

Paper for the IZA Workshop on the Future of Labor ‘The Effects of the Economic Crisis on the Labor Market, Unemployment and Income Distribution’, Bonn, February 21-22, 2013.

The design and distributional effects of fiscal consolidation measures in the European Union

Alari Paulus^{*}, Francesco Figari^{*°}, Manos Matsaganis⁺ and Holly Sutherland^{*}

^{}ISER University of Essex, [°]University of Insubria,*

⁺Athens University of Economics and Business

February 2012

Preliminary version, do not quote without permission.

Corresponding author: Alari Paulus, ISER, University of Essex, CO3 4SQ, Colchester, United Kingdom, apaulus@essex.ac.uk

Abstract

We compare the distributional effects of fiscal consolidation measures in nine EU countries implemented following the financial and economic crisis of the late 2000s. Using the EU microsimulation model EUROMOD, we identify measures introduced through cuts in public sector pay and cash benefits, increases in direct taxes and workers' social contributions as well as changes in VAT, and quantify their impact on household income distribution. We find notable variation in the size, composition and effects of fiscal consolidation. Overall, richer households tend to bear relatively more burden in most countries, though this differs a lot between types of tax-benefit instruments. Such heterogeneity remains little visible when measures are grouped as spending cuts and tax increases, which has been often used in the fiscal adjustment literature.

JEL: C81, H55, I3

Keywords: Austerity measures, European Union, Fiscal consolidation, Income distribution, Microsimulation.

Acknowledgements: We gratefully acknowledge help from Silvia Avram, Chrysa Leventi, Horacio Levy, Jekaterina Navicke, Eva Militaru and Olga Rastrigina. We would also like to thank Paola De Agostini, Carlos Farinha Rodrigues, Viginta Ivaskaite-Tamosiune, Romas Lazutka, Andres Võrk and Anna Zasova for advice and assistance, as well as the contribution of all past and current members of the EUROMOD consortium. The process of extending and updating EUROMOD is financially supported by the Directorate General for Employment, Social Affairs and Inclusion of the European Commission [Progress grant no. VS/2011/0445]. This research has been partly funded by the European Commission through the Social Situation Observatory on Income Distribution and Living Conditions. The authors alone are responsible for the analysis and interpretation of the data reported here. It does not necessarily reflect the opinion or position of the European Commission.

We use microdata from the EU Statistics on Incomes and Living Conditions (EU-SILC) made available by Eurostat under contract EU-SILC/2011/55 (for Latvia, Lithuania, Portugal and Romania) and the national EU-SILC "PDB" data made available by respective national statistical offices (for Estonia, Greece, Spain and Italy); and the Family Resources Survey data made available by the Department of Work and Pensions via the UK Data Archive (for the UK).

1. Introduction

The financial and economic crisis which started in the late 2000s and the fiscal consolidation measures to counter the subsequent government budget deficits have also an impact on household income distribution. The design and distributional effects of fiscal consolidation measures are of great relevance, not only because inequality, and any driver of growth in it, matters in its own right, but also because the way how fiscal consolidation is achieved and the cost of the crisis distributed has implications for the prospects for macroeconomic recovery and financial stability, as well as for the political acceptability of pathways in this direction.

The growing fiscal consolidation literature is mainly macro-oriented and often overlooking the distributional effects, not least because of data availability and difficulties in linking various budget items with specific households (Perotti, 1996). Furthermore, several studies have suggested that fiscal adjustments based on spending cuts, including both cuts in government expenditures and public transfers to households, are more effective in reducing public debt and less harmful to economic growth compared with fiscal adjustments based on tax increases, e.g. Alesina and Perotti (1995, 1997), Alesina and Ardagna (1998, 2010, 2013), Alesina, Favero and Giavazzi (2012), Guajardo et al. (2011), IMF (2010), McDermott and Wescott (1996), von Hagen and Strauch (2001). On the one hand, this raises a question whether these two broad approaches have similar or different distributional implications, which has not been addressed before. For example, one might expect that cuts in public transfers put more burden on the lower part of household income distribution while tax increases require relatively bigger contributions from richer households. On the other hand, it is likely that distributional effects vary notably also among benefit and tax instruments pointing to the need to consider even more disaggregated data.

The aim of this paper is to help filling the gap in the fiscal consolidation literature regarding distributional effects, taking a cross-country perspective to give a stronger base for generalising the results. Based on the microsimulation method, we provide *ex ante* estimates of the distributional impact of fiscal consolidation measures implemented in the EU countries since the start of the Great Recession and up to mid-2012.¹ We use EUROMOD, the EU tax-benefit microsimulation model, and concentrate our analysis on the PIGS countries (Portugal, Italy, Greece and Spain), the Baltic countries (Estonia, Latvia and Lithuania), Romania and the UK

¹ As such this paper builds on our previous work, see Callan et al. (2011) and Avram et al. (2012).

which have experienced the largest budget deficits² and/or fall in economic output during the crisis. These countries have also implemented fiscal consolidation measures of between 5% and 12% of GDP which are very large by historical comparison, see e.g. Sutherland et al. (2012).

Our paper contributes to the strand of fiscal consolidation literature using a narrative approach to identify discretionary changes in fiscal policy (e.g. Romer and Romer, 2010; IMF, 2010) rather than statistical methods (e.g. Alesina and Perotti, 1995; Alesina and Ardagna, 1998; Blanchard and Perotti, 2002).³ An additional advantage of the microsimulation method in this context is that it allows assessing policy changes in greater detail as we consider each individual policy instrument separately.

The degree of deficit reduction that these nine governments set out to achieve naturally varied, and so did the policy mix chosen to achieve it. Our analysis addresses the question of how changes to direct personal taxes, cash benefits and public sector pay, which have a direct impact on household income distribution, affect different income groups and types of household. We focus on these instruments as they provide governments with better control on distributional outcomes and offer more explicit choices, while macro-economic and labour market policies – and even cuts in public services – are blunt instruments in terms of their distributional effects. Furthermore, our attention is on the short-term outcome leaving aside potential behavioural responses⁴; for this reason we exclude e.g. employer social insurance contributions while we consider additionally the incidence of increases in VAT across the income distribution. We also limit our scope to permanent policy measures with a lasting effect on government budgets and exclude temporary fiscal adjustments.

² Of the nine countries analysed in this paper, only two were running budget surpluses in 2007 (Estonia and Spain) though apart from Greece all other had budget deficits around the European Union's Stability and Growth Pact limit of 3% of GDP. By 2009 only Estonia - which made most of fiscal adjustments in that year - had a deficit below that limit. Seven countries had budget deficits much higher than the EU-27 average, around or above 10% of GDP, and Italy slightly below the average. In 2010-11, the budget deficits were reduced in all countries though remained still above the 3% limit (except in Estonia which had even a small surplus by then), the highest deficits (8-9%) being in Greece, Spain and the UK.

³ Alesina, Ardagna and Perotti (AAP) use in several papers a procedure proposed by Blanchard (1990) where social transfers and government revenues (as a share of GDP) are regressed on the unemployment rate which is then used to estimate the counterfactual share of transfers and revenues if the unemployment rate would have remained constant. Blanchard and Perotti (2002) pioneered the use of a structural VAR model with quarterly data, making assumptions about the timing of different effects, i.e. quarterly changes only reflect automatic reactions as discretionary changes take longer to implement.

⁴ Although fiscal consolidation measures are likely to generate behavioural changes, these second round effects are presumably not very large. For example, Bargain et al. (2012) estimated labour supply elasticities for the US and 17 European countries and found that these were mostly modest.

We find notable variation in the size, composition and effects of fiscal consolidation (in the short term). Overall, richer households tend to bear relatively more burden in most countries, though this differs a lot between types of tax-benefit instruments. Such heterogeneity remains little visible when measures are grouped as spending cuts and tax increases, which has been often used in the fiscal adjustment literature. Our results emphasise the value of in depth analysis and provide insights for the choice of instruments to be used in order to consolidate public finances.

The structure of this paper is as follows. Section 2 discusses methodology and summarises the fiscal consolidation measures taken in each country and the scope of our analysis. Section 3 presents an analysis of the composition and distributional effects of the measures in the nine countries and shows how the different policy mixes each have their own distributional implications as well as certain common features. Final section concludes by summarising our policy relevant findings and by explaining the caveats to be adopted when interpreting them.

2. Methodology

We make use of microsimulation technique (see e.g. Bourguignon and Spadaro, 2006), which allows us to identify tax-benefit policy changes in detail and estimate their effect on disposable income for each household. Aggregating the impact across all households yields an aggregate measure of fiscal consolidation, as such providing an alternative, ‘bottom-up’ measurement strategy for usual approaches in the macroeconomic literature.

Specifically, we use EUROMOD, the EU tax-benefit microsimulation model (Sutherland, 2007; Lietz and Mantovani, 2007). It is the only integrated multi-country model and allows to assess and compare the effects across a number of countries in a comparable manner. EUROMOD uses information on personal and household characteristics (including market incomes) from the EU Statistics on Incomes and Living Conditions (EU-SILC) survey, providing a representative sample of each national population, and simulates cash benefit entitlements and personal tax and social insurance contribution (SIC) liabilities on the basis of the tax-benefit rules in place. The model draws both on the Eurostat version of SILC and, where available, on national versions (with more detailed information); the only exception is the UK for which the Family Resource Survey is used instead (see Table 1). We use the latest data wave currently linked with EUROMOD, i.e. SILC 2008 with 2007 incomes. The sample size for most countries is between 10 and 20 thousand individuals, it is about 35 thousand for Spain and more than 50 thousand for Italy and the UK.

Table 1: Summary of input datasets

Country		Input dataset	Income reference period	Sample size (individuals)
Estonia	EE	National SILC 2008	2007 (annual)	12,999
Greece	EL	National SILC 2008	2007 (annual)	16,814
Spain	ES	National SILC 2008	2007 (annual)	35,858
Italy	IT	National SILC 2008	2007 (annual)	52,135
Latvia	LV	EU-SILC 2008	2007 (annual)	13,081
Lithuania	LT	EU-SILC 2008	2007 (annual)	12,130
Portugal	PT	EU-SILC 2008	2007 (annual)	11,772
Romania	RO	EU-SILC 2008	2007 (annual)	19,111
UK	UK	FRS 2009/10	2009/10 (current)	57,380

In this analysis, we adjust the data to account for the most important labour market changes since the data collection (which was before the financial and economic crisis).⁵ As the economic crisis deepened, the countries considered here experienced, and in many cases are still experiencing, reductions in labour market activity. We predict transitions from employment into short- or long-term unemployment and from being out of work into employment, based on the changes in employment as indicated by 2007 and 2011 (i.e. the latest available) Labour Force Survey (LFS) data.⁶ Transitions are applied within 18 strata of characteristics – according to age group (3), gender and educational level (3), selecting (randomly) for each strata a required number of people for whom employment status is changed. This method builds on previous work by Figari et al. (2011) and Avram et al. (2011) and is explained in detail in Navicke et al. (2012).

We also adjust the nominal level of market incomes by source, in line with actual changes since the income reference period. Finally, some corrections are made in this analysis for tax evasion (Greece, Italy) and non take-up of certain means-tested benefits⁷, assuming behaviour in this respect to be the same before and after the policy changes.

Overall, we focus on the effects of fiscal consolidation packages on household incomes and leave aside effects on income distribution from labour market developments and financial, macroeconomic and political disarray, and on inequalities more generally from cuts in spending

⁵ See Avram et al. (2012) for an analysis mainly based on pre-crisis household characteristics. Note that such an exercise would correspond to a slightly different research question, arguably reflecting how the effects of fiscal adjustments might have been evaluated at the time of their implementation.

⁶ This is not done for the UK because the data already come from a later period.

on public services.⁸ As such it is not about the effects on inequality of the crisis as a whole, nor does it attempt to consider all aspects of economic welfare.

We identify changes in national legislations regarding individual tax and benefit instruments drawing on EUROMOD expertise and documentation.⁹ In some countries, such as Greece, explicit packages of reforms have been labelled as austerity measures. While mostly involving tax increases and cuts in social benefits and public sector pay, they also include increases in some benefits or reductions in taxes for certain groups to compensate or alleviate the impact of other measures. In any case, the package as a whole can be easily identified. In other countries it is not so clear how policies would have evolved in the absence of the budgetary crisis. In the UK, for example, there was a change of government in mid-2010 and the policy changes include, alongside measures that might have been introduced by any government, cuts and restructuring of the welfare system that arguably are part of a new approach, some under the guise of austerity. In general our approach has been to focus on changes that were explicitly introduced in order to cut the public deficit, or stem its growth. The aim is to distinguish between changes that were part of a “business as usual” scenario and those introduced for austerity reasons. As such we follow the spirit of other studies relying on historic sources, e.g. Romer and Romer (2010), IMF (2010), Devries et al. (2011).

What makes cross-national analysis more challenging is variation in the length of period when fiscal adjustments were made. In some cases measures were all announced and introduced within a single year. In other cases, for instance in the UK, measures announced at one point (e.g. in 2010) may not be implemented fully until much later (e.g. 2014). Furthermore, it is possible that the medium term plans that are announced will be reversed or amended before being implemented or further measures introduced. In addition, some of the measures introduced earlier in the period were intended to be temporary from the beginning or have been reversed later. Macroeconomic literature, however, as also pointed out by Perotti (2013), tends to ignore the multi-year nature of fiscal adjustments, focusing typically on annual (or even shorter)

⁷ A study by Matsaganis et al. (2010) estimated that the non take-up of means-tested benefits for the elderly in two of the countries examined here (Greece and Spain) could be very extensive. There is a long history of research on non take-up in the UK, e.g. Duclos (1995), Pudney et al. (2006).

⁸ Other studies are attempting to explore some of these complex issues at the national level – for example see Matsaganis and Leventi (2012) for Greece, Brandolini et al. (2013) for Italy, Nolan et al. (2013) for Ireland and Joyce and Sibieta (2013) and Brewer et al. (2011) for the UK.

changes. Here, we consider the impact of fiscal measures implemented since the crisis in each country and still in effect as of June 2012 – at which point fiscal adjustments were still continuing. We exclude one-off measures offering only temporary improvement in the government budget¹⁰ as well as the removal of fiscal stimulus measures (e.g. in Spain) if those reforms were originally presented as temporary.

In order to evaluate the effect of policy changes, it is necessary to define and construct the counterfactual scenario, i.e. what would have happened in the absence of the fiscal consolidation measures. We have chosen to interpret the “absence of the fiscal consolidation measures” as the continuation of pre-fiscal consolidation policies, indexed according to standard practice and official assumption, or law. Such indexation is not the same across countries under consideration. Apart from public pensions, most of the countries do not regularly index fiscal policies and instead change these occasionally on an ad hoc basis. The exceptions are Italy, Portugal and the UK with especially the latter having long-established indexation rules and conventions (Sutherland et al., 2008) although these are in the process of changing (Joyce and Levell, 2011). The only countries not applying any indexation are Greece and Lithuania.

To tackle increasing budget deficits, the governments tried to find ways both to increase revenues and decrease expenditures. In most countries the fiscal consolidation measures have taken the form of some combination of: (i) reductions in cash benefits and public pensions; (ii) increases in direct taxes and contributions paid by households; (iii) increases in employer-paid contributions; (iv) increases in indirect taxes; (v) reductions in public services that have an impact on the welfare of households using them; (vi) reductions in public expenditure that cannot be allocated to households (e.g. pure public goods like defence spending) and increases in taxes that are not straightforward to allocate to households; (vii) cuts in public sector pay and (viii) cuts in public sector employment. The direct effect on the public budget will be the net effect of these changes, including interactions between various instruments. For example, reductions in public sector pay and taxable pensions/benefits will serve to reduce tax revenue, means-tested benefits may absorb to some extent income losses due to other measures, increases

⁹ Tax-benefit policy changes for each country are summarised in EUROMOD Country Reports (along with modelling notes and validation results). See <https://www.iser.essex.ac.uk/euromod/resources-for-euromod-users/country-reports>

¹⁰ We do acknowledge that in some cases, these provided substantial fiscal savings in a particular year nonetheless: e.g. public wage cuts and suspended payments to the 2nd pension pillar in Estonia, a number of one-off additional taxes and contributions in Greece, an increase of income tax in Latvia and cuts in public pensions in Lithuania.

in indirect taxes will result in increased inflation and hence (in some cases) increased indexation of benefits. The eventual overall result will also depend on any behavioural or macro-economic second and third round effects.

In this analysis we focus on the first round effects of measures which have a direct impact on income distribution, i.e. cash payments (i), direct personal taxes and contributions (ii) as well as public sector pay cuts (vii), the latter measured net of any reduction in income tax and social contributions. We chose to exclude changes in employer SIC (iii) on the grounds that these are unlikely to affect household incomes in the short run. On the other hand, drawing on available previous research we also show, in broad and approximate terms, the additional effect of indirect tax increases (iv).

Table 2 summarises the types of measures that have been used in each country within the scope of our analysis, since the 2008 economic downturn and up to mid-2012. The starting point from which measures were introduced is different across countries depending on many factors, including the timing of the national macroeconomic and budgetary reactions to the financial crisis. Among the countries included in the analysis, the Baltic countries (Estonia, Latvia and Lithuania), Portugal and the UK started introducing fiscal consolidation measures in 2009 and followed with further measures in 2010 to 2012.¹¹ Other countries (Greece, Spain and Romania) started fiscal consolidation in 2010 and Italy introduced its first measures in 2011.

The table shows that all countries have cut cash benefits and/or pensions and, all of the countries except Lithuania and Romania increased both income taxes and workers' social insurance contributions. Greece further introduced additional new taxes and/or contributions (some on a one-off basis). In principle, all countries also cut (or froze or somehow limited) public sector pay though given the period of analysis this excludes Estonia and also the UK, due difficulties in establishing the extent and incidence of any effect.¹² While a number of countries also increased property taxes, it has not been possible to model these policy changes for all of them, due to lack

¹¹ Some policy measures in the UK which were implemented between April 2009 and June 2011 had been announced before the start of the crisis or were introduced as part of the political deal made in forming the 2010 coalition government. We exclude these (which tend to reduce tax revenue or increase spending) from our measure of fiscal adjustments.

¹² In Estonia there was a substantial cut in average public sector pay in 2009. But by the end point of the period we consider, public pay had risen again (similar to the average wage in the private sector). In the UK, while public sector institutions have had their budgets cut, and pay rises are certainly restricted, there is no figure for a specific pay cut that can be simulated in this exercise. This is partly because it is difficult to distinguish public and private sector employees, a factor that explains why this information is not collected in the UK micro-data that are used in this study.

of necessary information in the data. Finally, all countries have also increased the (standard) rate of VAT.

Table 2: Type of household income-based fiscal consolidation measures introduced (as of June 2012)

Type of measures	EE	EL	ES	IT	LV	LT	PT	RO	UK
Benefit and/or pension cuts (or freezing)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Increased income taxes and/or reduced tax concessions	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Increased worker social insurance contributions	Yes	Yes	No	Yes	Yes	No	Yes	No	Yes
Public sector pay cuts (or freezing)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Increased property taxes	No	Yes	(Yes)	Yes	(Yes)	(Yes)	(Yes)	(Yes)	No
Increased standard rate of VAT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start period of measures	2009	2010	2010	2011	2009	2009	2009	2010	2009

Notes: The fiscal consolidation measures included here are limited to those that have a direct effect on household income, plus also increases in (the standard rate of) VAT. Temporary measures which were reversed by mid-2012 are excluded. Employer contributions were increased in Estonia, Greece, Italy and the UK but the effect is not included in our analysis of household income. In the table, Yes in bold indicates that measures are captured in our analysis. (Yes) in parenthesis indicates that measures were introduced but are not possible to simulate.

Although our analysis covers the main changes in direct taxes and cash benefits, due to data limitations it is not possible to simulate all changes: e.g. cuts in minor benefits and tax allowances in Estonia; cuts in the benefits and tax credits administered by some regional governments in Spain. Among the changes in indirect taxes, as well as increases in the standard rates of VAT, reduced rates of VAT and excises were increased in some cases but are not captured in our analysis (except for Greece). Detailed information on the changes in each country can be found in Avram et al. (2012), see Appendix.

3. The effects of fiscal consolidation measures

We first analyse the size and composition of income-based fiscal consolidation measures, i.e. changes to cash benefits, income taxes and contributions paid by workers as well as public pay cuts (net of corresponding tax and contribution reductions). This is expressed as the net proportional reduction in household disposable income in each country. As noted above, our aggregate measure of fiscal consolidation is derived from micro-data and, hence, can provide a useful alternative to typical approaches in the fiscal adjustments literature. We then explore the distributional effects by analysing the proportional reductions in income, across the (counterfactual) income distribution and by household type. Finally, we show separately the

effect of the VAT increases which are cruder estimates, based on data from other studies, as the SILC datasets underlying EUROMOD do not include information about consumption expenditures.

Size and composition of the household income-based fiscal consolidation packages

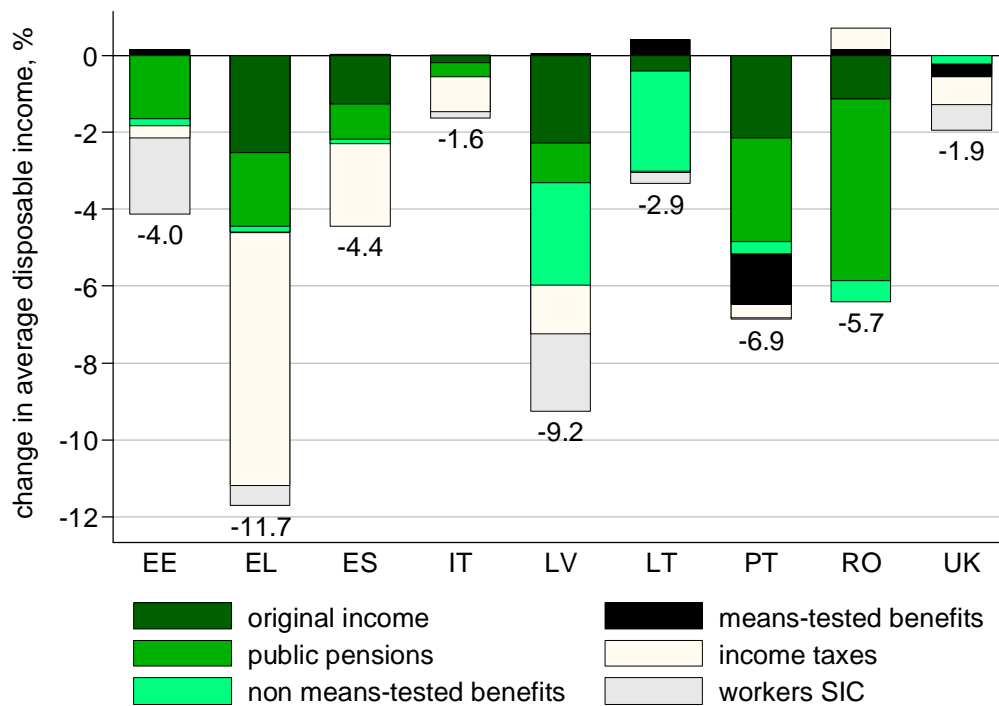
The extent and composition of the “fiscal consolidation packages” analysed here is shown in Figure 1. Measured as a percentage of pre-austerity total disposable income¹⁴, the overall fiscal consolidation generated by the household income-based measures included in the analysis varies from 1.6% of disposable income in Italy and 1.9% in the UK to 9.2% in Latvia and 11.7% in Greece. In interpreting these figures it is important to remember that they do not reflect the scale of the fiscal consolidation effort as a whole in each country. In some countries measures without a direct impact on household income – such as those affecting the corporate sector or employers generally; or cuts in public services (as in Italy) – have a relatively large role. In other cases the main effect of the measures is being planned for a period in the future (UK) and in Estonia, Greece, Latvia and Lithuania our analysis excludes the effect of measures that had already expired by mid-2012. These results indicate the scale of immediate and direct losses in income experienced by households.

Figure 1 also shows the relative importance of the different types of measure. Comparing across countries, this varies greatly, indicating that there has been no common approach to consolidating public budgets. Pay cuts for public sector workers (net of taxes and contributions) play a major role in Greece, Latvia and Portugal and a somewhat smaller role in Romania and Spain. Cuts in public pensions are especially important in Romania (making up well over half the overall total) and also in Portugal, Estonia and Greece. Increases in income tax are important in Greece and Spain, and in terms of the share of the total, also in Italy and the UK. Increases in worker social insurance contributions are important in Estonia and Latvia and in terms of the share, in the UK. Cuts in non-means-tested benefits are relatively large in Lithuania and Latvia. There were also cuts in means-tested benefits in Portugal and also the UK. In the other countries, spending on these benefits tended to increase, partly making up for reductions in other incomes. (In Portugal and the UK the negative effect shown is the net effect of cuts in entitlements and increases in the numbers eligible and size of payments due to cuts in other incomes). There are also interactions between pension and benefit cuts and income tax (and in some countries, social

¹⁴ That is, counterfactual incomes in 2012 without the fiscal consolidation measures.

contributions) payable on these benefits. The figures for income tax increases are net of reductions due to the decreased tax base in these respects. The net effect is positive in Romania where there were no consolidation-related changes to income tax.

Figure 1: Aggregate effect of simulated household income-based fiscal consolidation measures in place in 2012 as a percentage of total household disposable income, by type of policy



Notes: The measures included here are limited to those that have a direct effect on household disposable income (changes to direct taxes, cash benefits and public sector pay). Source: own simulations with EUROMOD version F6.0.

Overall, there is notable variation in terms of whether countries have relied more on spending cuts or tax increases. Public wage and benefit cuts are clearly dominant source of consolidation in Romania, Portugal and Lithuania (90% or more); it is also the main source for Latvia (65%). On the other hand, tax increases are more important source in the UK, Italy, Greece and Estonia, accounting for 60-70% of consolidation. Unlike other countries, Spain has roughly an equal mix. There are number of papers, e.g. Alesina and Perotti (1995, 1997), which have shown that successful fiscal consolidations, in terms of limiting public deficit, stabilising public debt or

output, have on average relied more on spending cuts.¹⁵ Therefore, while acknowledging that we do not capture all possible forms of fiscal consolidation, our findings may provide an early indication for macroeconomic performance of fiscal adjustments (so far).

Effects across the distribution of household incomes

The implications of the fiscal consolidation measures across the income distribution are illustrated in Figure 2. This shows the average proportional change in household disposable income by decile group caused by the fiscal consolidation measures that have a direct bearing on household income.¹⁶ The figure groups countries into three, based on the overall size of the change in income and the three figures are drawn to different scales (the gridlines are all 2 percentage points apart).

Two thirds of the countries (Greece, Spain, Latvia, Italy, Romania and the UK), show **progressive cuts** in income on the whole, i.e. richer income groups contributing more in relative terms. Portugal and, to a lesser extent, Lithuania show an **inverted U-shape pattern** where middle income groups contribute less compared to low and high income groups. Estonia is the only country with a strong **regressive** distribution of cuts, although the effect has been mitigated for the poorest decile group. To understand the reasons behind these overall distributional outcomes we focus on the distributional effects of each of the four main types of change: to (a) public sector pay, net of taxes and contributions, (b) public pensions, (c) other benefits and (d) income taxes and social contributions. This is shown in Figure 3.¹⁷

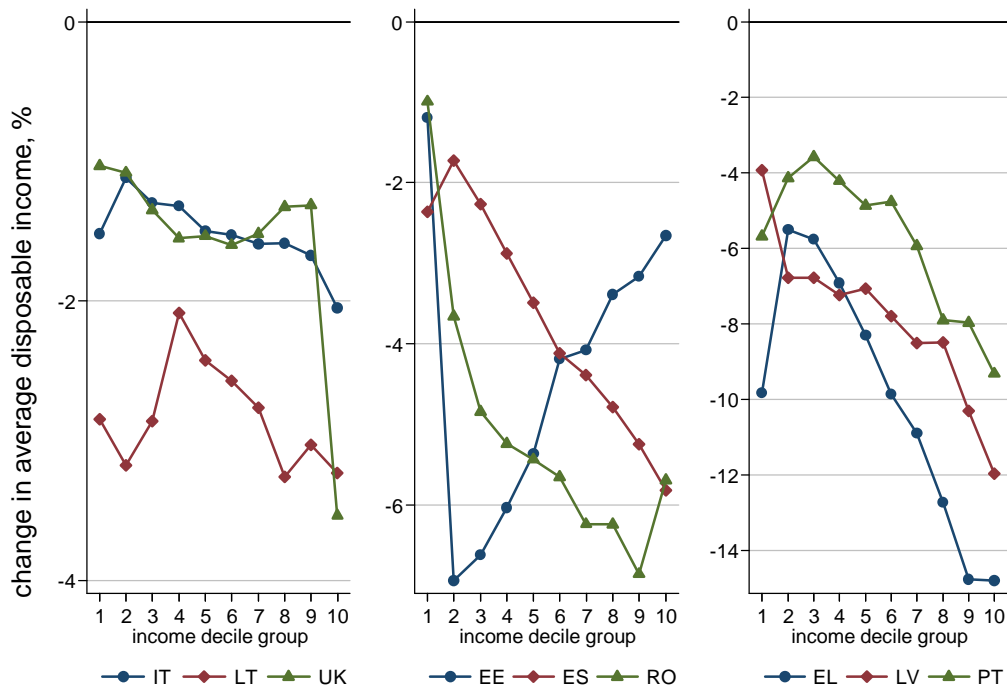
Public sector wage cuts had a progressive effect in all countries where they were implemented during the period we consider. The large size of this effect drives the overall progressivity observed in Greece, Latvia, Italy and Romania in Figure 2.

¹⁵ It should be noted that there are some differences between previous studies in terms of whether some items have been considered as part of spending or tax adjustments. For example, Alesina and Perotti (1995) include cash transfers in spending, while Blanchard and Perotti (2002) deduct these from taxes.

¹⁶ Deciles are calculated using household disposable income for each individual, equivalised using the modified OECD scale.

¹⁷ Note that these charts have different scales in order to focus on the distributional implications of each type of measure rather than the differences in overall size (which is shown in Figure 1).

Figure 2: Percentage change in household disposable income due to simulated household income-based fiscal consolidation measures by household income decile group



Notes: The measures included here are limited to those that have a direct effect on household disposable income (changes to direct taxes, cash benefits and public sector pay). Deciles are based on equivalised household disposable income in 2012 in the absence of fiscal consolidation measures and are constructed using the modified OECD equivalence scale to adjust incomes for household size. The charts are drawn to different scales, but the interval between gridlines on each of them is the same. Source: own simulations with EUROMOD version F6.0.

The distributional incidence of cuts to public pensions (see Figure 3b) depends on the design of the changes and the location of pensioners in the income distribution. In most of the countries where public pensions were reduced, this was implemented in the form of suspending pension indexation and freezing their nominal values. This measure implies a proportional decrease in pension incomes for all pensioners and higher losses for the lower-middle decile groups where pensioners are typically located. This is seen for example for Spain and Latvia. A progressive effect where losses are larger in percentage terms in the middle and top of the distribution than at the bottom is observed in countries (like Greece, Italy and Portugal), which limited the pension freeze to higher pensions and/or cut pensions in nominal terms, with larger reductions for higher pensions. These changes help to drive the overall progressive effect shown in Figure 2 for Greece and Portugal. In Estonia, the reduction was due to the change in the indexation of public pensions which we estimate to have resulted in the average pension being almost 10 percent

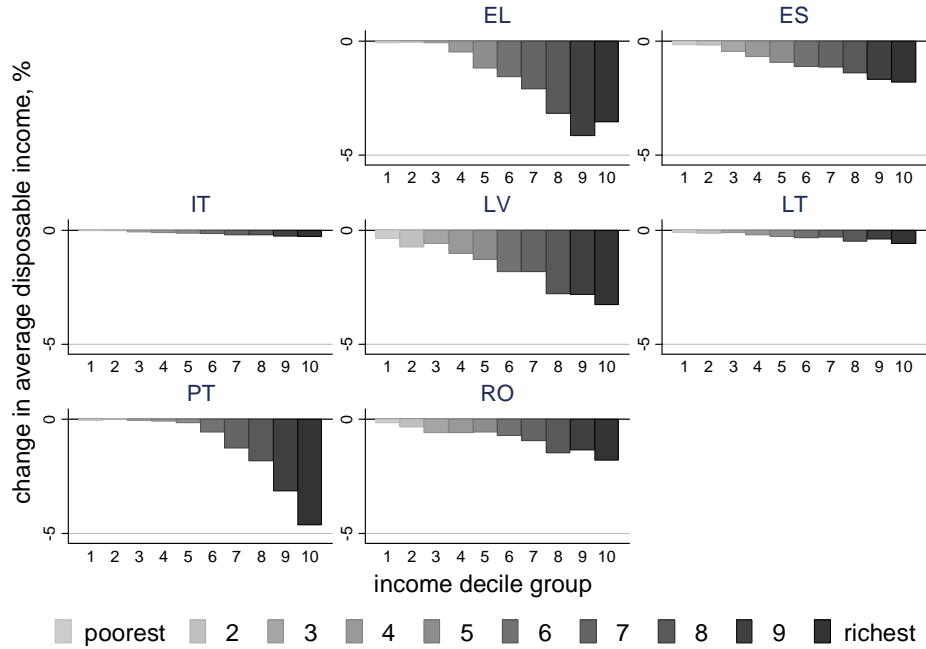
lower in 2012 than it would have been otherwise. Similar to Spain and Latvia, pensions were proportionally reduced but the effect on average household income is more regressive because of the location of pensioners towards the bottom of the distribution. This cut also drives the overall regressive effect observed for Estonia in Figure 2 as the effects due to other instruments were smaller in size as well as less pronounced across the income distribution. Overall, the largest pension losses were in Romania due to relatively high inflation eroding the real value of frozen pensions. In Romania pensioners are located throughout the income distribution. Minimum pensions are not normally indexed, explaining the smaller measured loss for low income households shown in Figure 3b.

Cuts to non-pension benefits (Figure 3c) are notable only in a few countries though their incidence across the income distribution is very diverse, reflecting changes to various benefits happening at the same time. Four countries with substantial cuts in benefits are Latvia, Lithuania, Portugal and the UK. Large progressive cuts are seen in Latvia where the main contributory benefits were capped, driving the overall progressive effect seen in Figure 2. The large regressive effects in Portugal resulted from the freeze of the means-tested benefit. In the UK the losses are at the bottom and the middle of the distribution due to a combination of several changes to the benefits for families with children, including some sharper means-testing. In Lithuania the effect is fairly even across the distribution due to the combined effects of three types of changes: lower income households being affected the most by cuts in social assistance, middle income groups by the child benefit becoming means-tested and the upper end of distribution by cuts in contributory family benefits.

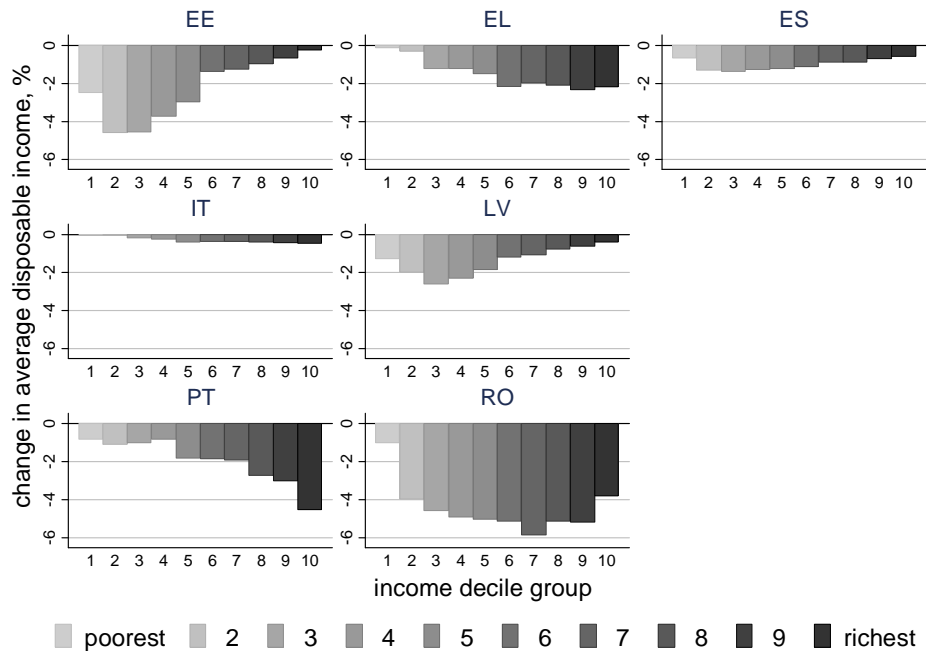
There are important interactions in all countries, in the form of means-tested benefits absorbing part of income losses due to other instruments. However, this is only evident for countries like Estonia (where social assistance was also made more generous), Spain and Romania; while in other countries the negative effect from cuts in non means-tested benefits (Greece, Lithuania) or even in means-tested benefits themselves (Portugal, UK) dominates.

Figure 3: Percentage change in household disposable income due to simulated household income-based fiscal consolidation measures by type of measure and household income decile group

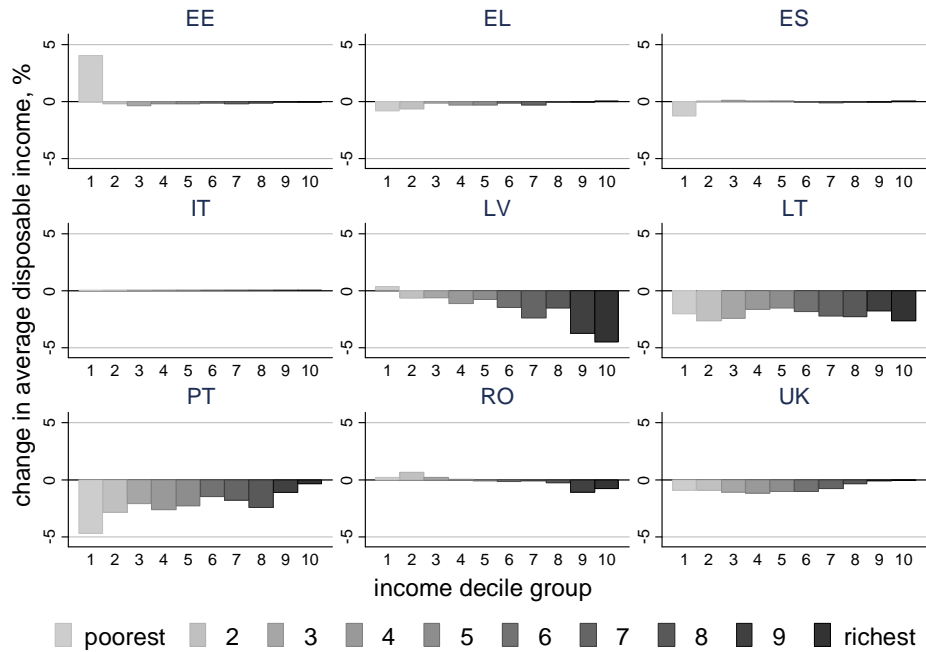
(a) public sector wages (net of taxes and SICs)



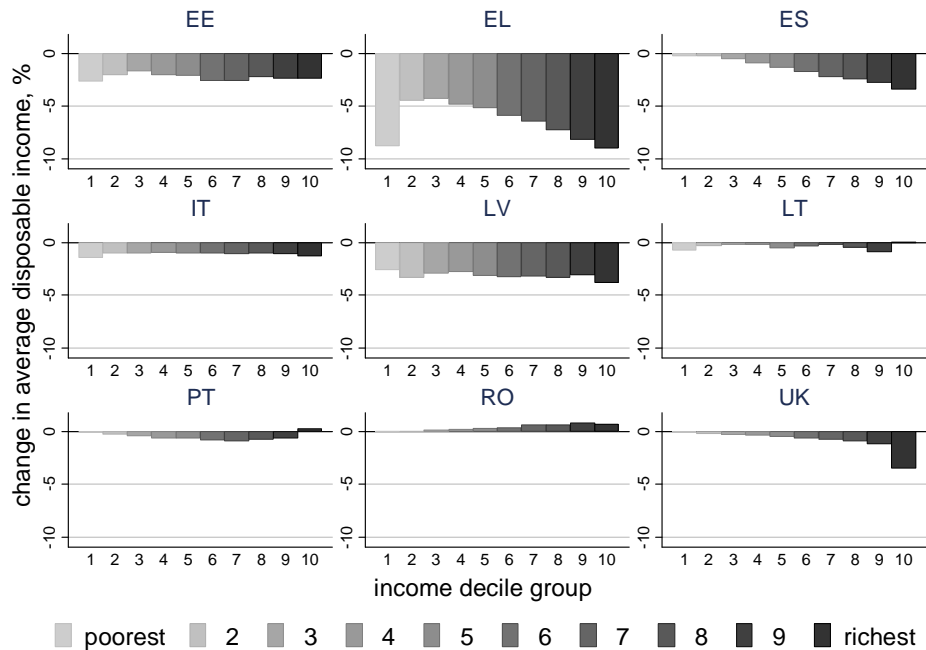
(b) public pensions



(c) non-pension benefits



(d) Income tax and worker SICs



Notes: The measures included here are limited to those that have a direct effect on household disposable income (changes to direct taxes, cash benefits and public sector pay). Deciles are based on equivalised household disposable income in 2012 in the absence of fiscal consolidation measures and are constructed using the modified OECD equivalence scale to adjust incomes for household size. The absence of a country from a chart indicates that there were no changes of the relevant type. Source: own simulations with EUROMOD version F6.0.

The pattern of the distribution of combined income tax and social contribution changes (Figure 3d) is often quite flat. In the case of the Baltic countries, small progressive increases from worker contributions are balanced with small regressive tax increases. Stronger progressive effects can be seen for Greece (with the exception of the first decile group), Spain and the UK, where the tax increases are incident mainly on the top decile group.¹⁸ These tax increases drive the overall progressive effects seen in Figure 2 for Spain and the UK and are also important in Greece. There are again interactions as in some cases tax and contribution increases are offset by reduction in tax collected from taxable pensions and benefits.¹⁹ These are relatively small though and on this graph visible only for Romania, which had largest reductions in public pensions and no policy changes to income tax or social contributions.

To summarise, the overall progressive effect shown in Figure 2 for Greece, Latvia, Italy and Romania is primarily due to public sector wage cuts, while driven by progressive tax cuts in Spain and the UK. The latter are also important in Greece. Overall progressivity is further strengthened by cuts in non means-tested benefits (Latvia) and cuts in public pensions (Greece and Portugal). While Italy implemented several progressive measures these have only a limited effect due to very narrow targeting.²⁰ In the UK, the progressivity is achieved through a much larger burden on the top decile group while the effects are fairly uniform for the other decile groups. The clearly regressive distribution in Estonia is driven by the cuts in public pensions although the increased means-tested social assistance lessens the effect for the first decile group. In Lithuania, the inverted u-shaped effect arises from a combination of progressive public wage cuts and cuts to several benefits. In the case of Portugal, this effect is due to a combination of progressive effects from cuts in public wages and pensions and regressive effects from the reduction of the (real) value of means-tested social assistance.

Due to country heterogeneity, no clear differences emerge between the two main types of fiscal consolidation measures (i.e. spending cuts vs tax increases). While public wage cuts are the most homogenous type with a strong progressive pattern, cuts in public pensions and other benefits

¹⁸ Browne and Levell (2010) show the large increase in tax in the top decile group in the UK is itself heavily skewed to the top one percent. This is confirmed by our own analysis, not reported here.

¹⁹ Changes in taxes and contributions due to cuts in (gross) public wages have been separated and shown together with the latter in Figure 3a.

²⁰ The solidarity contribution affects only 0.07% of tax payers (figures based on fiscal data in 2010), the public pension cuts affect 0.97% of pensioners and the public sector wage cuts only 1.49% of Italian employees (considering both public and private sectors).

show mixed results and, hence, the overall effect from expenditure cuts remains diverse as well. The same can be seen on the tax side though the profiles tend to be somewhat flatter.

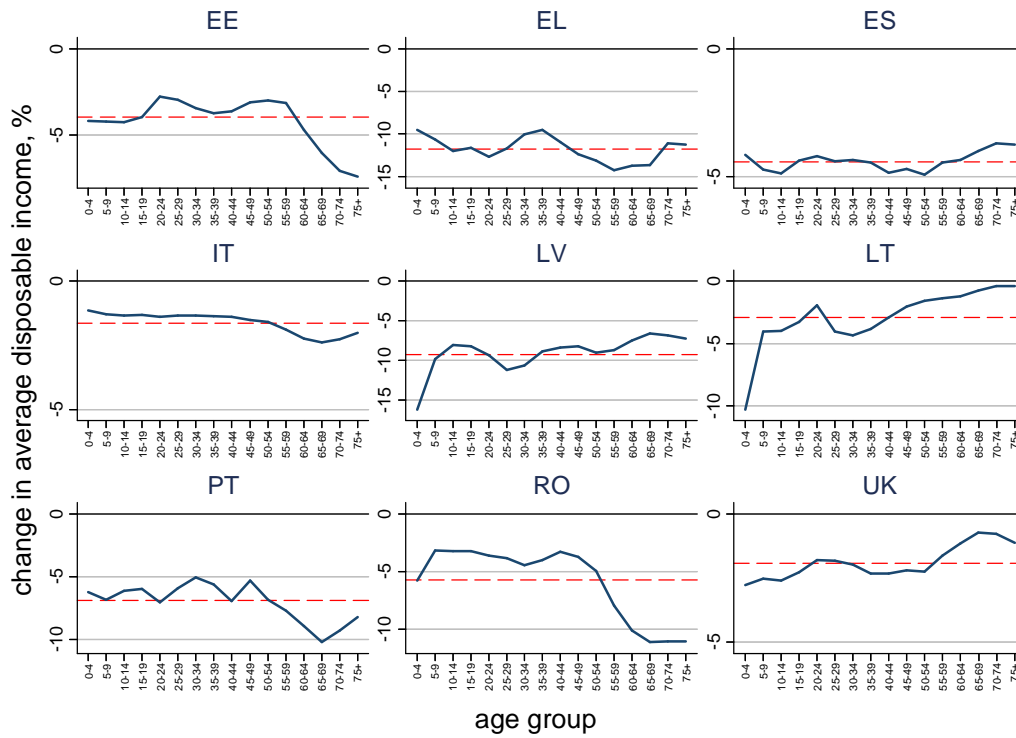
It is also of interest to understand how the burden of the fiscal consolidation measures is shared across different individuals. Figure 4 shows the proportional change in equivalised household disposable income by person age. Somewhat clearer overall pattern is visible in Lithuania (and Latvia) where income losses tend to decrease with age. Otherwise, largest differences with the average (shown with a dashed line) are visible for the elderly people, which on the one hand reflects greater (fiscal) importance of public pensions and, as a consequence, perhaps also a greater political attention towards this group. Elderly people contribute on average notably more in Romania, Estonia and Portugal, while they face smaller income losses relative to others in Latvia, Lithuania and the UK.

Figure 5 compares further the proportional change in disposable income by decile group for the whole population (as in Figure 2) with that for (a) people in households with children (defined as aged under 18) and (b) people in households containing elderly people (defined as aged 65 or more). Across countries the effects are rather similar for these groups with two main exceptions: households with children lose more right across the income distribution in Lithuania,²¹ while the opposite is true in Romania. There are also countries where the two lines cross, showing how at low income levels families with children (Spain, UK) or families with elderly (Greece, Portugal) are better protected while it is the opposite at higher income levels. Overall, these effects are partly due to decisions about tax and benefit changes that particularly affect children or elderly people: for example choices over whether to reduce a child tax credit or a pension. They are also partly driven by the composition of households across the income distributions.²²

²¹ Lithuania did cut public pensions but this was a temporary measure in 2010-11 and as such not included in our analysis.

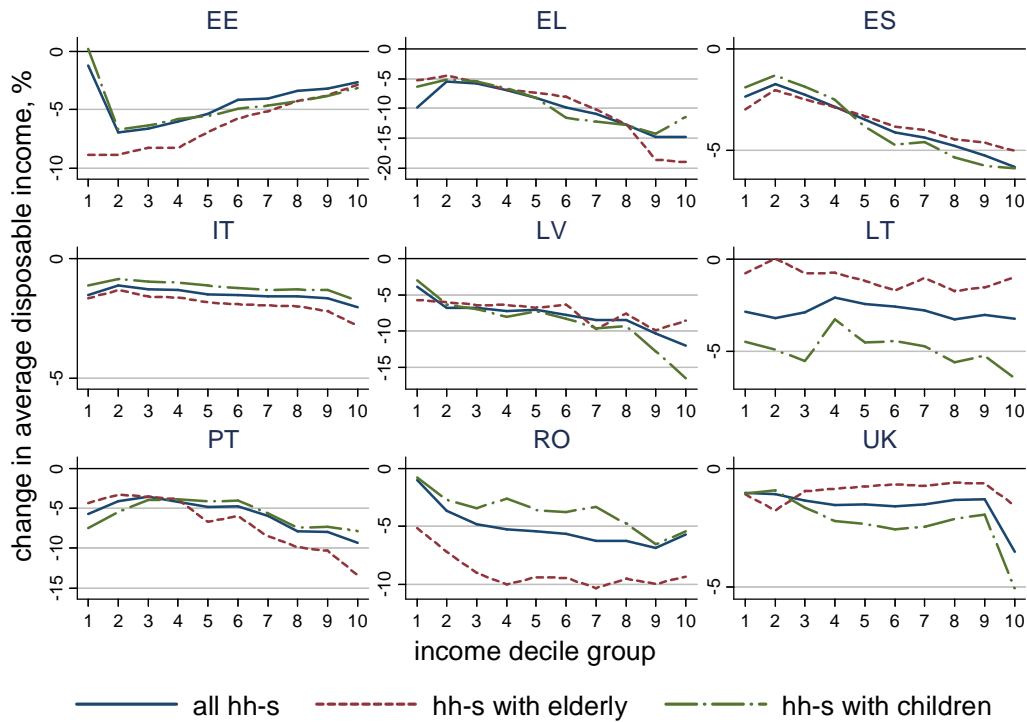
²² We also looked at the effects on the risk of poverty as defined having income below 60% of the median. If fixed poverty thresholds are used then, as expected, the risk of poverty rises in all countries due to falling incomes. However, if poverty thresholds are allowed to shift then the impact is relatively small, with the poverty rate changing less than half a percentage point in all countries except in Estonia (an increase of 13pp), Greece and Latvia (a decrease of 1.7pp and 0.8pp, respectively). Changes by age groups are broadly in line with Figure 5 – the poverty rate for elderly people increasing more in Estonia and Romania and for children in Lithuania and Portugal.

Figure 4: Percentage change in household disposable income due to simulated household income-based fiscal consolidation measures: by person age



Notes: The dashed line denotes the average effect. The measures included here are limited to those that have a direct effect on household disposable income (changes to direct taxes, cash benefits and public sector pay). Deciles are based on equivalised household disposable income in 2012 in the absence of fiscal consolidation measures and are constructed using the modified OECD equivalence scale to adjust incomes for household size. Source: own simulations with EUROMOD version F6.0.

Figure 5: Percentage change in household disposable income due to simulated household income-based fiscal consolidation measures: by type of household and household income decile group



Notes: The measures included here are limited to those that have a direct effect on household disposable income (changes to direct taxes, cash benefits and public sector pay). Deciles are based on equivalised household disposable income in 2012 in the absence of fiscal consolidation measures and are constructed using the modified OECD equivalence scale to adjust incomes for household size. Children are defined as those aged under 18 and “elderly people” as those aged 65 or more. The charts are drawn to different scales, but the interval between gridlines on each of them is the same. Source: own simulations with EUROMOD version F6.0.

Indirect taxes

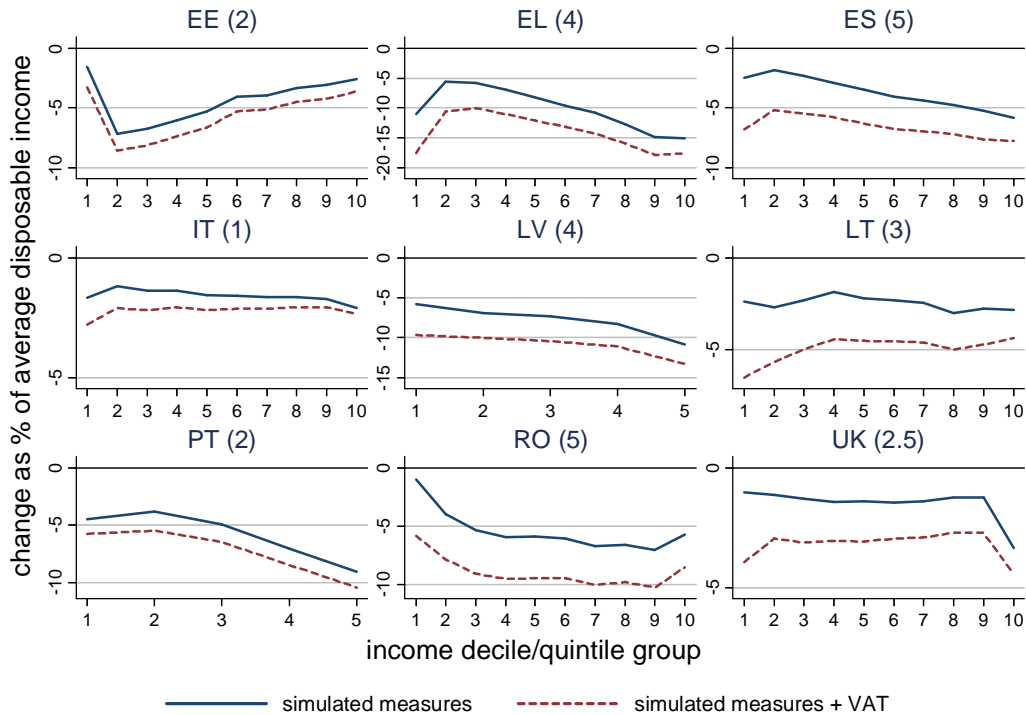
In all of the countries we consider there have been also changes to indirect taxes. While these do not have an effect on household disposable income they do impact directly each household’s consumption potential. For this reason, we also compare the effect of fiscal consolidation measures discussed above with those of increases in indirect taxes.

Using our own estimates or external information (where available) on the incidence of (pre-reform) VAT by income group (decile or quintile)²³, we have estimated the increase in VAT

²³ The studies used are, respectively, Vörk et al. (2008) for Estonia, Matsaganis and Leventi (2012) for Greece, Institute for Fiscal Studies (2011) for Spain, Taddei (2012) for Italy, Ivaškaitė-Tamošiūnė (2012) for Lithuania and Barnard (2010) for the UK. For the other countries we carried out our own calculations based on information from Household Budget Surveys (HBS) on the distribution of expenditure by COICOP categories by income decile/quintile group. 2006 HBS was used for Italy, 2008 HBS for Latvia, 2005/06 HBS for Portugal and 2009 HBS for Romania. Note that EUROMOD’s input database (EU-SILC) does not include data on expenditure.

payment due to the increase in the standard rate VAT as a proportion of disposable income. In doing so, we focus again on short-term outcome and have assumed that (i) there is no change in pre-tax expenditure or in pre-tax relative prices and (ii) the VAT increases are proportional to the pre-reform VAT payments.

Figure 6: Simulated household income-based fiscal consolidation measures as a percentage of household disposable income by income decile/quintile group: change excluding and including VAT increases



Notes: The fiscal consolidation measures included here are: (a) limited to those that have a direct effect on household disposable income (changes to direct taxes, cash benefits and public sector pay) and (b) increases in the standard rate of VAT (shown in percentage points after each country acronym). Other increases in indirect taxes are not included. Deciles or quintiles are based on equivalised household disposable income in 2012 in the absence of fiscal consolidation measures and are constructed using the modified OECD equivalence scale to adjust incomes for household size. The charts are drawn to different scales, but the interval between gridlines on each of them is the same. Source: own calculations with EUROMOD version F6.0 and Barnard (2010), Ivaškaitė-Tamošiūnė (2012), Matsaganis and Leventi (2012), Institute for Fiscal Studies (2011), Taddei (2012) and Vörk et al. (2008).

The effects are shown in Figure 6, which also indicates the change in the main VAT rate which ranges from 1 (Italy) to 5 percentage points (Spain and Romania). The combined effect of the VAT increase and of the changes simulated with EUROMOD (direct taxes, benefits and

pensions, and public sector pay) is shown with a dashed line, contrasted with the effect of the income changes alone with a solid line (as in Figure 2).²⁴

We find that in each of the countries, the effect is regressive across the income distribution.²⁵ The relative degree of regressivity across countries is due to (a) differences in the structure of VAT and how it relates to consumption patterns, i.e. the extent to which goods with lower tax rates are consumed by those on low incomes, and (b) the effective savings rate across the income distribution. For Greece, spending is much higher than income in the lower income decile groups. The same tends to apply in the other countries, but to a lesser extent. The impact of VAT changes is naturally larger in countries with bigger increases in the standard VAT rate but what is important to note is that in several countries (Spain, Lithuania, Romania and the UK) the effects are of similar magnitude to the measures affecting household incomes directly which highlights their importance. Including VAT would also change the overall balance between spending cuts and tax increases towards the latter.

4. Conclusions

We contribute to the literature on fiscal consolidation by estimating distributional effects of recent policy reforms in the nine EU countries which were aimed to address budgetary challenges. Using microsimulation approach, we identify and quantify fiscal consolidation measures introduced through cuts in cash benefits, increases in income taxes and workers' social contributions and cuts in public sector pay. Countries have adopted different combinations of policy instruments, resulting in various distributional profiles of income losses. Most are progressive on the whole, although it should be emphasised that even if the poor pay a lower proportion of their income than rich, in some countries the scale of the reductions in their income is still large (e.g. in Greece). Adding the approximate effect of the increases in VAT, which have been introduced in all nine countries, reduces any progressive effect. The latter are also substantial in absolute terms, in several countries being of similar magnitude to that resulting from the measures affecting household incomes directly.

²⁴ Note that by combining the results in this way we assume that the composition of the decile groups in the two data sources are the same. Both sets of calculations use a very similar concept of household disposable income and (generally) the same equivalence scale. However, the fact that different surveys are used means that there are bound to be some differences in the composition of the income deciles. These results should be viewed with caution, therefore.

Our “bottom-up” measure shows that there is wide variation in the scale of the resulting aggregate reduction in household incomes (from 2% to 12%). Countries represent also a mixture in terms of whether fiscal consolidation relies more on spending cuts or tax increases. In the light of previous findings in the literature, this might provide some early indication for the macroeconomic performance of these fiscal adjustments. Comparing distributional effects between these two broad types of instruments did not reveal any large systematic patterns and, hence, differences in distributional outcome are less likely to play a role in explaining why one type of consolidation measures tend to be more successful than the other. On the other hand, distributional impact of fiscal adjustments might still matter for macroeconomic dynamics, for example, through the effect on aggregate demand as consumption patterns usually differ between income groups.²⁶ This could be another source of variation adding to relevant aspects of country heterogeneity as discussed elsewhere (e.g. Favero et al., 2011).

In interpreting our analysis there are some caveats to be borne in mind. Most importantly, our analysis does not include the impact of cuts in in-kind benefits and services on households. These would involve at least two challenges for a micro-level analysis. First, the information requirements for a comparable analysis are considerable. Secondly, given the present state of research and knowledge in this area, any distributional results would be driven by the assumptions that would need to be made about the valuation of services, their incidence and the nature and incidence of the cuts. An extension to our analysis should also attempt to estimate behavioural responses, especially as these might vary between income groups.²⁷

Furthermore, the current round of fiscal consolidation is not yet complete. Some countries have already announced plans for future implementation and others may follow with additional measures as the crisis evolves.²⁸ Although a final assessment will only be possible as a piece of historical analysis once the austerity period can be considered to be complete, an interim comparative analysis such as that performed in this paper is relevant. We draw out the distributional implications of particular policy choices that may have been driven mainly by

²⁵ It should be noted that assessing the effect of taxes paid on the basis of recorded spending patterns as a proportion of recorded household *income* can distort the view of the regressivity or otherwise of indirect taxes, and especially the effect at the bottom of the income distribution.

²⁶ For example, Galí et al. (2007) and Coenen et al. (2012) distinguish in their models between credit-constrained households, i.e. who consume all their income, and those who can smooth consumption intertemporally.

²⁷ Giavazzi and McMahon (2013) provide some evidence on this in the context of military spending.

²⁸ For example, fiscal consolidation plans have been announced in the UK up to 2015 and a new Greek package was just recently agreed, coming into effect in 2013.

macroeconomic or political concerns. Comparing these effects across countries offers the possibility of policy learning, from which any future fiscal consolidation reforms may benefit.

References

- Alesina A. and R. Perotti, 1995, “Fiscal Expansions and Adjustments in OECD Countries”, *Economic Policy* 21, 207-247.
- Alesina A. and R. Perotti, 1997, “Fiscal adjustments in OECD countries: Composition and macroeconomic effects”, *IMF Staff Papers*, 44 (2), 297-329.
- Alesina A. and S. Ardagna, 1998, “Tales of fiscal adjustment”, *Economic Policy*, 13 (27), 487-545.
- Alesina A. and S. Ardagna, 2010, “Large Changes in Fiscal Policy: Taxes versus Spending”, *Tax Policy and the Economy* 24, 35-68.
- Alesina A. and S. Ardagna, 2013, “The design of fiscal adjustments”, *Tax Policy and the Economy*, forthcoming.
- Alesina A., C. Favero and F. Giavazzi, 2012, “The output effects of fiscal adjustments”, NBER Working Paper, no 18336.
- Avram, S., F. Figari, C. Leventi, H. Levy, J. Navicke, M. Matsaganis, E. Militaru, A. Paulus, O. Rastrigina and H. Sutherland, 2012, “The distributional effects of fiscal consolidation in nine EU countries”, Research note 01/2012, Social Situation Observatory on Income Distribution and Living Conditions, European Commission.
- Avram S., H. Sutherland, I. Tasseva and A. Tumino, 2011, “Income protection and poverty risk for the unemployed in Europe”, Research Note 1/2011 of the European Observatory on the Social Situation and Demography, European Commission.
- Bargain, O., K. Orsini and A. Peichl, 2012, “Comparing Labor Supply Elasticities in Europe and the US: New Results”, IZA Discussion Paper No. 6735.
- Barnard, A., 2010, “The effects of taxes and benefits on household income, 2008/09”, Office for National Statistics.
- Blanchard, O., 1990, “Suggestions for a New Set of Fiscal Indicators”, OECD Economics Department Working Papers, No. 79, OECD Publishing.
- Blanchard, O. and R. Perotti, 2002, “An empirical characterization of the dynamic effects of changes in government spending and taxes on output”, *Quarterly Journal of Economics*, 117 (4), 1329-1368.
- Bourguignon F. and A. Spadaro, 2006, “Microsimulation as a tool for evaluating redistribution policies”, *Journal of Economic Inequality*, 4, 77–106.
- Brandolini, A., F. D’Amuri and I. Faiella, 2013, “Country case study – Italy”, chapter 5 in Jenkins et al. (eds.), *The Great Recession and the Distribution of Household Income*, Oxford University Press, Oxford.
- Brewer, M., J. Browne and R. Joyce, 2011, “Child and working-age poverty from 2010 to 2020”, IFS Commentary C121, Institute for Fiscal Studies, London.
- Browne, J. and P. Levell, 2010, “The distributional effect of tax and benefit reforms to be introduced between June 2010 and April 2014: a revised assessment”, IFS Briefing Note 108, Institute for Fiscal Studies, London.

- Callan T., C. Leventi, H. Levy, M. Matsaganis, A. Paulus and H. Sutherland, 2011, “The distributional effects of austerity measures: a comparison of six EU countries”, Research Note 2/2011 of the European Observatory on the Social Situation and Demography, European Commission.
- Coenen, G., R. Straub and M. Trabandt, 2012, “Fiscal policy and the great recession in the euro area”, *American Economic Review*, 102 (3), 71-76.
- Devries, P., J. Guajardo, D. Leigh and A. Pescatori, 2011, “A new action-based dataset of fiscal consolidation”, IMF Working Paper 11/128.
- Duclos, J.-Y., 1995, “On equity aspects of imperfect income redistribution”, *Review of Income and Wealth*, 41, 177–190.
- Favero, C., F. Giavazzi and J. Perego, 2011, “Country heterogeneity and the international evidence on the effects of fiscal policy”, *IMF Economic Review*, 59 (4), 652-682.
- Figari F., A. Salvatori and H. Sutherland, 2011, “Economic downturn and stress-testing European Welfare systems”, in H. Immervoll, A. Peichl and K. Tatsiramos (eds.) *Who Loses in the Downturn? Economic Crisis, Employment and Income Distribution*, Research in Labor Economics 32, Bingley: Emerald.
- Galí, J., J. D. López-Salido and J. Vallés, 2007, “Understanding the effects of government spending on consumption”, *Journal of the European Economic Association*, 5 (1), 227-270.
- Giavazzi F. and M. McMahon, 2013, “The household effects of government spending”, chapter 3 in A. Alesina, and F. Giavazzi (eds.), *Fiscal policy after the financial crisis*, University of Chicago Press.
- Guajardo, J., D. Leigh, and A. Pescatori, 2011, “Expansionary austerity: New international evidence”, IMF Working Paper 11/158.
- Institute for Fiscal Studies, 2011, “A retrospective evaluation of elements of the EU VAT system”, A report to the European Commission, DG TAXUD.
- International Monetary Fund, 2010, “Will It Hurt? Macroeconomic Effects of Fiscal Consolidation” in *World Economic Outlook*, October 2010.
- Ivaškaitė-Tamošiūnė, V., 2012, “Pajamų perskirstymas formuojantis gerovės kapitalizmui Lietuvoje”. *Daktrao disertacija*. Vilnius: VU, LSTC (work in progress).
- Joyce, R. and P. Levell, 2011, “The impact in 2012-13 of the change to indexation policy”, IFS Briefing Note 120, The Institute for Fiscal Studies, London.
- Joyce, R. and L. Sibieta, 2013, “Country case study – UK”, chapter 7 in Jenkins et al. (eds.), *The Great Recession and the Distribution of Household Income*, Oxford University Press, Oxford.
- Lietz, C. and D. Mantovani, 2007, “A Short Introduction to EUROMOD: An Integrated European Tax-Benefit Model”, in O. Bargain (ed.), *Micro-simulation in action: Policy analysis in Europe using EUROMOD*, Research in Labor Economics, Vol. 25. Elsevier.
- Matsaganis M. and C. Leventi, 2012, “The distributional impact of the Great Recession in Greece”, presented at the 32nd General Conference of the International Association for Research in Income and Wealth, Boston, 5-11 August.
- Matsaganis, M., H. Levy and M. Flevotomou, 2010, “Non take up of social benefits in Greece and Spain”, *Social Policy and Administration* 44 (7), 827–844.
- McDermott, C. J. and R. F. Wescott, 1996, “An empirical analysis of fiscal adjustments”, *IMF Staff Papers*, 43 (4), 725-753.

- Navicke, J., O. Rastrigina and H. Sutherland, 2012, “Using EUROMOD to “nowcast” (and forecast) risk of poverty in the European Union”, paper for NetSILC2 conference, December.
- Nolan, B., T. Callan and B. Maître, 2013, “Country case study – Ireland”, chapter 4 in Jenkins et al. (eds.), *The Great Recession and the Distribution of Household Income*, Oxford University Press, Oxford.
- Perotti R., 1996, “Fiscal Consolidation in Europe: Composition Matters”, *The American Economic Review* 86 (2), 105-110.
- Perotti, R., 2013, “The 'austerity myth': Gain without pain?”, chapter 8 in A. Alesina, and F. Giavazzi (eds.), *Fiscal policy after the financial crisis*, University of Chicago Press.
- Pudney, S., R. Hancock and H. Sutherland, 2006, “Simulating the reform of means-tested benefits with endogenous take-up and claim costs”, *Oxford Bulletin of Economics and Statistics*, 68 (2), 135-166.
- Romer, C. D. and D. H. Romer, 2010, “The macroeconomic effects of tax changes: Estimates based on a new measure of fiscal shocks”, *American Economic Review*, 100 (3), 763-801.
- Sutherland D., P. Hoeller and R. Merola, 2012, “Fiscal consolidation: How much, how fast and by what means?” *OECD Economic Policy Papers* No. 1.
- Sutherland, H., 2007, “EUROMOD: the tax-benefit microsimulation model for the European Union” in A. Gupta and A. Harding (eds.), *Modelling our future: population ageing, health and aged care*, *International Symposia in Economic Theory and Econometrics* Vol. 16, Elsevier, Amsterdam, 483-488.
- Sutherland, H., R. Hancock, J. Hills and F. Zantomio, 2008, “Keeping up or falling behind? The impact of benefit and tax uprating on incomes and poverty”, *Fiscal Studies*, 29 (4), 467-498.
- Taddei A., 2012, “L’ipotesi di tax-shift dal lavoro ai consumi in Italia: un’analisi di microsimulazione fiscale utilizzando il modello EUROMOD”, *University of Genova DEP Working Paper* 7/2012.
- von Hagen J. and R. R. Strauch, 2001, “Fiscal consolidations: Quality, economic conditions, and success”, *Public Choice*, 109 (3/4), 327-346.
- Võrk, A., A. Paulus and H. Poltimäe, 2008, “Maksupoliitika mõju leibkondade maksukoormuse jaotumisele”, *PRAXIS Working Paper* No. 42, Tallinn.