnings was twice as large as initially assumed, i.e. -10% rather than -5%. Recall that, as discussed in section 3, no reliable data on recent changes in such earnings are available yet. By reference to a poverty line at 60% of median incomes, the poverty rate rose from 20.9% to 21.0%. By reference to a poverty line at 40% of median incomes, the poverty rate went up by another half percentage point, from 8.0% to 8.1%. Using a poverty line anchored at its 2009 level and adjusted for inflation caused the poverty rate to rise more markedly from 25.5% to 26.0%. On this evidence, our results seemed rather robust[18].

Income loss

Figure 2 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 each decile's disposable income in 2009, adjusted for inflation). Note that our estimates focus on income alone, i.e. the effects of changes in indirect taxation are ignored. Note also that the composition of income deciles has been fixed in pre-crisis terms, i.e. individuals were ranked according to their equivalised disposable income in 2009.

In absolute terms, a rather steep gradient can be observed. Households in the top decile appear to have lost €4,344 per year per "equivalent adult" in 2009 prices (i.e. as much as €9,122 per year for a couple with two children). By contrast, those in the poorest decile were left €313 worse off (€657 per year for a family of four).

However, in relative terms the pattern of income loss looked a lot less progressive. Households in the poorest decile lost an estimated 8.7% of their income; those in the next poorest decile 8.6%. Around the middle of the distribution (deciles 3-7), relative income loss fluctuated around 9.5%. Further up, income loss reached 10.1% (decile 8), and peaked at 11.6% for households in the richest decile.

The burden of austerity

[17] Note that following the adjustment to the dataset described in section 3, the population share of households headed by unemployed workers rose from 2.0% in 2009 to 3.4% in 2010.

[18] We also experimented with excluding from our analysis the effects of one-off measures, such as the 1% emergency tax on high incomes described in section 2; this made no difference whatsoever to our results.

We now turn to a crucial (and politically contested) question: how was the burden of austerity shared between income groups? Figure 3 shows the relative contribution of the main austerity measures (including increases in VAT rates) to the Greek government's overall fiscal consolidation effort, by income decile, as a proportion of total savings.

An important finding, at first surprising, is that cuts in public sector pay and pension benefits were almost exactly offset by increased spending on unemployment benefits and lower income tax proceeds. The most effective (in terms of contribution to fiscal consolidation) of all the austerity measures, and the one to have made a difference, is the increase in VAT rates.

In distributional terms, a significant factor is the actual design of each measure. For example, pensioners' solidarity contribution was created with the explicit aim of placing a much higher burden on high pension than on low ones[19]. It can be clearly seen that this was achieved, since this measure hardly affected anyone in the bottom half of the income distribution. To a lesser extent, this is also the case with cuts in pension benefits[20].

Furthermore, much also depends on the income position of those affected by each measure. For instance, most public sector workers tend to be located towards the top of the income distribution. In fact, further analysis confirms that 74% of civil servants and 65% of public utility workers were located in the top 30% of the income distribution (Table A.5). As a result of that, even assuming a proportional reduction in public sector pay (as we do here), the top 30% of the income distribution provided an estimated 84% of the total fiscal savings from cuts in public sector pay[21].

Paradoxically, in spite of the changes in the structure of personal income tax, three factors combined to make the changes less effective (in terms of tax proceeds) and at the same time less progressive (in terms of distributional effects). The austerity reduces the taxable incomes of public sector workers and pensioners. The recession reduces other taxable incomes (i.e. wages and salaries of private sector employees, and earnings of own account workers and the liberal professions). Tax evasion places a significant share of real incomes from farming and self employment beyond the control of the tax system, distorting the latter's intended distributional effect.

Redistributive effects of each austerity measure can be more formally assessed by calculating the values of index of residual progression proposed by Reynolds and Smolensky (1977). The index shows the difference between the actual value of the Gini coefficient and its counterfactual value in the absence of changes in the policy being assessed, keeping all other effects constant (see also Duclos and Araar 2006). The results are shown in Table 5.

The values of the Reynolds-Smolensky index confirm that the redistributive effect of cuts in public sector pay was considerably progressive. Moreover, changes in personal income tax and the introduction of pensioners' solidarity contribution also seem to have been (mildly) progressive. On the other hand, the redistributive effect of cuts in pension benefits was shown to be weakly regressive.

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[19] The estimated contribution of the top three deciles to total savings from the introduction of pensioners' solidarity contribution is estimated at 78%. The richest decile alone accounted for 45% of total savings from this policy measure.

[20] We estimated that 53% of the total savings from cuts in public pensions concerned the top three deciles. In contrast, the bottom three deciles accounted for 7% of the relevant savings.

[21] Own calculations, available on request.

VAT changes (analysed separately) have been unambiguously regressive[22]. In spite of the fact that different rates may apply to different expenditure items (as is the case with VAT in Greece), the structure of all indirect taxes remains largely proportional. Moreover, as income falls the propensity to consume tends to rise, exceeding 1 at low incomes (where families 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 tax take, which amounts to a very high proportion of their own income.

On the whole, the rich appear to have shouldered most of the burden of the fiscal consolidation effort: those in the top decile contributed 21.5% of total savings; those in the next richest decile 14.3%. Nonetheless, the contribution of lower incomes was far from negligible: those in the bottom decile accounted for 4.3% of total savings; those in the next poorest decile for 6.1%. Since the relative income share of the two lowest income deciles was respectively 2.5% and 4.3% (and leaving for a moment aside the objection that our estimate of the impact of VAT changes is imperfect), we can conclude that the poor contributed a clearly greater proportion of their income than the rich to the government's fiscal consolidation effort.

5. Concluding remarks

Our results can be summarized as follows. As a result of the austerity measures and the wider recession in Greece, relative poverty (as measured conventionally, by reference to a poverty threshold of 60% of median incomes) has increased from 20.1% in 2009 to 20.9% to 2010. Extreme poverty (measured by reference to a threshold of 40% of median incomes) has followed a similar pattern, rising from 7.3% to 8.0%. While these increases may appear unimpressive, poverty was shown to have risen to 25.5% if anchored in pre-crisis terms (measured by reference to a threshold of 60% of median incomes in 2009, adjusted for inflation). We argue that the latter indicator is better suited to periods of rapid change in living standards, better approximating the experience of impoverishment when nominal incomes fall and prices rise (as was the case in Greece in 2010 relative to 2009).

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 risk of poverty within this group has risen further: of all individuals living in a household whose head was unemployed, 38.5% had an income of less than 40% of median, while the proportion of those with income below 60% of median was 60.1%!

Taking into account that the maximum duration of unemployment insurance benefit is 12 months, that unemployment assistance benefit has narrow eligibility conditions and suffers from massive non take up, while the rate of unemployment (and of long-term unemployment) is expected to remain high in the immediate future, poverty among the unemployed is certain to become the new social question *par excellence*.

[22] Specifically, the bottom three deciles contributed 18.5% of the total savings from VAT rate increases. The poorest decile alone accounted for 5% of total savings. Further analysis, based on data from the 2004 Household Budget Survey (results available on request), shows that the increase in VAT corresponded to around 2.5% of each decile's total consumption expenditure across the distribution. On the contrary, as a proportion of each decile's disposable income it ranged from 2.5% for the richest decile to 6.5% for the poorest decile, rising monotonically as income fell.

Changes in inequality were less pronounced, while their general direction was rather indeterminate: on the basis of available evidence, we cannot say with any degree of safety whether the income distribution in Greece became more or less compressed as a result of the crisis. In terms of relative income share, although the richest decile appeared to have lost ground, so did the two poorest deciles.

Income losses were far greater for the rich than for the poor in absolute terms (i.e. in euros). However, in relative terms (i.e. as a proportion of their income), lower income groups suffered a significant loss of income. For instance, households in the bottom quintile (i.e. the poorest 20% of the population) lost an estimated 9% of their income, compared to an income loss of 11% for households in the top quintile.

Some of the government's austerity measures 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 most affected were located towards the top of the income distribution (e.g. public sector pay cuts). However, this was partly offset by the regressive effect (albeit weak) of pension benefits cuts. Taking into account VAT rate increases would tilt the balance decisively in the latter direction: as a proportion of their income, the poor have contributed more than the rich to the government's fiscal consolidation effort.

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

With respect to data, the original database offers an imperfect representation of reality. The Greek dataset of EU-SILC 2007 over-samples some population sub-groups (civil servants, public utility workers, banking employees), while it under-samples others (the self-employed, farmers, pensioners). If, as is often the case, the former have higher income than the latter, a composition effect arises, with the implication that poverty and inequality in the population could be higher than in the sample.

Moreover, uprating incomes from an earlier date to the present amounts to assuming that everybody's income from a given source has risen by the same rate over the relevant period. This is clearly unrealistic, and could well understate distributional changes. On the other hand, uprating some incomes (e.g. self-employed earnings, incomes from farming etc.) is subject to an even greater degree of uncertainty.

On the other hand, the simulation of the tax-benefit system 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. Furthermore, as discussed earlier, our approach to accounting for tax evasion, based on earlier work (Matsaganis & Flevotomou 2010), even though a clear improvement over standard practice, remains rather simplistic. Assuming that (a) rates of under-reporting have not changed since 2004, that (b) they only vary by income source, and (c) 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 this paper, we have drawn on findings from earlier research (Decoster at al. 2010) in order to account for the likely impact of VAT changes, albeit in a rather crude manner. 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 incorporating non-monetary components into EUROMOD (Paulus et al. 2010). However, we know too little about the actual effect of funding cuts on the quality and quantity of social services. While collecting the relevant information and relating inputs to outputs is impossible without a substantial amount of further research, the gains could also be substantial.

Although we have made 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, we have implicitly assumed that the reduced demand for the 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 business does fail are not classified as unemployed but either as involved in some other activity (e.g. in farming) or as inactive (e.g. pensioners). Nevertheless, the assumption that no self-employed worker was made unemployed as a result of the crisis seems rather problematic.

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 distributional effects of austerity measures 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 factors, distinguishing between progressive and regressive items within the same policy package (as is the case here), there really is no alternative to microsimulation[23].

Our research is part of collaborative work, involving other European countries as well (Leventi et al. 2010). In the immediate future we hope to improve our methods, study more countries, and make use of better data as soon as they become available.

In the meantime, 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 deficits), as well as from a political point of view (restoring distributional justice would go a long way towards making austerity measures more acceptable).

Quite apart from the effects of the austerity, the wider recession (and, in particular, the sharp rise in unemployment) has raised the demand for social benefits. So far, the Greek government's response has been inadequate (Matsaganis 2011). Even though the number of unemployed workers rose by 45.1% in December 2010 compared to the same month a year earlier, the number of unemployment benefit recipients over the same period went up by only 9.6%. Rather perversely, housing benefit was suspended in 2010, partly because the crisis slowed the flow of social contributions into the relevant scheme. The frantic search for fiscal savings has not spared social services, some of which (e.g. the successful Home Help programme)

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

suffered significantly. On the whole, the supply of social benefits seems to have been reduced rather than increased. 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

Inequality indices

	2009	2010	difference (%)
Gini coefficient	0.349	0.350	+0.05
coefficient of variation	0.800	0.786	-1.68
S80/S20 income share ratio	6.109	6.193	+1.39

Source: EUROMOD version F4.0.

TABLE 2

Poverty rates: poverty line at 60% of median incomes

	2009	2010	difference (p.p.)
all	20.06	20.88	+0.82
gender			
men	19.04	20.01	+0.97
women	21.02	21.70	+0.68
age			
0-15	21.41	22.31	+0.90
16-29	19.02	20.12	+1.10
30-44	16.44	17.93	+1.49
45-64	19.02	19.81	+0.79
65+	24.61	24.53	-0.08
household head is:			
unemployed	51.09	60.14	+9.05
employee (public sector or banking)	0.31	0.42	+0.11
employee (private sector excl. banking)	12.69	12.31	-0.38
liberal profession	3.79	3.72	-0.07
own account worker	16.63	17.39	+0.76
farmer	46.88	45.56	-1.32
pensioner	24.74	24.72	-0.02
other	20.65	20.56	-0.09

Note: The poverty threshold for a person living alone was €570 per month in 2009 vs. €543 per month in 2010. In the case of a family of four (couple with two children) the poverty threshold was €1198 per month in 2009 vs. €1140 per month in 2010. 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.

Source: EUROMOD version F4.0.

TABLE 3

Poverty rates: poverty line at 40% of median incomes

	2009	2010	difference (p.p.)
all	7.28	7.95	+0.67
gender			
men	7.04	7.54	+0.50
women	7.50	8.33	+0.83
age			
0-15	8.51	9.74	+1.23
16-29	8.30	8.90	+0.60
30-44	6.35	7.55	+1.20
45-64	8.27	8.74	+0.47
65+	5.29	5.30	+0.01
household head is:			
unemployed	34.77	38.53	+3.76
employee (public sector or banking)	0.00	0.00	+0.00
employee (private sector excl. banking)	3.32	2.87	-0.45
liberal profession	0.99	0.97	-0.02
own account worker	5.78	6.69	+0.91
farmer	24.26	22.70	-1.56
pensioner	5.56	5.46	-0.10
other	9.74	9.59	-0.15

Note: The poverty threshold for a person living alone was €380 per month in 2009 vs. €362 per month in 2010. In the case of a family of four (couple with two children) the poverty threshold was €799 per month in 2009 vs. €760 per month in 2010. 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.

Source: EUROMOD version F4.0.

TABLE 4

Poverty rates: poverty line at 60% of 2009 median incomes adjusted for inflation

	2009	2010	difference (p.p.)
all	20.06	25.45	+5.39
gender			
men	19.04	24.52	+5.48
women	21.02	26.34	+5.32
age			
0-15	21.41	27.87	+6.46
16-29	19.02	25.27	+6.25
30-44	16.44	22.04	+5.60
45-64	19.02	23.53	+4.51
65+	24.61	29.39	+4.78
household head is:			
unemployed	51.09	63.71	+12.62
employee (public sector or banking)	0.31	1.40	+1.09
employee (private sector excl. banking)	12.69	16.36	+3.67
liberal profession	3.79	3.72	-0.07
own account worker	16.63	21.32	+4.69
farmer	46.88	50.87	+3.99
pensioner	24.74	29.06	+4.32
other	20.65	28.57	+7.92

Note: The poverty threshold for a person living alone was €570 per month in 2009 vs. €597 per month in 2010. In the case of a family of four (couple with two children) the poverty threshold was €1198 per month in 2009 vs. €1254 per month in 2010. 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.

Source: EUROMOD version F4.0.

TABLE 5

Redistributive effect of austerity measures

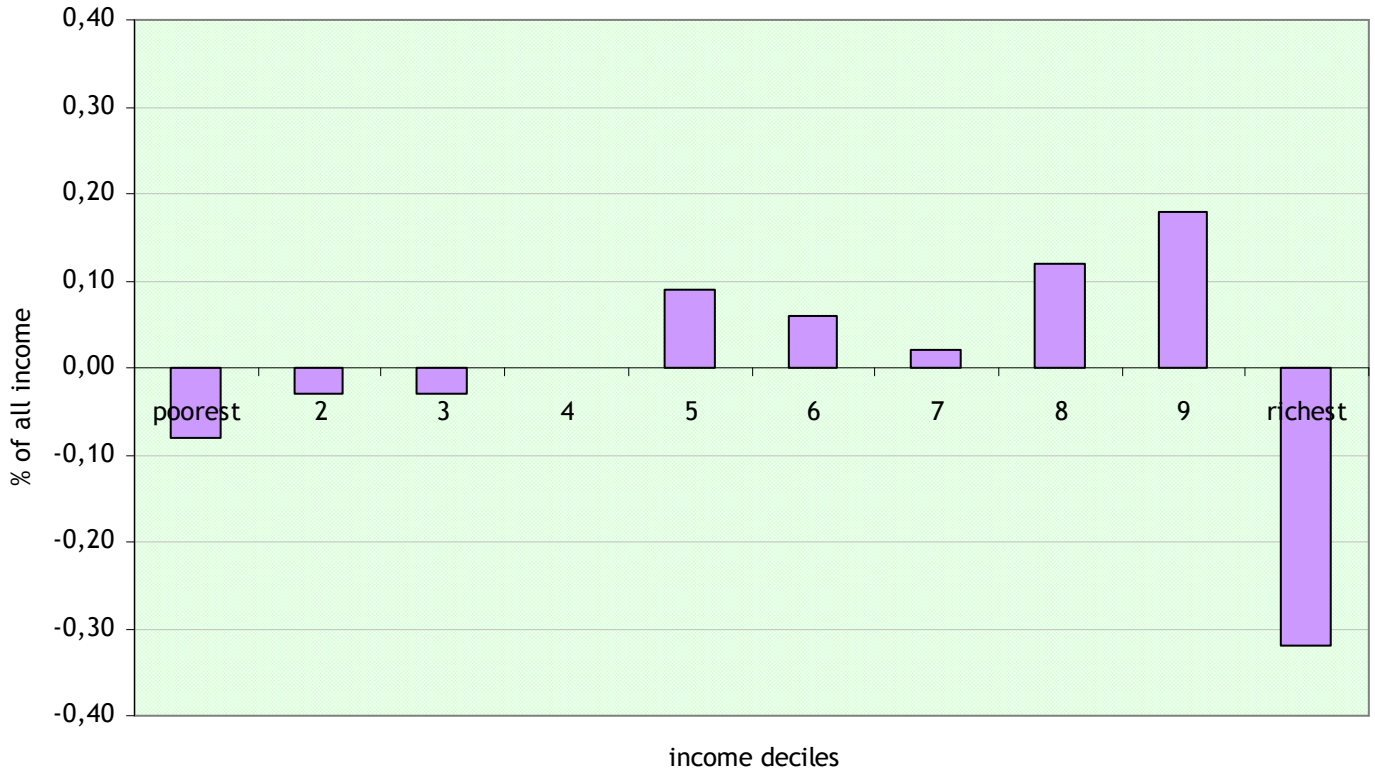
	values of Gini coefficient		Reynolds-Smolensky index
	actual	counterfactual	
income tax	0.34962	0.35007	+0.00045
pension benefits	0.34962	0.34959	-0.00003
public sector pay	0.34962	0.35250	+0.00288
pensioners' solidarity contribution	0.34962	0.35021	+0.00059

Notes: The Reynolds-Smolensky index shows the difference between the actual value of the Gini coefficient in 2010 and its counterfactual value in the absence of the policy changes being assessed, keeping all other effects constant.

Source: EUROMOD version F4.0.

FIGURE 1

Changes in relative income share by decile

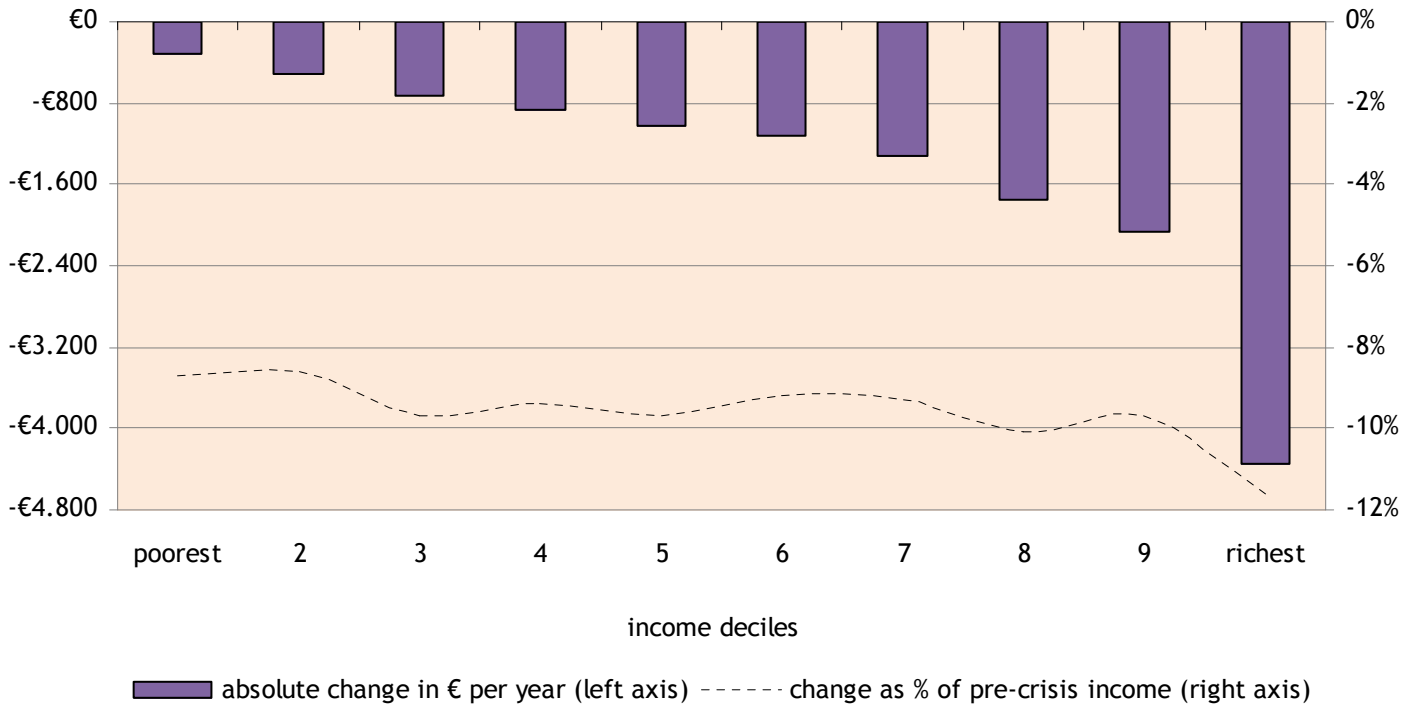


Note: Income deciles were constructed according to the "modified OECD" equivalence scale, based on equivalised disposable income in the counterfactual scenario.

Source: EUROMOD version F4.0.

FIGURE 2

Absolute and relative income loss by decile

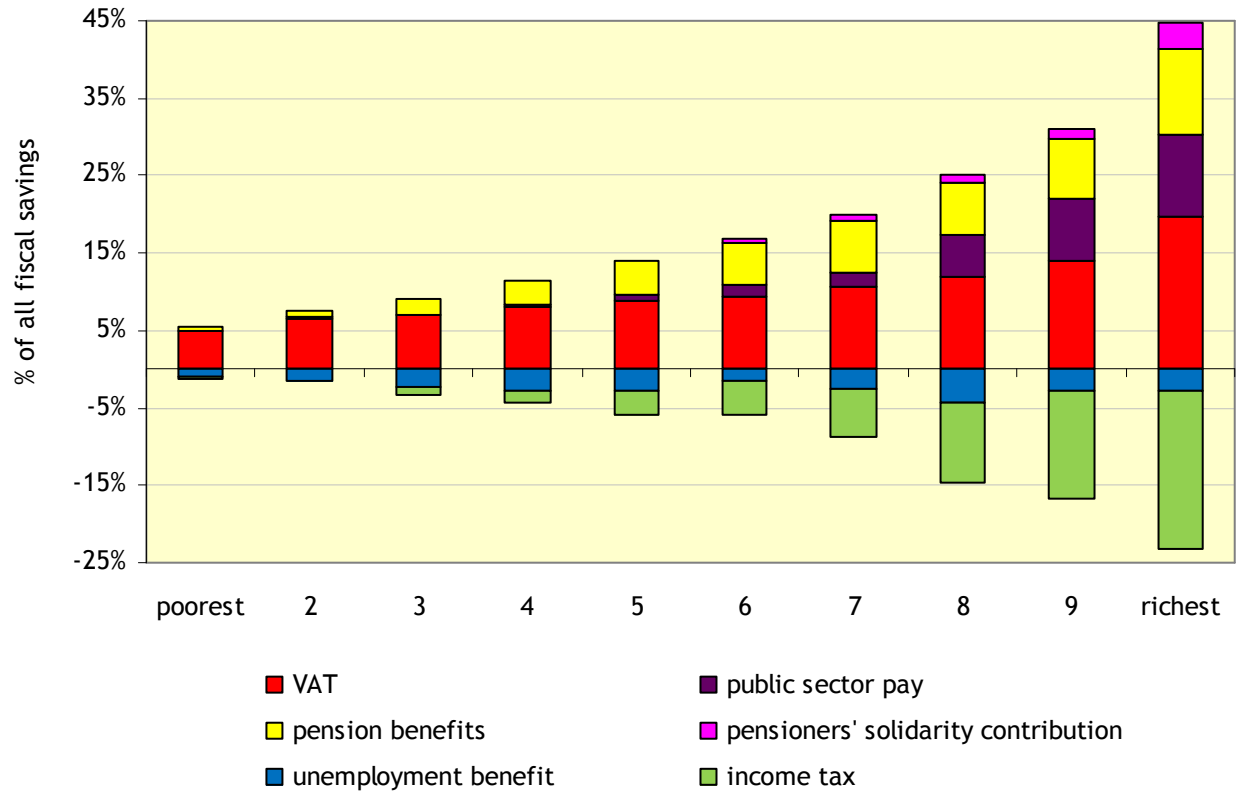


Note: Income loss is measured in real terms (i.e. adjusted for inflation), averaged for each decile. Income deciles were constructed according to the "modified OECD" equivalence scale, based on equivalised disposable income in the counterfactual scenario.

Source: EUROMOD version F4.0.

FIGURE 3

Distribution of fiscal savings by income decile



Note: Income deciles were constructed according to the "modified OECD" equivalence scale, based on equivalised disposable income in the counterfactual scenario.

Source: EUROMOD version F4.0.

Appendix

TABLE A.1

EUROMOD uprating factors

	2006	2007	2008	2009	2010
Income from dependent employment					
civil service	1.000	1.038	1.112	1.170	1.058
public utilities	1.000	1.071	1.159	1.248	1.179
banking	1.000	1.089	1.089	1.129	1.109
non-banking private firms	1.000	1.061	1.130	1.162	1.128
Income from self employment					
farming	1.000	1.008	0.946	0.920	0.899
own account workers	1.000	1.052	1.117	1.169	1.110
liberal professions	1.000	1.052	1.117	1.169	1.110
Investment / property income					
Investment	1.000	1.031	1.119	1.089	1.164
property and rents	1.000	1.045	1.086	1.125	1.152
Other income					
private transfers	1.000	1.052	1.117	1.169	1.110
non-cash income	1.000	1.052	1.117	1.169	1.110
income received by people aged under 16	1.000	1.052	1.117	1.169	1.110
Retirement pensions / benefits					
main old age pension	1.000	1.040	1.071	1.071	1.071
supplementary old age pension	1.000	1.040	1.071	1.071	1.071
other minor pensions	1.000	1.040	1.071	1.071	1.071
survivors pension	1.000	1.040	1.071	1.071	1.071
orphans pension	1.000	1.040	1.071	1.071	1.071
pensioners' social solidarity benefit	1.000	1.218	1.436	1.436	1.436
social pension	1.000	1.220	1.449	1.449	1.487
private pension	1.000	1.030	1.074	1.088	1.139
Unemployment benefits					
unemployment insurance	1.000	1.181	1.299	1.459	1.459
unemployment assistance	1.000	1.000	1.000	1.000	1.000
minor unemployment benefits	1.000	1.181	1.299	1.459	1.459
Family benefits					
3rd child benefit	1.000	1.029	1.069	1.091	1.119
large family benefit	1.000	1.029	1.069	1.091	1.119
lifetime pension to many-children mothers	1.000	1.029	1.069	1.091	1.119
civil servants' family benefit	1.000	1.000	1.000	1.000	1.000
support to families of children at school	1.000	1.000	1.000	1.000	1.000
minor family benefits	1.000	1.000	1.000	1.000	1.000
Sickness / maternity benefits					
contributory maternity benefits	1.000	1.052	1.117	1.169	1.110
health benefits	1.000	1.052	1.117	1.169	1.110

TABLE A.1 (cont'd)

EUROMOD uprating factors

	2006	2007	2008	2009	2010
Disability benefits					
invalidity pensions	1.000	1.040	1.071	1.071	1.071
disability benefits	1.000	1.045	1.127	1.218	1.318
Other benefits					
housing benefits	1.000	1.000	1.000	1.000	1.000
scholarships and grants	1.000	1.000	1.000	1.000	1.000
minor social assistance benefits	1.000	1.000	1.000	1.000	1.000
large property tax	1.000	1.000	1.000	1.000	1.000
Tax relief					
loan value	1.000	1.030	1.074	1.088	1.139
financial capital	1.000	1.030	1.074	1.088	1.139
rent paid	1.000	1.045	1.086	1.125	1.152
education expenses	1.000	1.030	1.074	1.088	1.140
housing cost	1.000	1.031	1.119	1.089	1.164
interest on mortgage payment	1.000	1.030	1.074	1.088	1.139
other housing costs	1.000	1.031	1.119	1.089	1.164
medical expenses	1.000	1.030	1.074	1.088	1.139
expenses for new heating systems	1.000	1.030	1.074	1.088	1.139
alimony expenditure	1.000	1.029	1.066	1.080	1.093
other maintenance payments	1.000	1.029	1.066	1.080	1.093
expenditure on private pensions	1.000	1.030	1.074	1.088	1.139
nominal GDP deflator	1.000	1.029	1.066	1.080	1.093
harmonised consumer price index	1.000	1.030	1.074	1.088	1.139

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

TABLE A.2

Unemployment rates: by age, gender and education attainment (%)

	original database	LFS 2010	adjusted database
men all (aged 20-64)	6.3	9.9	10.0
20-24	20.2	25.4	26.1
25-29	12.0	16.4	15.3
30-44	3.7	8.7	8.4
45-64	4.9	6.8	7.1
PhD or Master's	4.2	6.7	7.1
university	4.7	6.1	6.1
technical and post secondary	8.0	10.3	10.3
upper secondary	6.7	10.2	10.2
lower secondary	6.4	12.2	12.2
primary (completed)	6.1	10.0	10.0
incomplete primary / no schooling	8.3	19.0	18.7
women all (aged 20-64)	13.0	15.6	15.7
20-24	38.1	39.7	40.6
25-29	18.6	23.0	24.3
30-44	11.7	15.0	13.8
45-64	6.0	9.1	8.3
PhD or Master's	22.5	9.4	22.5
university	7.6	10.5	10.5
technical and post secondary	13.3	19.2	19.2
upper secondary	15.5	17.7	17.7
lower secondary	16.7	17.7	17.7
primary (completed)	11.4	13.4	13.4
incomplete primary / no schooling	6.4	18.3	14.2

Note: EUROMOD originally relied on data from EU-SILC 2007. To account for the rise in unemployment, the underlying database was adjusted using data from LFS 2010.

Source: EUROMOD version F4.0.

TABLE A.3

Correction for tax evasion

income source	assumed rate of under-reporting (%)
salaries and wages	1
pension benefits	0
self-employment earnings	25
farming incomes	55

Note: Stylised rates on the basis of the findings of Matsaganis & Flevotomou (2010).

TABLE A.4

Correction for non take up

	number of recipients		
	full take up	admin data	correction
social pension	102,842	63,806	71,694
unemployment assistance for older workers	33,523	1,089	784

Source: Various benefit-providing agencies; EUROMOD version F4.0.

TABLE A.5

Income position of earners by occupational group (2009)

	Position in the distribution		
	low income	middle income	high income
farmers	50	38	12
own account workers	20	37	43
private sector excl. banking	18	45	37
liberal professions	4	11	85
civil servants	2	24	74
public enterprises	1	34	65
banking employees	0	25	75
unemployed	47	40	13
pensioners	31	48	21

Note: "Low income" refers to the bottom 30% of the distribution (i.e. covers deciles 1-3). "High income" refers to the top 30% of the distribution (i.e. covers deciles 8-10). "Middle income" covers deciles 4-7 (inclusive).

Source: EUROMOD version F4.0.