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Decomposition of changes in the EU income distribution in 2007-2011

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Abstract

We summarise and decompose changes in the household disposable income distribution in 2007-2011 across 27 EU countries to study the impact of the Great Recession on household incomes and the key factors contributing to it. Using microsimulation techniques and applying the EU tax-benefit model EUROMOD in combination with EU-SILC household micro-data, we separate direct (first-order) effects of tax-benefit policy on the income distribution from the effects of changes in household market incomes and characteristics. There is substantial variation in income dynamics between and within countries. We find that in most countries, changes in market income and population characteristics had a poverty- and inequality-increasing effect, while policies were more often poverty- and inequality-reducing. However, there is no clear country-level correlation between the two effects in this period.

JEL: D31, H23, I38

Keywords: income distribution, decomposition, tax-benefit policies, European Union

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1. Introduction

European economies and labour markets experienced abrupt and drastic changes in the Great Recession, with some countries still facing its lasting impact. This important episode has received considerable academic and policy attention; among others, the dynamics of household employment and incomes have been studied to understand how different households fared in the crisis. Previous studies have looked at both overall changes in the household income distribution and its composition (Jenkins et al., 2013; Eurofound, 2017) as well as assessed the direct effects of tax-benefit policy changes in various countries and/or (sub)periods (Avram et al., 2012; De Agostini et al., 2013, 2014, 2015; EUROMOD, 2016). There is however still limited information on the role of tax-benefit policies in this period in a wider context: in particular, how these compared against market- and population-related changes.[1] Such a comparison can shed light on whether policy measures were offsetting or enhancing the distributional impact of market- and population-related changes and provide lessons for future policy responses amid concerns of rising poverty and inequality.

This paper aims to fill the gap in the literature by analysing the medium-term effects of the crisis – between 2007 and 2011 – on the distribution of household net incomes, poverty and inequality in the EU-27 countries. In particular, we distinguish how much of the observed changes in the income distribution can be attributed to i) tax-benefit policy changes and ii) changes in the market and population characteristics, which in contrast to policies are not under the direct control of policy makers. For our focus is on cash household incomes, the policy measures included in the analysis are direct income taxes, cash benefits and public pensions. Changes in the market and population are considered jointly. The former refers to changes in the distribution of gross market incomes. The latter includes changes to the characteristics of the population with an impact on incomes via the tax-benefit system e.g. education, working hours, ageing etc.[2]

To decompose changes in the various distributional measures into (i) the direct effects of tax-benefit policies and (ii) the effects of changes in market incomes and population characteristics, we start from the observed household income distribution in 2007 and 2011 and create a series of counterfactual distributions. A comparison between the actual and counterfactual distributions unveils the contribution of each factor to the total change in incomes. The decomposition draws on the analytical framework suggested by Bargain and Callan (2010), with refinements by Paulus and Tasseva (2017), and applies fiscal microsimulation techniques (Bourguignon and Spadaro, 2006; Figari et al., 2015). We use the EU tax-benefit model EUROMOD in combination with household survey data from the EU Statistics on Income and Living Conditions (EU-SILC) to carry out the decomposition for the EU-27 countries. Our analysis is similar to Bargain et al.

[1] The main reason for this gap in the literature is that unlike an (ex ante) assessment of police effect alone, which could be carried out using a tax-benefit simulation model and information on household characteristics at a single point in time, covering both dimensions requires relevant household micro-data for the whole period of analysis and hence is more dependent on data availability. Such analysis for the crisis period is now possible due to the availability of tax-benefit policies simulated with a microsimulation model combined with more recent household survey data covering the crisis years.

[2] Population characteristics also affect gross market incomes, with the effect being captured directly through the changes in the distribution of gross market incomes.

(2017) but covers all EU countries (before Croatia joined), extends to a broader set of indicators and spans a longer period.

Our results show that while changes in market income and population characteristics in this period contributed to increases in poverty and inequality in most countries, the effects of tax-benefit policy changes acted more often in the opposite direction. There is, however, no clear correlation in terms of the size of the two factors, suggesting limited policy responsiveness.

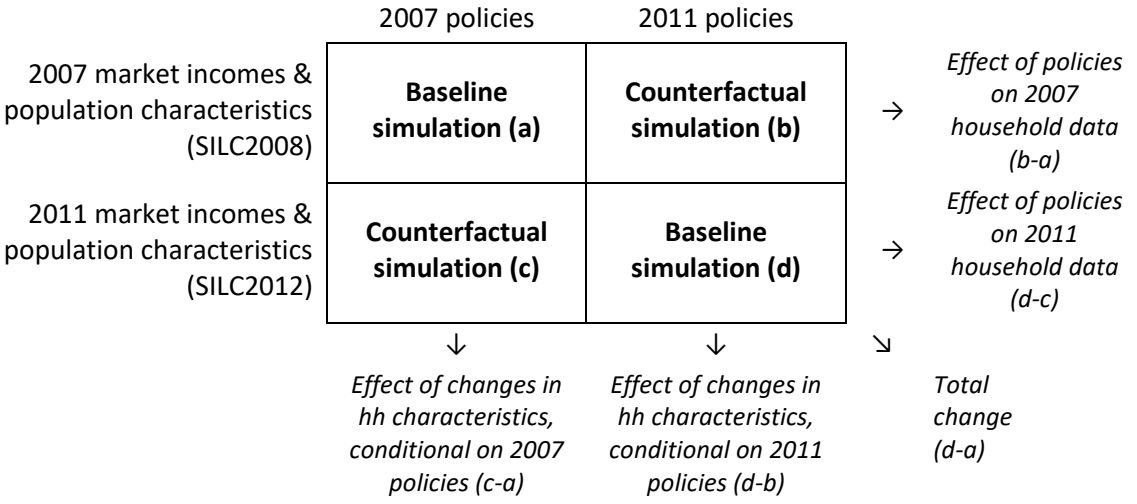
The rest of the paper is structured as follows. Section 2 provides an overview of the methodology and household micro-data used. Section 3 presents and discusses overall changes in the income distribution. Section 4 proceeds with the results of the decomposition analysis. The final section concludes. Tables and supplementary figures are presented after the main body of text, figures are included in the main text.

2. Methodology and data

We decompose changes in household disposable incomes in 2007-2011 for EU-27 countries distinguishing between two major factors: changes in tax-benefit policies and changes in household characteristics, including their market incomes. We employ a tax-benefit microsimulation model, which can apply different sets of tax-benefit rules to a representative sample of households and simulate their disposable incomes under each policy scenario given their characteristics.

Simulating 2007 tax-benefit policies on 2007 household data and 2011 policies on 2011 household data, provides baseline estimates for analysing overall changes in the income distribution in this period (see Section 3). To identify and separate the policy effect from market-related changes (Section 4), we subsequently apply 2007 policies to 2011 population and 2011 policies to 2007 population (i.e. counterfactual simulations). Comparing indicators of interests (see below) for the baseline and counterfactual income distributions, allows us to estimate the marginal contribution of each component in turn while keeping everything else constant (see Figure 1). We focus on the direct (first-order) effect of policies and do not to attempt to separate behavioural responses to policies from other changes in population characteristics.

Figure 1: Simulation scenarios and the decomposition of changes in the distribution of household disposable income



We present the decomposition method in more formal terms next, and finally describe the microsimulation model and data.

The decomposition method

Following the notation used in Bargain and Callan (2010), let us denote (a vector of) household disposable incomes in period *t* as d_t. Disposable incomes are a function of household gross market income and characteristics (y_t), and the (monetary) parameters of tax-benefit system (p_t): $d_t = d_t(p_t, y_t)$. Any summary indicator *I* calculated on the basis of the distribution of disposable income (or certain part of it) is denoted as $I[d_t(p_t, y_t)]$. A change in the indicator over time, between period 0 and period 1, is then:

$$\Delta I = I[d_1(p_1, y_1)] - I[d_0(p_0, y_0)]$$

To decompose the total change and assess the marginal contribution of each component, the expression is rearranged by introducing additional (counterfactual) terms, varying one component at the time and keeping others constant. For example, one combination is the following:

$$\Delta I = \underbrace{I[d_1(p_1, y_1)] - I[d_0(\alpha p_0, y_1)]}_{\text{Policy effect conditional on data 1}} + \underbrace{I[d_0(\alpha p_0, y_1)] - I[d_0(\alpha p_0, \alpha y_0)]}_{\text{Other effect conditional on indexed policy 0}}$$
$$+ \underbrace{I[d_0(\alpha p_0, \alpha y_0)] - I[d_0(p_0, y_0)]}_{\text{Nominal effect conditional on data 0}}$$

In this way, the total change is split into the (direct) policy effect, effects due to changes in market incomes and population characteristics ('other effect') and the effect arising from changes in nominal levels ('nominal effect').

The first two terms apply period 1 and period 0 policies to the same population characteristics and market incomes (from period 1 in this example), and their difference captures the policy effect. To make monetary values of policy parameters (*p*) – such as benefit amounts, income thresholds for means-tested benefits and tax brackets – comparable between the two periods, they are adjusted with a counterfactual indexation factor (α); in this example, scaling period 0 parameters. Importantly, this approach allows the policy effect not only to reflect the first-order impact of *changes* in policy rules and parameters but also the effect of keeping policy parameters constant (frozen) in nominal terms, as long as $\alpha \neq 1$. We discuss the choice of α below.

The middle two terms let population characteristics and market incomes vary, while holding policy rules and parameters constant (at period 0 values). Here we need to adjust market incomes to make their (nominal) values comparable between period 0 and 1 and the same counterfactual indexation factor is used again. Unlike the policy effect component, estimating this component requires household characteristics to be observed at two points in time. With relevant data now available (see below), we can complement previous work (De Agostini et al., 2013, 2014, 2015), which could only assess the policy effect.

Some of the changes in population characteristics could arise from behavioural (second-order) responses to the (first-order) policy effects and are therefore also captured by this component. In principle, it is possible to further separate the second-order policy effects by combining a (static) tax-benefit model with structural or reduced-form econometric models but this is outside the scope of the paper. Modelling population behaviour in several dimensions simultaneously (e.g. labour market, retirement, fertility) presents formidable data requirements. For example, Bargain (2012) extended the original framework by separating specifically labour supply responses to policy changes.

The combined effect of differences in nominal levels is summarised with the last two terms which hold policy rules, parameters and market incomes constant (all from period 0), apart from adjusting all monetary values by α and measuring the effect of doing so. In the case of poverty and inequality indicators which are typically not measured in monetary units (e.g. poverty headcount, Gini coefficient), the nominal effect disappears altogether as the value of indicators is insensitive to the choice of currency unit for policy parameters and market incomes.

There is a further important methodological aspect. Each of the three components can be expressed in multiple ways (e.g. the policy effect could also be assessed using period 0 population characteristics and market income), depending in which order the components are separated from the total change (that is, decomposition is path-dependent). There is no clear priority of one combination over others and a recommended solution is to calculate all combinations (permutations) and average results across these. We calculate the policy effect, other effect and – where applicable – nominal effect as an average of all 6 combinations identified in Paulus and Tasseva (2017). See the latter for further details and a formal presentation of combinations (and their averages).

We now return to the choice of counterfactual indexation factor (α), which should be thought of as a degree of indexation needed to keep the tax-benefit system balanced (or neutral) over time and setting a benchmark against which to compare *actual* developments in tax-benefit policies. The latter include, among others, (statutory) indexation rules applied in practice which need to be clearly distinguished from α. The choice of α, therefore, largely reflects the viewpoint of the analyst of which adjustments to the monetary parameters of the tax-benefit policies are necessary to keep the system in line with broader changes in the economy.

Common approaches in the previous literature have based counterfactual indexation on price or wage/income changes (e.g. Clark and Leicester, 2004; Hills et al., 2014) and we also follow that in our analysis. Specifically, we use the following indices:

- $\alpha_1 = CPI$ (Consumer Price Index): 2007 (2011) monetary policy parameters or market incomes are indexed (deflated) in line with consumer price changes between 2007-2011;
- $\alpha_2 = MII$ (Market Income Index): 2007 (2011) monetary policy parameters or market incomes are indexed (deflated) by the change in average market income between 2007-2011.

We essentially analyse policy effects and changes in market income distribution in real terms with CPI, and assess them against the growth in *average* market incomes with MII. Assuming a CPI-based benchmark implies that we would consider policy effects on households income position neutral if their real purchasing power remains the same. However, the income position of benefit recipients is then likely to deteriorate relative to wage earners over time. A MII-based benchmark, on the other hand, aims to keep tax liabilities and benefit receipts in line with developments in private incomes, ensuring that the system is fiscally balanced and the relative positions of benefit recipients and wage earners are retained (ceteris paribus). However, at times when private incomes fall, this would imply that public income support would need to be reduced as well. Due to their different meaning, it is therefore useful to consider a range of indexation assumptions and see how sensitive estimates are to them. The values of CPI and MII for all countries are provided in Appendix 1.

Tax-benefit model and household micro-data

We use the EU tax-benefit model EUROMOD (Sutherland and Figari, 2013) to simulate household disposable incomes in various scenarios needed for decomposition (see Figure 1). EUROMOD covers all 28 EU countries and models their tax-benefit systems in a common framework, maximising consistency and comparability in cross-country analyses. The model uses nationally representative household micro-data from the EU Statistics on Income and Living Conditions (EU-SILC) and Family Resources Survey (FRS) for the UK (which became the official source for the EU-SILC later) as input and applies national tax-benefit rules (as of 30th June in a given year) for each country.

EUROMOD aims to simulate as many tax and benefit components of disposable income (social insurance contributions, direct taxes, cash benefits) as possible though the cross-sectional nature of household information used as input excludes some instruments (mainly contributory pensions and benefits). Information on instruments which cannot be simulated is taken directly from EU-SILC and FRS. EUROMOD is a static microsimulation model, taking individual characteristics and market incomes as given. Each country module has been thoroughly documented in a separate Country Report, providing also validation results against external statistics on tax revenues and benefit expenditures as well as the number of tax payers and benefit recipients.[3]

We use two waves of household survey data for each country, in most cases cross-sectional EU-SILC 2008 and 2012.[4] (At the time of writing, the 2012 wave is the most recent covering all EU countries in EUROMOD.) In the case of UK, we use FRS 2008/09 and 2012/13, which became the official data source in later SILC waves. For some countries, EUROMOD input datasets also include selected variables from the national SILC (Estonia, Lithuania, Luxembourg, Poland) – which provide the basis for the Eurostat version and often contain more detailed income information – or use solely the national SILC version (Greece, France, Italy, Austria, Slovakia). SILC databases contain income information for the preceding calendar year; FRS databases collect current monthly incomes. Appendix 2 summarises EUROMOD input database information and provides the sample size in terms of households and individuals.

SILC databases often pool (income) information from various sources, complementing survey information with data from administrative registers. An increasing number of countries rely on registers as the primary source of income information and use a survey only to cover remaining few (and minor) income components. There are two countries where a switch from (mainly) survey to register-based income information occurred between the two waves used in our analysis: France and Malta. France started using registers for main income components since the 2008 wave (Burricand, 2013). Malta retrieves employment and self-employment income from registers since the 2010 wave.[5] These structural breaks in data series need to be kept in mind in the subsequent analysis.

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[3] See https://www.euromod.ac.uk/using-euromod/country-reports/ for EUROMOD Country Reports.

[4] For France and Malta, the first wave used is 2007 and 2009, respectively. In this case, the values of market incomes and non-simulated taxes and benefits are adjusted to bring them in line with the simulation year (2007) using updating factors, which reflect statutory indexation rules for tax-benefit instruments and income growth for market income components. Updating factors are also documented in EUROMOD Country Reports.

[5] Intermediate Quality Report of EU-SILC 2010 for Malta, p. 36: "As from the year under review, data for variables PY010 (employee cash or near cash income) and PY050 (cash benefits or losses from self-employment) were obtained from the Department of Inland Revenue."

Throughout the analysis we apply the modified OECD equivalence scale and rely on equivalised household disposable income. We use Foster, Greer and Thorbecke (FGT) (1984) indices and the Gini coefficient to measure income poverty and inequality, respectively. The FGT indices describe different dimensions of household circumstances below the poverty line (relative to the whole population): the number of households (headcount) below the poverty line as a share of the total population (FGT0), the average poverty gap expressed as a ratio of the poverty line (FGT1) and the poverty severity (FGT2). Poverty lines are derived as 60% of national median equivalised household income, calculated separately for each baseline and counterfactual income distribution. By using `floating' poverty lines, changes to the poverty indices capture in essence changes in income inequality at the bottom of the distribution. We then use the Gini coefficient to capture changes in inequality within the whole distribution of income (not just at the tails as e.g. the S80/S20 ratio does). Compared to some other inequality indices (e.g. generalised entropy measures), the Gini coefficient is easier to interpret and compare across countries and over time as its value ranges between 0 and 1. Standard errors for point estimates reflect sample variation and are obtained with the delta method.

3. Overall changes in the income distribution in 2007-2011

We start from summarising overall changes in the income distribution in the period of 2007-2011, before proceeding with a decomposition analysis in the next section.

Figure 2 presents growth incidence curves (Ravallion and Chen, 2003) across countries, showing the nominal income growth by income percentile group. (Recall that with cross-sectional EU-SILC, we are unable to follow movements of the same households in the income distribution.) A first thing to notice is a large variety of growth profiles: one can find examples of clearly pro-poor (Latvia, Netherlands) and pro-rich income changes (Spain, France, Sweden) as well as profiles which are non-linear in other ways (Luxembourg, Germany, UK) or mostly flat (Belgium, Lithuania, Slovenia). Secondly, in several countries, disposable incomes fell even in nominal terms in this period. In Ireland, Greece and Spain, this happened across the whole income distribution; in Latvia it affected the upper three fifth of the distribution and in Italy the lower one fifth. Portugal was the only case where nominal incomes fell for a substantial part of the top and the bottom of distribution but not in the middle. In about 10 more countries (Belgium, Denmark, Germany, Estonia etc), the decrease in nominal incomes was limited to the poorest and/or richest percentile groups. However, these points in the distribution are estimated with the least precision, so corresponding changes were generally not statistically significant. As the tails of the distribution (bottom and top 1-5 percentiles) tend to be more volatile and susceptible to measurement errors, the corresponding results should be considered cautiously even when they are statistically significant.

To assess income changes relative to price developments, we can compare changes in mean household disposable income (Table 5) with changes in consumer price index (CPI). Recall that CPI and the market income index (MII), see Appendix 1, are used in the decomposition analysis to construct counterfactual scenarios against to separate policy and market-related effects. We can see that average (equivalised) disposable incomes increased in real terms only in about half of the countries in this period and average market income increased in real terms in just 5 countries: Slovakia, France,

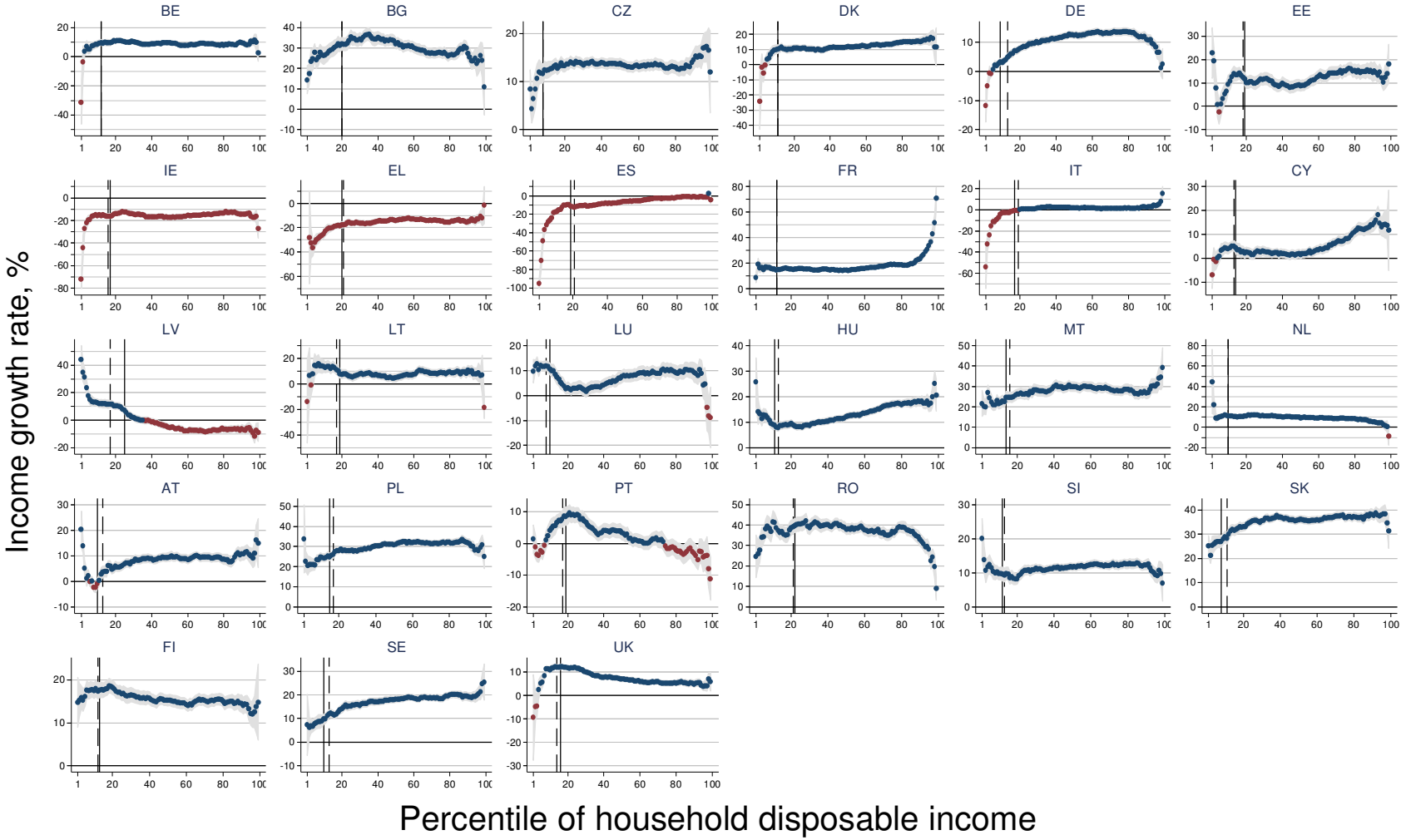
Malta, Poland, Sweden. However, in the case of France and Malta, their large income growth is likely to be driven by structural changes in SILC (see Section 2).[6]

The distributional changes are further summarised in terms of poverty and inequality measures in Figure 3 by plotting the change in each indicator in 2007-2011 against its starting value (2007). We show results for poverty headcount (FGT0), poverty gap (FGT1), poverty severity (FGT2) and the Gini coefficient. There is no clear correlation between the initial levels and the changes which occurred in this period. There is, however, a robust positive correlation between the change in poverty and change in inequality measured by the Gini coefficient (see Figure 4 for a plot of headcount poverty rate and the Gini).

The most drastic change in poverty in this period occurred in Latvia (FGT0 -7.4 percentage points; FGT1 -3.0pp; FGT2 -1.6pp), which had the highest levels of FGT0 and FGT1 in the start of the period and also shows the largest decrease in the poverty line (also shown in Figure 2). The next largest (and statistically significant) reductions in poverty took place in the UK (-2.4pp) and Portugal (-2.0pp) for the headcount poverty rate (FGT0); and the Netherlands for the poverty gap and poverty severity (FGT1: -0.5pp; FGT2: -0.7pp). The largest *increases* in poverty measured by FGT0 were in Germany (+4.0pp), Sweden (+2.9pp), Austria and Spain (+2.7pp); in relation to FGT1 in Spain (+2.0pp) and Greece (+1.4pp); and by FGT2 in Spain (+1.7pp), Ireland and Greece (+0.9pp). In terms of the Gini coefficient, the largest increases are observed in France (+4.1pp), Spain (+2.9pp) and Cyprus (+2.7pp) and the biggest falls in Latvia (-3.0pp) and the Netherlands (-2.4pp). The change in the Gini in France seems to be also due to the structural break in SILC and caused by improved coverage of investment and property income, which is mostly received by richer households (see also Figure 2).

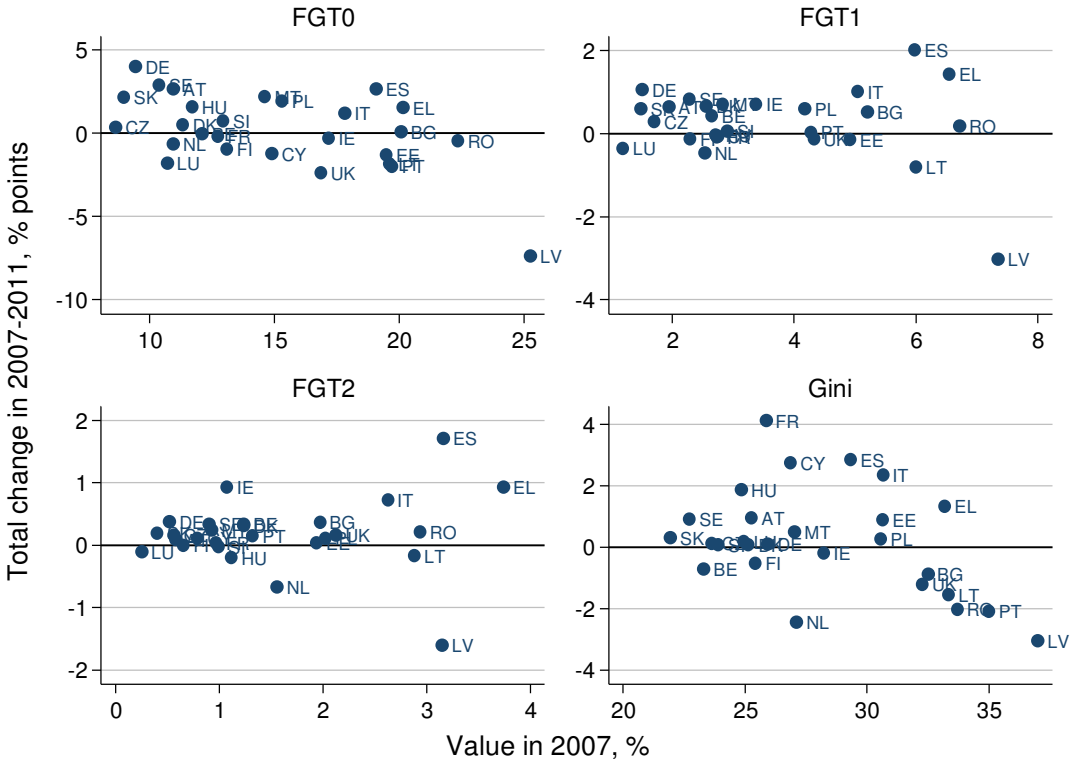
[6] Burricand (2013) reported 15% growth in average disposable income for France in a single year alone, between survey-based SILC 2007 and register-based SILC 2008.

Figure 2: Nominal growth rate of disposable income by income percentile group in 2007-2011



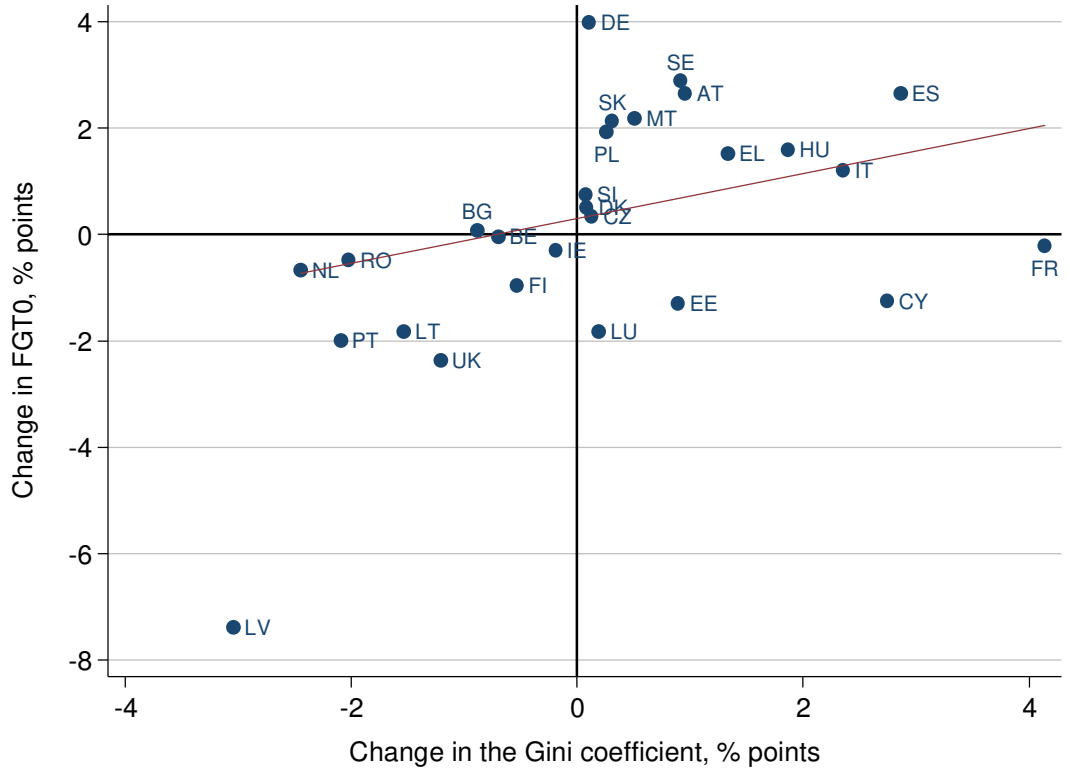
Notes: Income growth shows a percentage change in the percentile value of equivalised household disposable income. The solid and dashed vertical lines show the location of poverty lines respectively in 2007 and 2011. Shaded area shows 95% confidence intervals.
Source: Own calculations using EUROMOD.

Figure 3: Change in poverty and inequality indicators in 2007-2011 and the level in 2007



Source: Own calculations using EUROMOD.

Figure 4: Headcount poverty (FGT0) and the Gini coefficient: change in 2007-2011



Notes: The solid line denotes a simple linear fit (unweighted for population size; without LV).
Source: Own calculations using EUROMOD.

4. Decomposition of changes in the income distribution

The effects of policy vs market-related changes

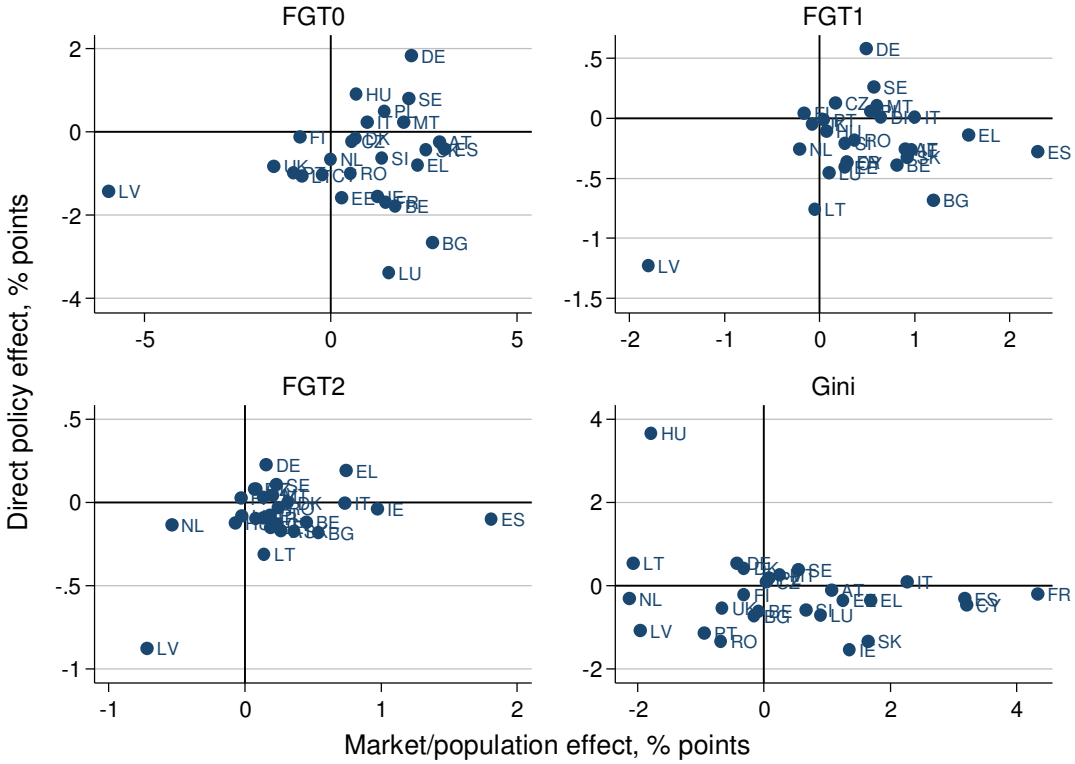
The changes in poverty, inequality and mean disposable income are decomposed by applying the methodology explained in Section 2. Poverty and inequality indicators are decomposed into the *policy* and *other effect* (see Table 1 to Table 4), while (relative) changes in mean disposable income are decomposed into the *policy*, *other* and *nominal effect* (Table 5). Two sets of results are shown: with CPI- and MII-based counterfactual indexation.

Several important observations can be made. Most importantly, there was no obvious correlation between effects due to policy changes (policy effect) and concurrent market/population changes (other effect) in 2007-2011. This conclusion is also robust to the indexation benchmarks used (CPI and MII), as shown for poverty and inequality in Figure 5 and Figure 6. There are multiple factors, which can possibly explain that. First, policy responses take time to formulate and implement, so even if policies are explicitly linked to market-related changes, there is likely to be a lag between the two realisations (and potentially even longer when policy effects are to prompt behavioural responses). Second, market/population changes themselves are often learned with a delay as relevant micro-data typically becomes available with a lag of 2-3 years.[7] Third, it is also plausible that there were indeed other priorities or constraints, which motivated policy changes, and distributional aspects were not central. This may have been especially acute in the Great Recession presenting two challenges at the same time: adverse market-related developments (increased unemployment, wage cuts etc) and reduced fiscal capacities (less tax revenues, increased number of benefit recipients).

Figure 5 and Figure 6 also indicate that market/population related changes were in most countries poverty and inequality increasing, while policy effects were more often poverty and inequality reducing. In quite a few cases, a small or negligible overall change hides sizeable opposite changes in these two components (e.g. headcount poverty rate in Belgium, Bulgaria and Ireland). In fact, while the total change is statistically significant only in about half of 27 countries, the effect of changes in market/population characteristics (other effect) is statistically significant in more countries and this is nearly always the case for the policy effect. Policy (and nominal) effects are generally very precisely measured in the statistical sense as the baseline and counterfactual scenario refer to the same households (effectively a pseudo panel), while the market/population effect (and hence also the total effect) is estimated with less precision because of the cross-sectional nature of underlying data. (To improve on that, panel data would be needed.) In terms of variation and (absolute) size, neither policy effects nor market/population effects dominate the other.

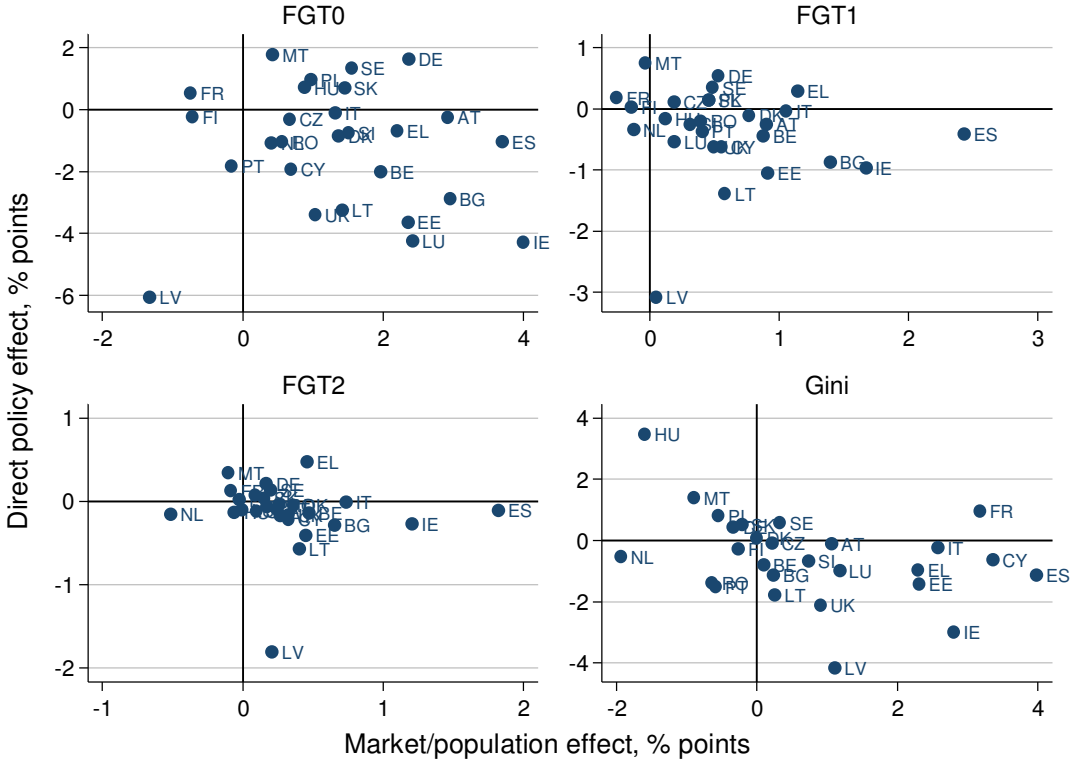
[7] See Gasior and Rastrigina (2016) for an example of nowcasting household income distribution as a way of addressing this limitation.

Figure 5: The effect of policy and market/population-related changes on poverty and inequality (CPI-indexation)



Notes: Average effects across all 6 combinations.
Source: Own simulations using EUROMOD.

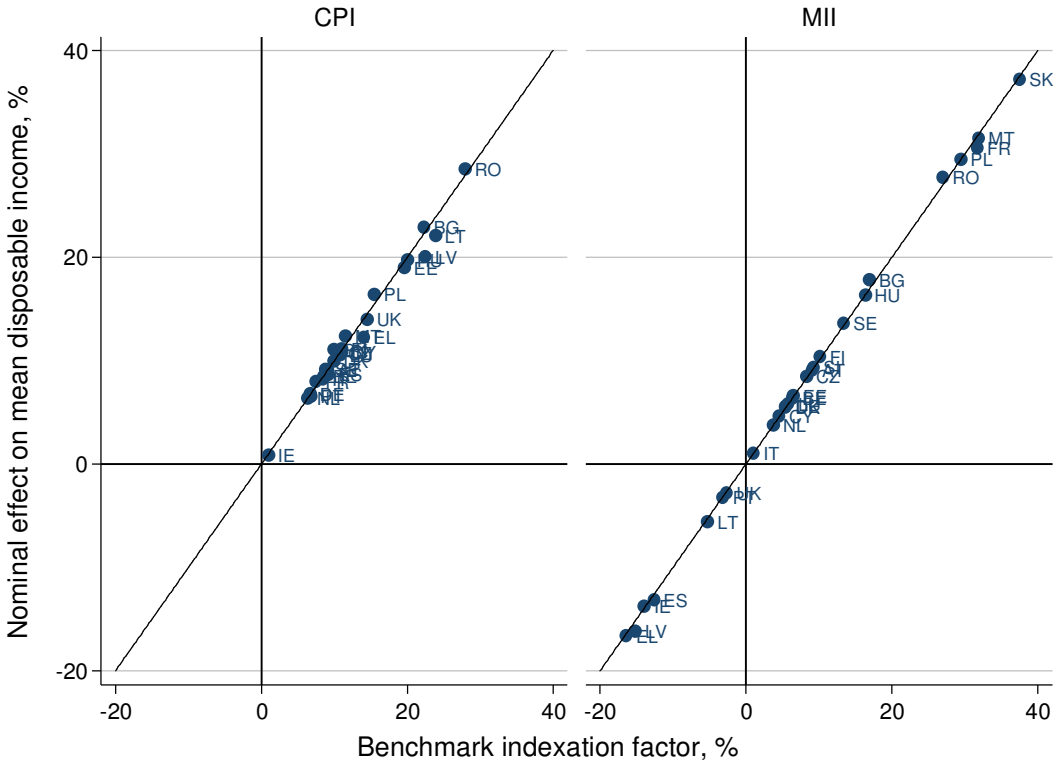
Figure 6: The effect of policy and market/population-related changes on poverty and inequality (MII-indexation)



Notes: Average effects across all 6 combinations. Source: Own simulations using EUROMOD.

Unlike common poverty and inequality measures, mean equivalised household disposable income is measured in monetary units and the decomposition of its changes leads to three components: policy, other and nominal effect (see Table 5). We see that the nominal effect on mean disposable income is nearly perfectly correlated with the benchmark indexation factor (Figure 7), giving the latter therefore a very intuitive interpretation – it is part of nominal income growth, which needs to be discarded to obtain incomes relative to our benchmark. So, our reference point is disposable income growing in nominal terms in line with either prices or market incomes. With the latter, we still find non-zero 'other' effects because MII only reflects a change in average market income, while the growth of market income varies across households, and the component reflects also changes in other characteristics of households.

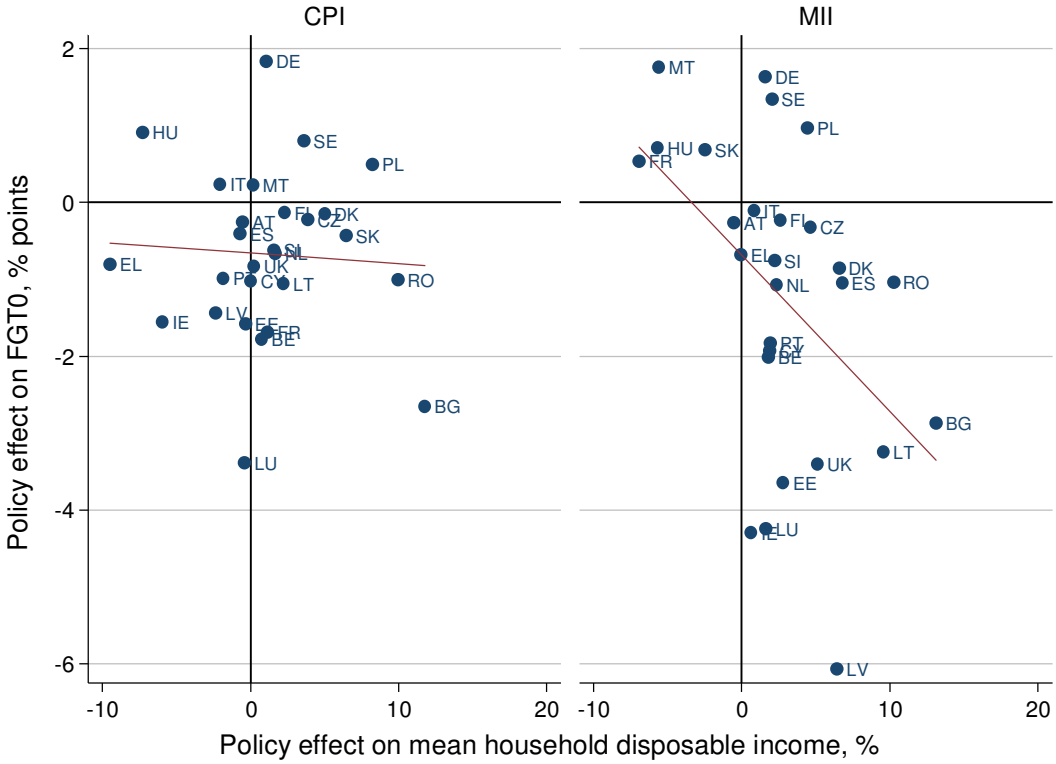
Figure 7: Nominal effect on mean equivalised household disposable income and the benchmark indexation factor



Notes: Average effects across all 6 combinations. 45-degree lines shown.
Source: Own simulations using EUROMOD.

Finally, Figure 8 explores a potential relationship between the policy effects on poverty (FGT0) and mean disposable income. In other words, whether the distributive impact was related to policies being expansionary or contractionary. No clear pattern emerges for the CPI-based scenario, however, with the MII-scenario there is a clear negative correlation. That is, the more expansionary policies (relative to MII-indexed benchmark) are associated with larger poverty-reducing effects.

Figure 8: Policy effect on mean equivalised household disposable income and on the poverty headcount (FGT0)



Notes: Average effects across all 6 combinations. Change in mean equivalised household disposable income is measured as a percentage of mean income in 2007. The solid line denotes a simple linear fit (unweighted for population size).
Source: Own simulations with EUROMOD.

The main compositional effects across countries

As well as considering general compositional patterns, it is instructive to summarise the largest compositional effects across countries. This discussion draws, in addition to Table 1 to Table 5 (already introduced above), on supplementary graphs showing the policy, other and total effect by income decile group (Figure 9 and Figure 10). The nominal effect, which has practically flat incidence across the income distribution (see also previous subsection), is omitted from these graphs for the sake of clarity. The policy effects are further broken down by main tax-benefit components (Figure 11 and Figure 12).

In terms of **headcount poverty** (FGT0, Table 1), countries which faced the biggest challenges from market and population changes in this period were Spain, Austria and Bulgaria, where the other effect shows about a 3pp increase in the headcount poverty (with either benchmark index). Only in Ireland, was there a more drastic increase in FGT0 due to market/population effects (+4pp), though this was limited to the MII-scenario. On the basis of **poverty gap** (FGT1, Table 2), market/population effects had the largest poverty-increasing effect (more than +1pp) in Spain, Greece, Bulgaria, Italy and Ireland. At the other end of scale is Latvia, where market/population changes had the largest poverty-reducing effects on FGT0 (CPI: -6pp; MII; -1.3pp) and FGT1 with CPI-based index (-1.8pp). Only other countries where market/population changes contributed to a reduction of more than 1pp where the UK (CPI: -1.5pp) and Portugal (CPI: -1pp) for FGT0.

Results for policy effects on FGT0 and FGT1 measures are qualitatively even more similar. The largest poverty-reducing policy effects can be found for Luxembourg, Belgium, Bulgaria, Ireland and the Baltic countries (exceeding 1pp with both counterfactuals for FGT0). Such progressive policy effects were mainly due to increased public pensions in Belgium, Bulgaria and Estonia and also to some extent, in the case of MII-scenario, in Latvia and Lithuania where public pensions were frozen while average market incomes decreased in nominal terms. In Luxembourg and Ireland, increased means-tested benefits were particularly important. Ireland is further distinguished from the other countries by very sizeable and progressive tax increases.

The largest poverty-increasing policy effects occurred in Germany, Malta and Sweden, exceeding 1pp for FGT0 and 0.3pp for FGT1 at least in one scenario. This is reflected in regressive profiles in Figure 9 and Figure 10, showing the composition of changes in household disposable income by income decile group.[8] In all three countries, such outcome stems from regressive losses from means-tested benefits, lagging growth in prices and market incomes. In Germany, pro-rich tax changes contributed further; in Sweden, public pensions lagged growth in market incomes; and in Malta both factors played a role.

In terms of **inequality** (the Gini coefficient, Table 4), market/population changes had the largest inequality-increasing effects in Cyprus and Spain (between 3-4pp) and were also notable in Italy, Greece, Ireland and Estonia where the increase exceeded 2pp (at least in one scenario). While the impact of market/population on the Gini exceeded +3pp in France, it seems clearly related to the switch from survey to register-based income information in the French SILC. In particular, it resulted in much improved coverage of capital incomes which are highly concentrated in the top income decile group (as also reflected in Figure 9 and Figure 10). On the other hand, market/population effects had a very notable inequality-reducing effect in the Netherlands (-2pp) and also exceeded 1pp at least in one scenario in Lithuania, Latvia and Hungary.

The largest inequality-reducing policy effects (exceeding 1pp in one or both scenarios) were in Ireland, Slovakia, Romania, Bulgaria, Portugal, Spain and the Baltic countries. Similar to the poverty-reducing policy impacts, these are mainly related to changes in means-tested benefits and public pensions. Progressive tax increases are most notable in Ireland and Portugal. By far, the largest inequality-increasing policy effects are seen for Hungary (+3.5-3.6pp), mainly related to the flat tax reform in 2011.

Qualitative findings for poverty and inequality in this period are overall quite robust to the indexation. Quantitatively, the differences between the two counterfactual scenarios are particularly notable for Latvia.

Regarding changes in **mean household disposable incomes** (Table 5), the market/population changes led, in the CPI-scenario, to very substantial losses in average income in Latvia, Lithuania and Greece (between -17% and -22%) as well in Spain, Ireland and the UK (between -8% and -13%). On the other hand, market/population changes suggest a very notable positive impact on incomes in Slovakia, Malta and France (14-17%), however, in the latter two cases (at least) this stems from changes in

[8] Note that statistical precision is much lower for the bottom and top income decile group, except for policy effect. Confidence intervals are also large for the total and other effect across all age groups.

the data collection method.[9] The country ranking is different for MII-scenario, showing that relative to the MII-based counterfactual, market/population effects increased average disposable incomes the most in Latvia, Hungary, the UK and Estonia (over 3%), and decreased the most in Romania, Poland and Ireland (by more than 3%). It is worth emphasising again that several countries experienced in this period a decline in average market income (in nominal terms): between 10-15% in Ireland, Greece, Spain and Latvia, between 2-5% in the UK, Portugal and Lithuania.

The largest negative policy effects on mean household disposable income are found for Greece (-9.5%), Hungary (-7.3%) and Ireland (-6.0%) in the CPI-scenario and France (-6.9%), Hungary (-5.7%) and Malta (-5.6%) in the MII-scenario. These effects result from cuts in or erosion of pensions/benefits and – except for France and Malta – higher income taxes. The largest positive effects are in Bulgaria and Romania (10-13% across two scenarios), Poland (CPI: +8.2%) and Lithuania (MII: +9.6%). These are driven by increases in public pensions and additionally by progressive tax cuts in Poland. The compositional structure of policy effect is the most diverse in Lithuania.

5. Concluding remarks

We analyse changes in household disposable income distribution across 27 EU countries in 2007-2011 to study the impact of the Great Recession on household incomes and the key factors driving it. Specifically, we decompose the overall (observed) changes in the income distribution, distinguishing between (first-order) tax-benefit policy effects and market and population-related effects on household incomes to establish their relative contribution and whether government actions were reinforcing or counterbalancing market trends. We use microsimulation techniques to construct required counterfactual income distributions and apply the EU tax-benefit model EUROMOD in combination with EU-SILC household micro-data. As such we complement our previous analyses (De Agostini et al., 2013, 2014, 2015), which only assessed policy effects in (selected) EU countries since the crisis.

We find large cross-country variation in household income dynamics in this period. There are cases of both pro-poor and pro-rich income changes, broadly flat as well as highly non-linear distributional changes. Various distributional indicators show similar trends, e.g. there is a robust correlation between change in headcount poverty rate and the Gini coefficient, though there appears to be little association between changes in indicators and their initial levels in 2007.

More importantly, our decomposition analysis shows that there was no clear relationship between policy effects and market/population effects in this period. This could imply low responsiveness of policy decisions to market-related changes but also potential lags in the process – from learning the impact of market-related changes to formulating and implementing appropriate policies – or greater fiscal constraints due to the crisis. To investigate the sensitivity of this finding to the reference period and potential time lags in policy responses, more data points (waves) would be needed. In most of countries, market-related changes were poverty and inequality increasing; policy effects on the other hand, tended to be poverty and inequality reducing. In several cases, the opposite influences are sizable and important but remain hidden when

[9] There is no indication in SILC Quality Reports of changes in data collection method for Slovakia between SILC 2008 and SILC 2012.

considering only overall (observed) income changes. This clearly demonstrates the added value of counterfactual decomposition analysis.

Market and population-related changes had both sizable poverty and inequality increasing effects in Spain, Italy, Greece, Ireland; while opposite large effects were found for Latvia in particular. Policy effects, on the other hand, were most poverty- and inequality-reducing in Bulgaria, Ireland and the Baltic countries, and the most poverty- and inequality increasing in Germany, Malta and Sweden. Hungary stands out for the largest inequality-increasing policy effects, related to the flat tax reform in 2011. In quite a few countries, market and population-related effects led to large reductions in household disposable income in real terms (Latvia, Lithuania, Greece, Spain, Ireland, the UK); Greece and Ireland experienced also substantial losses of income due to policies. The largest income-enhancing policies in this period occurred in Bulgaria and Romania. While our coverage of all EU countries (in the period of interest) induces us to take a broader comparative focus, these observations nevertheless point to specific country features, which would benefit from a more detailed investigation.

Finally, there are some caveats to keep in mind for the analysis. First, while our focus is on the first-order policy effects, we estimate these on the basis of both start- and end-period household characteristics and market incomes, then averaging the results. To the extent that the end-period characteristics could be affected by policy changes occurring in this period, the results may partly reflect some behavioural responses too. Estimating full behavioural responses (e.g. labour supply) is outside the scope of the paper. Second, a couple of countries switched in SILC from survey to register-based income information between the two waves used here and such structural breaks can affect some of the results. In particular, part (if not most) of substantial income growth in France and Malta can be attributed to this and, in the case of France, the distribution of incomes was also notably altered because of that. Third, unlike policy effects, the effects of changes in household characteristics cannot be measured very accurately based on repeated cross-sectional waves. To increase their statistical precision and achieve narrower confidence intervals around point estimates, longitudinal panel data would be needed.

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Tables and supplementary figures

Table 1: Decomposition of changes in the poverty headcount (FGT0)

Country	Total change		CPI				MII			
			Policy		Other		Policy		Other	
BE	0.0	(0.75)	-1.8***	(0.16)	1.7**	(0.73)	-2.0***	(0.17)	2.0***	(0.73)
BG	0.1	(1.09)	-2.7***	(0.30)	2.7***	(1.06)	-2.9***	(0.31)	3.0***	(1.05)
CZ	0.3	(0.62)	-0.2*	(0.13)	0.6	(0.62)	-0.3**	(0.13)	0.7	(0.62)
DK	0.5	(0.96)	-0.2*	(0.08)	0.7	(0.96)	-0.9***	(0.12)	1.4	(0.95)
DE	4.0***	(0.47)	1.8***	(0.14)	2.2***	(0.45)	1.6***	(0.14)	2.4***	(0.45)
EE	-1.3	(0.88)	-1.6***	(0.15)	0.3	(0.87)	-3.6***	(0.22)	2.4***	(0.85)
IE	-0.3	(1.23)	-1.5***	(0.32)	1.3	(1.17)	-4.3***	(0.33)	4.0***	(1.18)
EL	1.5	(1.13)	-0.8***	(0.28)	2.3**	(1.09)	-0.7***	(0.23)	2.2**	(1.10)
ES	2.7***	(0.73)	-0.4***	(0.08)	3.1***	(0.73)	-1.0***	(0.18)	3.7***	(0.71)
FR	-0.2	(0.60)	-1.7***	(0.15)	1.5**	(0.58)	0.5***	(0.16)	-0.7	(0.58)
IT	1.2**	(0.59)	0.2***	(0.06)	1.0*	(0.58)	-0.1	(0.07)	1.3**	(0.58)
CY	-1.2	(0.91)	-1.0***	(0.15)	-0.2	(0.90)	-1.9***	(0.18)	0.7	(0.88)
LV	-7.4***	(1.00)	-1.4***	(0.17)	-6.0***	(0.99)	-6.1***	(0.28)	-1.3	(0.95)
LT	-1.8	(1.31)	-1.1***	(0.30)	-0.8	(1.31)	-3.2***	(0.38)	1.4	(1.28)
LU	-1.8	(1.14)	-3.4***	(0.36)	1.6	(1.08)	-4.2***	(0.39)	2.4**	(1.06)
HU	1.6**	(0.64)	0.9***	(0.18)	0.7	(0.62)	0.7***	(0.17)	0.9	(0.62)
MT	2.2**	(1.00)	0.2*	(0.13)	2.0*	(1.00)	1.8***	(0.19)	0.4	(0.99)
NL	-0.7	(0.86)	-0.7***	(0.10)	0.0	(0.86)	-1.1***	(0.11)	0.4	(0.85)
AT	2.7***	(0.84)	-0.3*	(0.13)	2.9***	(0.82)	-0.3**	(0.13)	2.9***	(0.82)
PL	1.9***	(0.62)	0.5***	(0.11)	1.4**	(0.61)	1.0***	(0.11)	1.0	(0.61)
PT	-2.0**	(1.00)	-1.0***	(0.17)	-1.0	(0.98)	-1.8***	(0.19)	-0.2	(0.97)
RO	-0.5	(1.13)	-1.0***	(0.25)	0.5	(1.10)	-1.0***	(0.25)	0.6	(1.10)
SI	0.7	(0.59)	-0.6***	(0.12)	1.4**	(0.59)	-0.8***	(0.12)	1.5**	(0.59)
SK	2.1***	(0.75)	-0.4***	(0.15)	2.6***	(0.73)	0.7***	(0.12)	1.4*	(0.74)
FI	-1.0	(0.60)	-0.1	(0.09)	-0.8	(0.60)	-0.2**	(0.09)	-0.7	(0.60)
SE	2.9***	(0.63)	0.8***	(0.09)	2.1***	(0.63)	1.3***	(0.11)	1.6**	(0.62)
UK	-2.4***	(0.45)	-0.8***	(0.10)	-1.5***	(0.44)	-3.4***	(0.13)	1.0**	(0.43)

*Notes: Average effects across all 6 combinations. Significance levels indicated as * p<0.1, ** p<0.05, *** p<0.01 and standard errors shown in parentheses. The poverty line is 60% of the median of equivalised household disposable income.*
Source: Own simulations with EUROMOD.

Table 2: Decomposition of changes in the poverty gap (FGT1)

Country	Total change		CPI				MII			
			Policy		Other		Policy		Other	
BE	0.4*	(0.24)	-0.4***	(0.02)	0.8***	(0.24)	-0.4***	(0.02)	0.9***	(0.24)
BG	0.5	(0.40)	-0.7***	(0.06)	1.2***	(0.40)	-0.9***	(0.06)	1.4***	(0.40)
CZ	0.3*	(0.18)	0.1***	(0.02)	0.2	(0.18)	0.1***	(0.02)	0.2	(0.18)
DK	0.7*	(0.37)	0.0	(0.01)	0.6*	(0.37)	-0.1***	(0.01)	0.8**	(0.37)
DE	1.1***	(0.11)	0.6***	(0.03)	0.5***	(0.11)	0.5***	(0.03)	0.5***	(0.11)
EE	-0.1	(0.30)	-0.4***	(0.02)	0.3	(0.30)	-1.1***	(0.04)	0.9***	(0.30)
IE	0.7**	(0.34)	-0.3***	(0.05)	1.0***	(0.33)	-1.0***	(0.06)	1.7***	(0.33)
EL	1.4***	(0.49)	-0.1***	(0.05)	1.6***	(0.48)	0.3***	(0.07)	1.1**	(0.48)
ES	2.0***	(0.34)	-0.3***	(0.01)	2.3***	(0.33)	-0.4***	(0.03)	2.4***	(0.34)
FR	-0.1	(0.18)	-0.4***	(0.03)	0.3*	(0.17)	0.2***	(0.04)	-0.3	(0.17)
IT	1.0***	(0.25)	0.0	(0.01)	1.0***	(0.25)	0.0***	(0.01)	1.1***	(0.25)
CY	-0.1	(0.22)	-0.4***	(0.01)	0.3	(0.22)	-0.6***	(0.02)	0.6**	(0.22)
LV	-3.0***	(0.32)	-1.2***	(0.05)	-1.8***	(0.32)	-3.1***	(0.09)	0.0	(0.31)
LT	-0.8	(0.54)	-0.8***	(0.10)	-0.1	(0.54)	-1.4***	(0.13)	0.6	(0.55)
LU	-0.4**	(0.15)	-0.5***	(0.04)	0.1	(0.16)	-0.5***	(0.05)	0.2	(0.16)
HU	0.0	(0.18)	-0.1***	(0.03)	0.1	(0.18)	-0.2***	(0.03)	0.1	(0.18)
MT	0.7***	(0.27)	0.1***	(0.02)	0.6**	(0.27)	0.7***	(0.05)	0.0	(0.27)
NL	-0.5*	(0.28)	-0.3***	(0.02)	-0.2	(0.27)	-0.3***	(0.02)	-0.1	(0.27)
AT	0.6***	(0.21)	-0.3***	(0.03)	0.9***	(0.21)	-0.3***	(0.03)	0.9***	(0.21)
PL	0.6***	(0.22)	0.1***	(0.02)	0.5**	(0.22)	0.1***	(0.02)	0.5**	(0.22)
PT	0.0	(0.26)	0.0	(0.05)	0.0	(0.26)	-0.4***	(0.05)	0.4	(0.26)
RO	0.2	(0.43)	-0.2***	(0.06)	0.4	(0.43)	-0.2***	(0.06)	0.4	(0.43)
SI	0.1	(0.16)	-0.2***	(0.02)	0.3*	(0.16)	-0.3***	(0.02)	0.3*	(0.16)
SK	0.6***	(0.18)	-0.3***	(0.03)	0.9***	(0.18)	0.1***	(0.01)	0.5**	(0.18)
FI	-0.1	(0.14)	0.0***	(0.01)	-0.2	(0.14)	0.0**	(0.01)	-0.1	(0.14)
SE	0.8***	(0.20)	0.3***	(0.01)	0.6***	(0.19)	0.3***	(0.01)	0.5**	(0.19)
UK	-0.1	(0.17)	-0.1**	(0.03)	-0.1	(0.17)	-0.6***	(0.03)	0.5***	(0.17)

*Notes: Average effects across all 6 combinations. Significance levels indicated as * p<0.1, ** p<0.05, *** p<0.01 and standard errors shown in parentheses. The poverty gap measures the average shortfall from the poverty line expressed as a percentage of the poverty line (across the whole population). The poverty line is 60% of the median of equivalised household disposable income.*
Source: Own simulations with EUROMOD.

Table 3: Decomposition of changes in the poverty severity (FGT2)

Country	Total change		CPI				MII			
			Policy		Other		Policy		Other	
BE	0.3*	(0.18)	-0.1***	(0.01)	0.5**	(0.18)	-0.1***	(0.01)	0.5***	(0.18)
BG	0.4*	(0.20)	-0.2***	(0.03)	0.5***	(0.20)	-0.3***	(0.03)	0.7***	(0.20)
CZ	0.2**	(0.08)	0.1***	(0.01)	0.1	(0.08)	0.1***	(0.01)	0.1	(0.08)
DK	0.3	(0.34)	0.0	(0.02)	0.3	(0.34)	0.0**	(0.02)	0.4	(0.33)
DE	0.4***	(0.06)	0.2***	(0.01)	0.2**	(0.06)	0.2***	(0.01)	0.2***	(0.06)
EE	0.0	(0.16)	-0.1***	(0.01)	0.2	(0.16)	-0.4***	(0.02)	0.4***	(0.16)
IE	0.9***	(0.20)	0.0*	(0.02)	1.0***	(0.19)	-0.3***	(0.03)	1.2***	(0.20)
EL	0.9**	(0.38)	0.2***	(0.05)	0.7**	(0.37)	0.5***	(0.06)	0.5	(0.37)
ES	1.7***	(0.26)	-0.1***	(0.01)	1.8***	(0.26)	-0.1***	(0.02)	1.8***	(0.27)
FR	0.0	(0.10)	-0.1***	(0.02)	0.1	(0.09)	0.1***	(0.03)	-0.1	(0.09)
IT	0.7***	(0.19)	0.0	(0.00)	0.7***	(0.19)	0.0	(0.01)	0.7***	(0.19)
CY	0.1	(0.11)	-0.1***	(0.01)	0.2**	(0.11)	-0.2***	(0.01)	0.3***	(0.11)
LV	-1.6***	(0.17)	-0.9***	(0.04)	-0.7***	(0.17)	-1.8***	(0.07)	0.2	(0.16)
LT	-0.2	(0.38)	-0.3***	(0.05)	0.1	(0.38)	-0.6***	(0.07)	0.4	(0.39)
LU	-0.1***	(0.04)	-0.1***	(0.01)	0.0	(0.04)	-0.1***	(0.01)	0.0	(0.04)
HU	-0.2*	(0.11)	-0.1***	(0.02)	-0.1	(0.11)	-0.1***	(0.02)	-0.1	(0.11)
MT	0.2*	(0.12)	0.0***	(0.01)	0.2	(0.13)	0.3***	(0.04)	-0.1	(0.13)
NL	-0.7***	(0.26)	-0.1***	(0.01)	-0.5**	(0.26)	-0.2***	(0.01)	-0.5**	(0.25)
AT	0.1	(0.09)	-0.2***	(0.02)	0.3***	(0.08)	-0.2***	(0.02)	0.3***	(0.08)
PL	0.1	(0.15)	-0.1***	(0.02)	0.2	(0.14)	-0.1***	(0.02)	0.2	(0.15)
PT	0.2	(0.10)	0.1***	(0.02)	0.1	(0.10)	-0.1***	(0.02)	0.2**	(0.10)
RO	0.2	(0.25)	0.0	(0.03)	0.2	(0.25)	0.0	(0.03)	0.3	(0.25)
SI	0.0	(0.07)	-0.1***	(0.01)	0.1	(0.07)	-0.1***	(0.01)	0.1	(0.07)
SK	0.2***	(0.07)	-0.2***	(0.02)	0.4***	(0.07)	0.0***	(0.01)	0.2**	(0.07)
FI	0.0	(0.06)	0.0***	(0.00)	0.0	(0.06)	0.0***	(0.00)	0.0	(0.06)
SE	0.3***	(0.12)	0.1***	(0.01)	0.2**	(0.12)	0.1***	(0.01)	0.2*	(0.11)
UK	0.2	(0.13)	0.0	(0.02)	0.1	(0.12)	-0.2***	(0.02)	0.3***	(0.12)

*Notes: Average effects across all 6 combinations. Significance levels indicated as * p<0.1, ** p<0.05, *** p<0.01 and standard errors shown in parentheses. The poverty line is 60% of the median of equivalised household disposable income.*
Source: Own simulations with EUROMOD.

Table 4: Decomposition of changes in the Gini coefficient of equivalised household disposable income

Country	Total change		CPI				MII			
			Policy		Other		Policy		Other	
BE	-0.7	(0.54)	-0.6***	(0.02)	-0.1	(0.54)	-0.8***	(0.02)	0.1	(0.54)
BG	-0.9	(0.85)	-0.7***	(0.06)	-0.2	(0.85)	-1.1***	(0.07)	0.2	(0.85)
CZ	0.1	(0.54)	0.1***	(0.03)	0.0	(0.54)	-0.1**	(0.03)	0.2	(0.54)
DK	0.1	(1.13)	0.4***	(0.06)	-0.3	(1.13)	0.1	(0.07)	0.0	(1.13)
DE	0.1	(0.41)	0.5***	(0.03)	-0.4	(0.41)	0.4***	(0.03)	-0.3	(0.41)
EE	0.9	(0.66)	-0.4***	(0.02)	1.3*	(0.66)	-1.4***	(0.03)	2.3***	(0.66)
IE	-0.2	(0.74)	-1.5***	(0.06)	1.4*	(0.73)	-3.0***	(0.07)	2.8***	(0.72)
EL	1.3	(0.95)	-0.4***	(0.06)	1.7*	(0.94)	-1.0***	(0.07)	2.3**	(0.96)
ES	2.9***	(0.40)	-0.3***	(0.01)	3.2***	(0.40)	-1.1***	(0.03)	4.0***	(0.40)
FR	4.1***	(0.56)	-0.2***	(0.04)	4.3***	(0.56)	1.0***	(0.05)	3.2***	(0.55)
IT	2.4***	(0.47)	0.1***	(0.01)	2.3***	(0.47)	-0.2***	(0.01)	2.6***	(0.47)
CY	2.7***	(0.93)	-0.5***	(0.03)	3.2***	(0.94)	-0.6***	(0.05)	3.4***	(0.94)
LV	-3.0***	(0.98)	-1.1***	(0.05)	-2.0**	(0.98)	-4.2***	(0.08)	1.1	(0.98)
LT	-1.5	(0.95)	0.5***	(0.09)	-2.1**	(0.95)	-1.8***	(0.11)	0.3	(0.95)
LU	0.2	(0.92)	-0.7***	(0.04)	0.9	(0.93)	-1.0***	(0.05)	1.2	(0.93)
HU	1.9***	(0.47)	3.7***	(0.09)	-1.8***	(0.46)	3.5***	(0.09)	-1.6***	(0.46)
MT	0.5	(1.01)	0.3***	(0.02)	0.2	(1.01)	1.4***	(0.04)	-0.9	(1.02)
NL	-2.4***	(0.54)	-0.3***	(0.02)	-2.1***	(0.54)	-0.5***	(0.02)	-1.9***	(0.54)
AT	1.0	(0.65)	-0.1***	(0.02)	1.1	(0.65)	-0.1***	(0.02)	1.1	(0.65)
PL	0.3	(0.52)	0.2***	(0.02)	0.1	(0.52)	0.8***	(0.02)	-0.5	(0.52)
PT	-2.1**	(0.85)	-1.1***	(0.04)	-0.9	(0.85)	-1.5***	(0.05)	-0.6	(0.85)
RO	-2.0***	(0.61)	-1.3***	(0.06)	-0.7	(0.60)	-1.4***	(0.07)	-0.6	(0.60)
SI	0.1	(0.33)	-0.6***	(0.02)	0.7**	(0.33)	-0.7***	(0.02)	0.7**	(0.33)
SK	0.3	(0.44)	-1.3***	(0.03)	1.7***	(0.44)	0.5***	(0.02)	-0.2	(0.44)
FI	-0.5	(0.54)	-0.2***	(0.01)	-0.3	(0.54)	-0.3***	(0.01)	-0.3	(0.54)
SE	0.9**	(0.42)	0.4***	(0.02)	0.5	(0.42)	0.6***	(0.02)	0.3	(0.42)
UK	-1.2***	(0.39)	-0.5***	(0.03)	-0.7*	(0.39)	-2.1***	(0.04)	0.9**	(0.39)

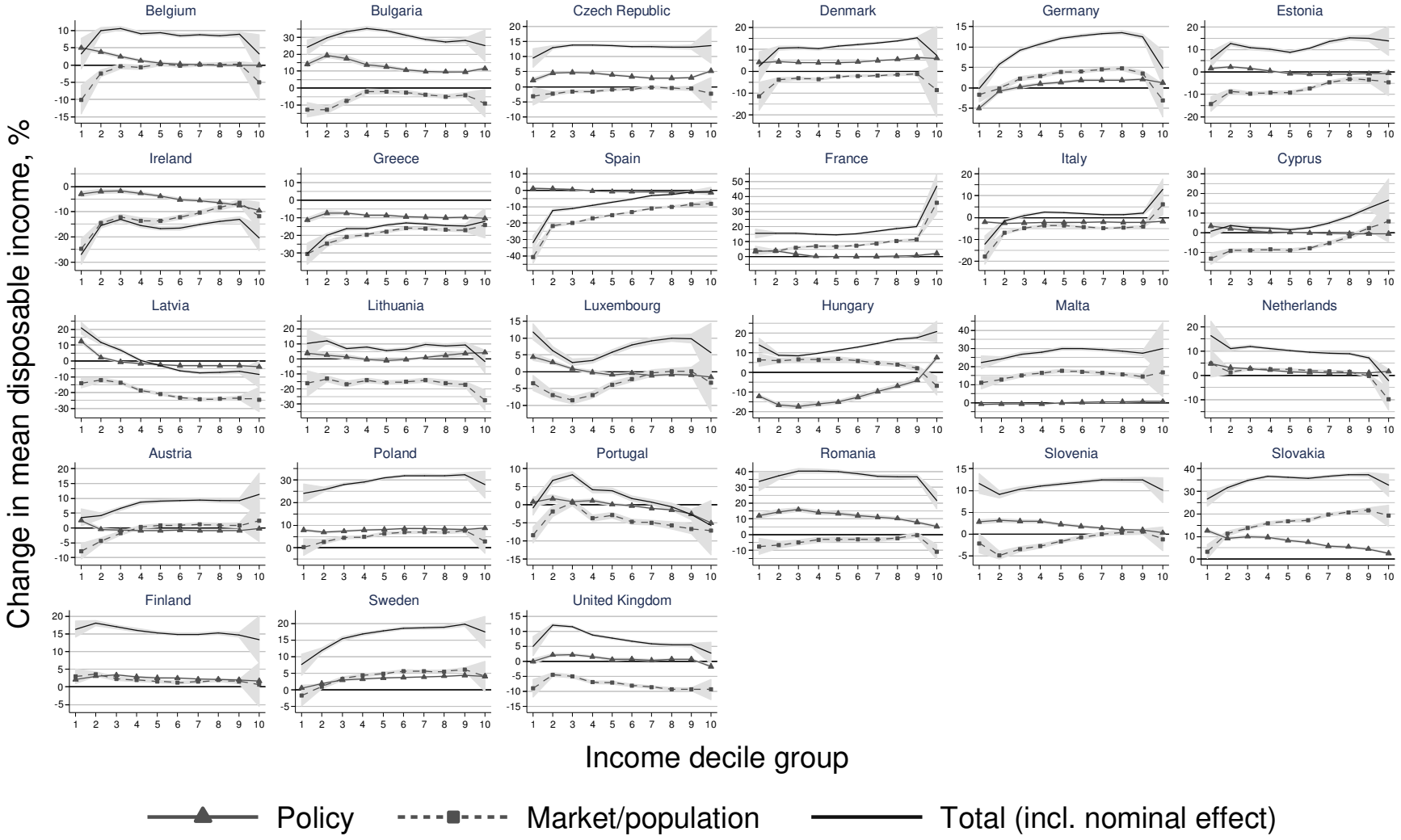
*Notes: Average effects across all 6 combinations. Significance levels indicated as * p<0.1, ** p<0.05, *** p<0.01 and standard errors shown in parentheses.*
Source: Own simulations with EUROMOD.

Table 5: Decomposition of changes in mean equivalised household disposable income, %

Country	Total change		CPI						MII					
			Policy		Other		Nominal		Policy		Other		Nominal	
BE	7.7***	(1.11)	0.8***	(0.04)	-1.6	(1.06)	8.5***	(0.04)	1.8***	(0.04)	-0.5	(1.07)	6.4***	(0.03)
BG	28.9***	(2.50)	11.8***	(0.17)	-5.8***	(2.16)	22.9***	(0.22)	13.1***	(0.19)	-2.1	(2.19)	17.8***	(0.18)
CZ	13.2***	(1.16)	3.9***	(0.05)	-1.3	(1.08)	10.7***	(0.05)	4.6***	(0.06)	0.1	(1.09)	8.5***	(0.04)
DK	11.0***	(1.94)	5.0***	(0.10)	-4.0**	(1.81)	10.0***	(0.09)	6.6***	(0.11)	-1.1	(1.83)	5.5***	(0.05)
DE	9.7***	(0.90)	1.1***	(0.04)	1.8**	(0.87)	6.8***	(0.03)	1.6***	(0.04)	2.5***	(0.87)	5.6***	(0.02)
EE	12.7***	(1.87)	-0.3***	(0.03)	-6.0***	(1.72)	19.0***	(0.15)	2.8***	(0.07)	3.3*	(1.78)	6.6***	(0.06)
IE	-16.5***	(1.47)	-6.0***	(0.11)	-11.4***	(1.50)	0.9***	(0.01)	0.6***	(0.14)	-3.3**	(1.57)	-13.7***	(0.12)
EL	-14.4***	(1.84)	-9.5***	(0.12)	-17.2***	(1.80)	12.3***	(0.12)	0.0	(0.11)	2.2	(2.04)	-16.6***	(0.18)
ES	-4.9***	(0.97)	-0.7***	(0.02)	-12.8***	(0.93)	8.6***	(0.04)	6.8***	(0.06)	1.5	(1.01)	-13.1***	(0.07)
FR	23.2***	(1.33)	1.2***	(0.07)	14.1***	(1.26)	8.0***	(0.05)	-6.9***	(0.09)	-0.5	(1.18)	30.6***	(0.16)
IT	3.9***	(1.00)	-2.0***	(0.03)	-2.3**	(0.97)	8.2***	(0.04)	0.8***	(0.03)	2.0**	(0.99)	1.0***	(0.01)
CY	7.9***	(1.91)	0.0	(0.05)	-2.9	(1.82)	10.8***	(0.09)	1.9***	(0.07)	1.4	(1.86)	4.6***	(0.04)
LV	-4.5**	(2.07)	-2.4***	(0.07)	-22.2***	(1.90)	20.0***	(0.19)	6.4***	(0.18)	5.2**	(2.18)	-16.2***	(0.19)
LT	5.8**	(2.37)	2.2***	(0.20)	-18.5***	(2.14)	22.1***	(0.22)	9.6***	(0.24)	1.8	(2.32)	-5.6***	(0.06)
LU	7.3***	(2.08)	-0.4***	(0.07)	-2.9	(1.98)	10.6***	(0.10)	1.6***	(0.09)	-0.2	(2.01)	5.8***	(0.06)
HU	15.0***	(1.14)	-7.3***	(0.20)	2.6**	(1.09)	19.7***	(0.09)	-5.7***	(0.19)	4.4***	(1.09)	16.3***	(0.08)
MT	28.4***	(2.39)	0.2***	(0.03)	15.8***	(2.27)	12.4***	(0.12)	-5.6***	(0.11)	2.4	(2.17)	31.5***	(0.29)
NL	7.1***	(1.16)	1.7***	(0.03)	-1.0	(1.12)	6.4***	(0.03)	2.4***	(0.03)	0.9	(1.12)	3.8***	(0.02)
AT	8.9***	(1.41)	-0.5***	(0.03)	0.4	(1.35)	9.1***	(0.06)	-0.5***	(0.03)	0.4	(1.35)	9.1***	(0.06)
PL	30.0***	(1.45)	8.2***	(0.06)	5.3***	(1.31)	16.4***	(0.09)	4.5***	(0.05)	-4.0***	(1.27)	29.5***	(0.16)
PT	-0.5	(2.01)	-1.8***	(0.06)	-5.3***	(1.95)	6.6***	(0.07)	1.9***	(0.09)	0.8	(2.00)	-3.2***	(0.03)
RO	33.8***	(2.15)	10.0***	(0.18)	-4.8***	(1.83)	28.6***	(0.23)	10.3***	(0.18)	-4.2**	(1.83)	27.8***	(0.23)
SI	11.4***	(0.86)	1.6***	(0.04)	-1.2	(0.81)	11.0***	(0.04)	2.2***	(0.04)	-0.2	(0.82)	9.3***	(0.04)
SK	35.0***	(1.32)	6.5***	(0.08)	17.5***	(1.23)	11.1***	(0.06)	-2.5***	(0.03)	0.3	(1.15)	37.2***	(0.18)
FI	15.1***	(1.12)	2.3***	(0.02)	1.6	(1.05)	11.2***	(0.06)	2.6***	(0.02)	2.1**	(1.05)	10.4***	(0.05)
SE	17.3***	(0.99)	3.6***	(0.03)	4.5***	(0.93)	9.2***	(0.04)	2.0***	(0.04)	1.6*	(0.92)	13.6***	(0.06)
UK	6.0***	(0.90)	0.3***	(0.05)	-8.3***	(0.84)	14.0***	(0.06)	5.1***	(0.07)	3.6***	(0.90)	-2.8***	(0.01)

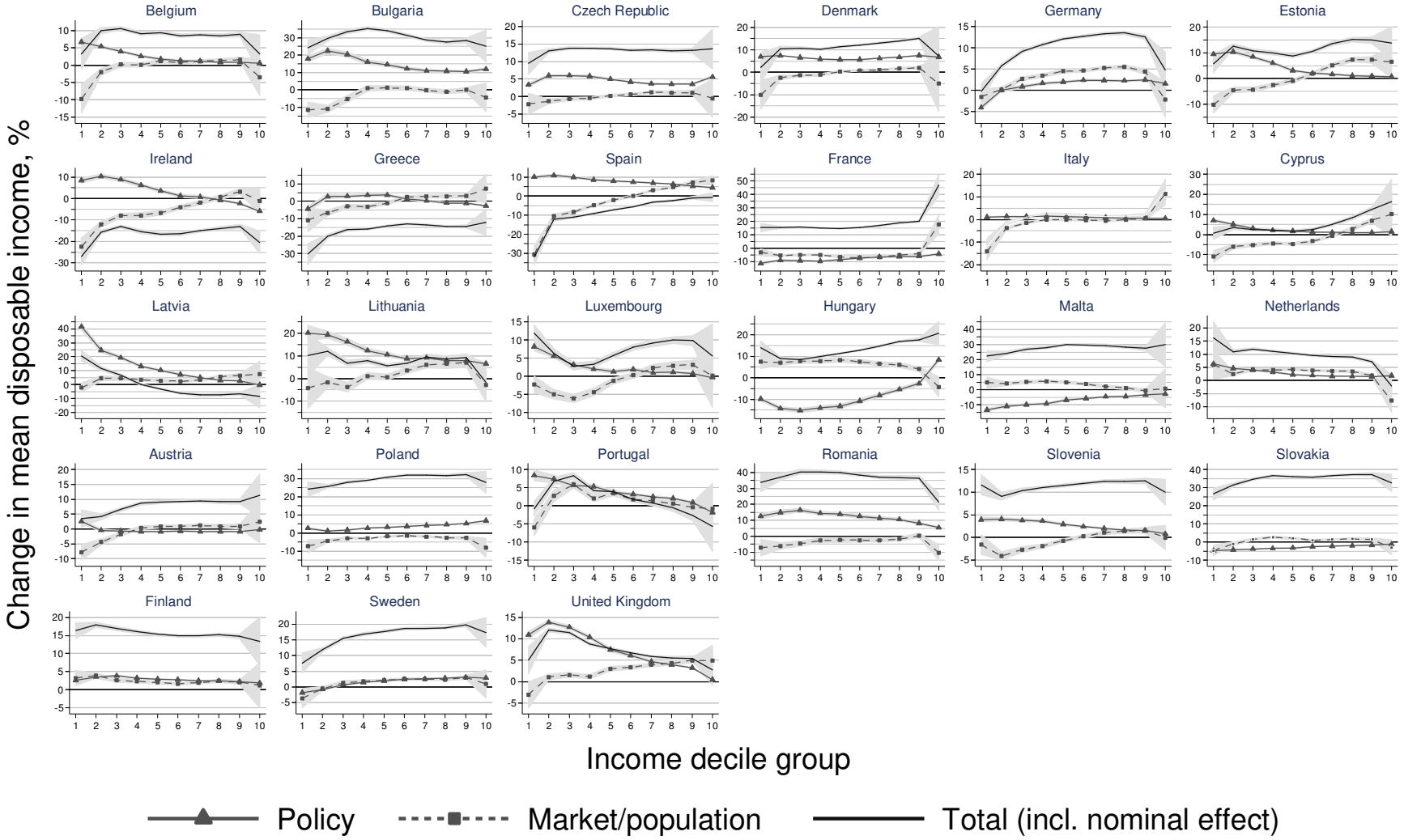
*Notes: Average effects across all 6 combinations. Change in mean equivalised household disposable income is measured as a percentage of mean income in 2007. Significance levels indicated as * p<0.1, ** p<0.05, *** p<0.01 and standard errors shown in parentheses. Source: Own simulations with EUROMOD.*

Figure 9: Decomposition of changes in mean equivalised household disposable income by income decile group (CPI-indexation)



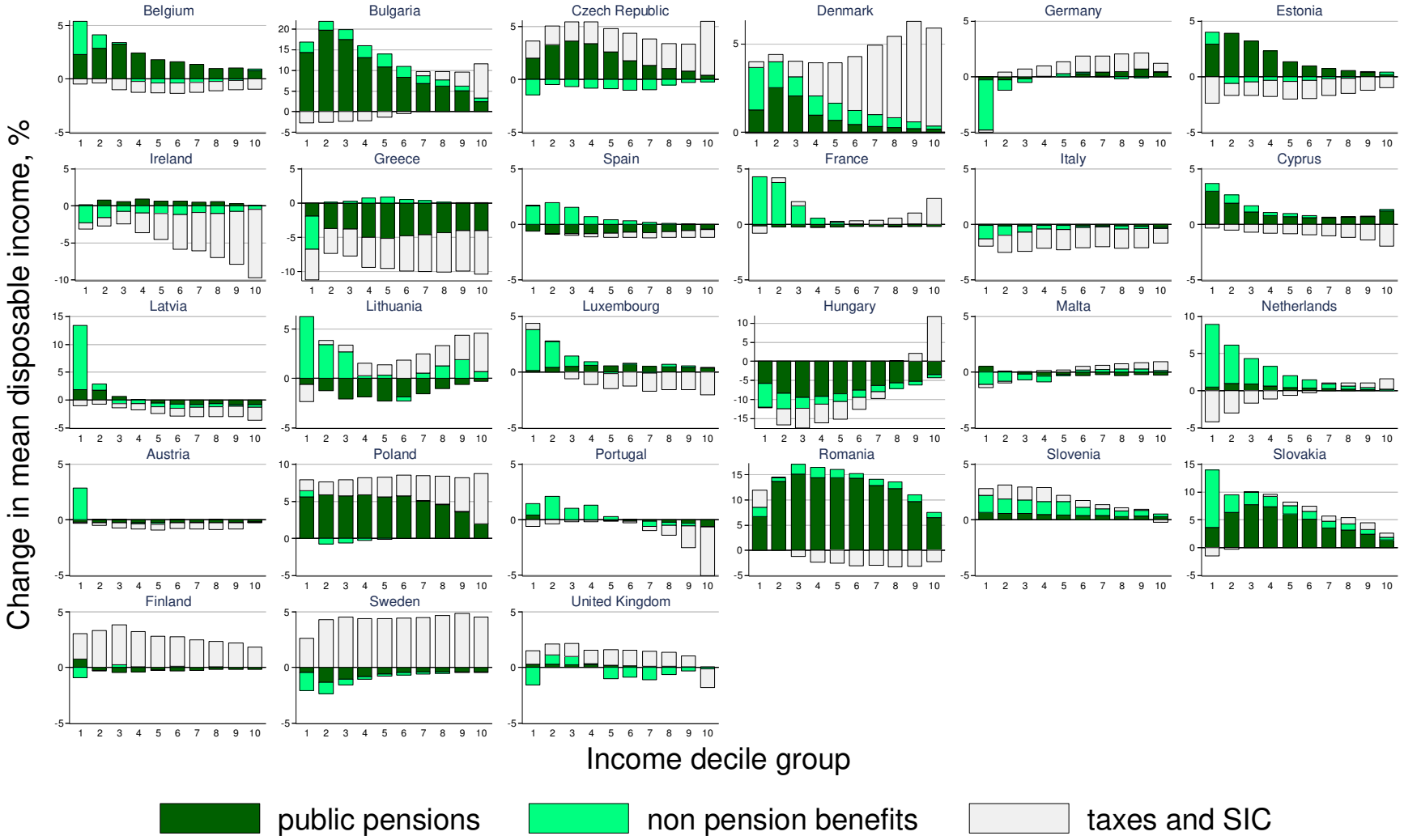
Notes: Nominal effect not shown separately. Average effects across all 6 combinations. Change in mean equivalised household disposable income is measured as a percentage of mean income in 2007. Deciles are based on equivalised household disposable income in 2007. Shaded area shows 95% confidence intervals. The charts are drawn to different scales, but the interval between gridlines on each of them is the same.
Source: Own simulations with EUROMOD.

Figure 10: Decomposition of changes in mean equivalised household disposable income by income decile group (MII-indexation)



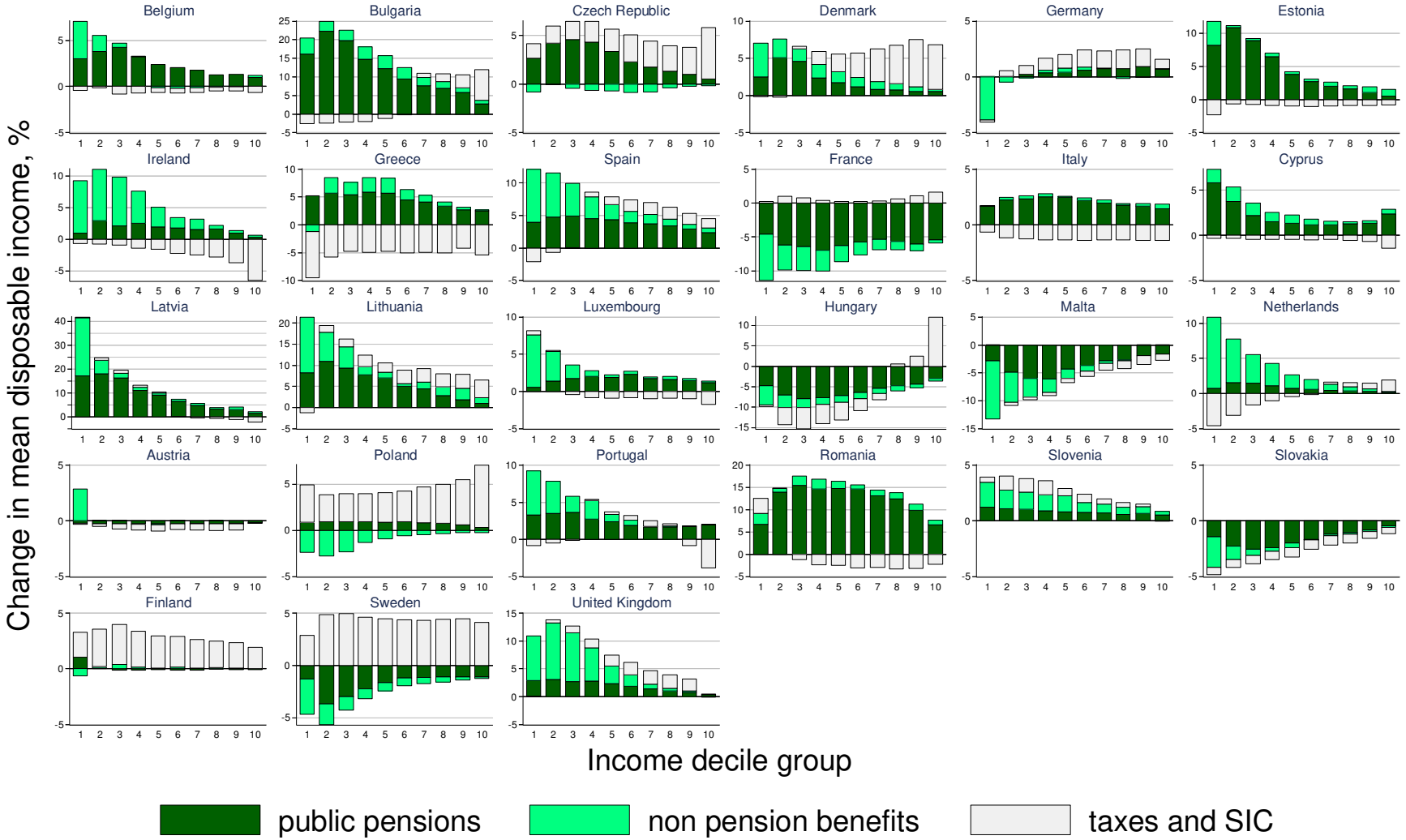
Notes: Nominal effect not shown separately. Average effects across all 6 combinations. Change in mean equivalised household disposable income is measured as a percentage of mean income in 2007. Deciles are based on equivalised household disposable income in 2007. Shaded area shows 95% confidence intervals. The charts are drawn to different scales, but the interval between gridlines on each of them is the same.
Source: Own simulations with EUROMOD.

Figure 11: Percentage change in household disposable income due to policies by tax-benefit components (CPI-indexation)



Notes: Average policy effect across all 6 combinations. Change in mean equivalised household disposable income is measured as a percentage of mean income in 2007. Deciles are based on equivalised household disposable income in 2007. The charts are drawn to different scales, but the interval between gridlines on each of them is the same.
Source: Own simulations with EUROMOD.

Figure 12: Percentage change in household disposable income due to policies by tax-benefit components (MII-indexation)



Notes: Average policy effect across all 6 combinations. Change in mean equivalised household disposable income is measured as a percentage of mean income in 2007. Deciles are based on equivalised household disposable income in 2007. The charts are drawn to different scales, but the interval between gridlines on each of them is the same.
Source: Own simulations with EUROMOD.

Appendix 1: Movements in prices (CPI) and average market incomes (MII) in 2007-2011

Country	MII	CPI
BE	6.4	8.5
BG	16.9	22.3
CZ	8.3	10.6
DK	5.4	9.9
DE	5.5	6.7
EE	6.5	19.6
IE	-13.9	0.9
EL	-16.4	14.1
ES	-12.6	9.2
FR	31.7	7.5
IT	1.0	8.4
CY	4.5	11.0
LV	-15.2	22.5
LT	-5.3	23.9
LU	5.8	10.8
HU	16.4	20.0
MT	31.9	11.5
NL	3.7	6.3
AT	9.1	9.1
PL	29.4	15.5
PT	-3.2	6.8
RO	27.0	27.9
SI	9.3	10.9
SK	37.5	9.9
FI	10.2	11.0
SE	13.4	8.8
UK	-2.6	14.5

Sources: MII is based on own calculations using the concept and values of market income in EUROMOD databases. CPI is based on Eurostat's series for Harmonised Indices of Consumer Prices (HICP).

Appendix 2: Description of micro-data sources

Country		Input database #1	Sample size [c]		Input database #2	Sample size [c]	
			HH	IND		HH	IND
Belgium	BE	EU-SILC 2008 (1)	6,300	15,072	EU-SILC 2012 (1)	5,817	13,896
Bulgaria	BG	EU-SILC 2008 (4)	4,339	12,148	EU-SILC 2012 (2)	5,679	14,487
Czech Republic	CZ	EU-SILC 2008 (3)	11,294	26,884	EU-SILC 2012 (2)	8,773	20,213
Denmark	DK	EU-SILC 2008 (4)	5,778	14,836	EU-SILC 2012 (1)	5,355	13,319
Germany	DE	EU-SILC 2008 (4)	13,312	28,845	EU-SILC 2012 (1)	13,145	27,840
Estonia	EE	EU-SILC 2008 (4)	4,744	12,999	EU-SILC 2012 (1) [a]	5,433	14,210
Ireland	IE	EU-SILC 2008 (2)	5,247	12,516	EU-SILC 2012 (1)	4,592	11,794
Greece	EL	EU-SILC 2008 (4) [a]	6,504	16,814	EU-SILC 2012 (1) [a]	5,626	13,832
Spain	ES	National SILC 2008 (2)	13,014	35,858	National SILC 2012 (1)	12,714	33,501
France	FR	EU-SILC 2007 (3)	10,498	25,803	National SILC 2012 (1)	11,999	28,413
Italy	IT	National SILC 2008 (3)	20,928	52,135	National SILC 2012 (1)	19,579	47,149
Cyprus	CY	EU-SILC 2008 (6)	3,355	9,998	EU-SILC 2012 (1)	4,638	13,306
Latvia	LV	EU-SILC 2008 (3)	5,196	13,081	EU-SILC 2012 (2)	6,499	15,165
Lithuania	LT	EU-SILC 2008 (3) [a]	4,823	12,130	EU-SILC 2012 (1) [a]	5,394	12,659
Luxembourg	LU	EU-SILC 2008 (2) [a]	3,512	9,366	EU-SILC 2012 (1) [a]	5,802	15,462
Hungary	HU	EU-SILC 2008 (4)	8,818	22,335	EU-SILC 2012 (3)	11,311	28,407
Malta	MT	EU-SILC 2009 (3)	3,646	10,213	EU-SILC 2012 (2)	4,350	11,925
Netherlands	NL	EU-SILC 2008 (4)	10,337	25,275	EU-SILC 2012 (2)	10,168	24,813
Austria	AT	National SILC 2008 (5)	5,711	13,563	National SILC 2012 (1)	6,232	13,861
Poland [b]	PL	EU-SILC 2008 (3) [a]	13,984	41,064	EU-SILC 2012 (2) [a]	13,116	36,991
Portugal	PT	EU-SILC 2008 (3)	4,454	11,772	EU-SILC 2012 (1)	6,257	15,926
Romania	RO	EU-SILC 2008 (2)	7,805	19,111	EU-SILC 2012 (1)	7,578	17,685
Slovenia	SI	EU-SILC 2008 (1)	9,028	28,919	EU-SILC 2012 (1)	9,205	28,034
Slovakia	SK	National SILC 2008 (3)	5,450	16,518	National SILC 2012 (1)	5,291	15,440
Finland	FI	EU-SILC 2008 (2)	10,472	26,481	EU-SILC 2012 (1)	10,307	25,370
Sweden	SE	EU-SILC 2008 (3)	7,452	18,663	EU-SILC 2012 (1)	6,628	16,452
United Kingdom	UK	FRS 2008/09 (4)	25,088	57,276	FRS 2012/13 (2)	20,196	46,420

Notes: Number in parentheses refers to the EUROMOD input dataset version. HH/IND refers to the number of households/individuals. Income reference period is the preceding calendar year for SILC databases and current month for FRS.

[a] Includes selected national variables, added with the permission from the respective national statistical office.

[b] Microsimulation SILC indicator dataset complementing the Polish UDB SILC database was provided for the purpose of income source identification in EUROMOD by the Polish Central Statistical Office.

[c] Initial sample size of EUROMOD input datasets shown. Throughout the analysis, we exclude households with extreme negative or positive equivalised disposable incomes (defined as below -1.5 and above +100 times of median equivalised disposable income), which can have a disproportionately large effect on some of the indicators (e.g. FGT2). There are only 1-2 such households in the Danish and French datasets and in the earlier dataset for the Netherlands and the UK.