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Europe Through the Crisis: Discretionary Policy Changes and Automatic Stabilizers*

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Abstract

Tax-benefit policies affect changes in household incomes through two main channels: discretionary policy changes and automatic stabilizers. We study their role in the EU countries in 2007–14 using an extended decomposition approach. Our results show that the two policy actions often reduced rather than increased inequality of net incomes, and so helped offset the inequality-increasing impact of growing disparities in gross market incomes. While inequality reductions were achieved mainly through benefits using both routes, policy changes to and the automatic stabilization response of taxes and contributions raised inequality in some countries and lowered it in others.

1. Introduction

The financial crisis of 2007–08 and the subsequent Great Recession posed serious economic challenges to Europe. Substantial increases to unemployment, losses to wages and self-employment income, increase in governments debt and fall in GDP put strain on

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fiscal budgets and households finances.[1] In response to such economic challenges, tax-benefit policies have important implications for household net incomes. They affect incomes through two main channels: discretionary policy changes and automatic stabilizers.

Automatic stabilizers characterize the policies' in-built flexibility to absorb shocks to earnings and people's characteristics (Pechman, 1973). They reduce, ceteris paribus, the need for discretionary policy actions which take time to design and implement and can be particularly important if the scope for discretionary fiscal policies is limited, for example, in the eurozone (Mabbett and Schelkle, 2007). They are viewed as a crucial tool for reducing macroeconomic volatility (e.g. Blanchard, Dellariccia and Mauro, 2010). In particular, income taxes and unemployment insurance benefits in the US, Canada and Europe have received a great deal of attention in the micro- and macroeconomic literature as important stabilizers of fluctuations in aggregate output as well as in disposable income and household consumption (e.g. Auerbach and Feenberg, 2000; Browning and Crossley, 2001; Kniesner and Ziliak, 2002; Auerbach, 2009; Dolls, Fuest and Peichl, 2012; Fernández Salgado *et al.*, 2014; Di Maggio and Kermani, 2016; McKay and Reis, 2016; Hsu, Matsa and Melzer, 2018).

There is less consensus on the size and direction of impact of discretionary fiscal policies on economic stability (e.g. Taylor, 2000; Feldstein, 2002; Blanchard and Perotti, 2002; Fatás and Mihov, 2003; Auerbach and Gorodnichenko, 2012; Caggiano *et al.*, 2015; Miyamoto, Nguyen and Sergeyev, 2018). But a large body of microeconomic literature has shown their importance for the income distribution, for example, Clark and Leicester (2005); Sefton and Sutherland (2005); Sutherland *et al.* (2008); Bargain (2012) for the UK; Decoster *et al.* (2015) for Belgium; Matsaganis and Leventi (2014); De Agostini, Paulus and Tasseva (2016); Bargain *et al.* (2017); Hills *et al.* (2019); Paulus, Sutherland and Tasseva (2019) for selected EU countries. A decomposition approach combined with a tax-benefit calculator and household micro-data has enabled researchers to identify the direct (non-behavioural) impact of policy changes on the income distribution. The estimate for the policy effect has often been compared with the contribution of 'other' factors, which encompass the *combined* (net) effect of changes to market incomes and population characteristics, and automatic stabilizers (e.g. Bargain and Callan, 2010; Bargain *et al.*, 2015, 2017). For the early crisis years (2007–11), the literature agrees that policy changes were broadly poverty- and inequality-reducing in nearly all EU countries but their redistributive effect became more heterogeneous across countries between 2011 and 2014.

In contrast, there is little empirical evidence on the redistributive power of automatic stabilizers. For several Southern EU countries and Ireland, Callan, Doorley and Savage (2018) find that automatic stabilizers – mainly through benefits – reduced income inequality between 2007 and 2013. For hypothetical earnings shocks, on the other hand, benefits and taxes are shown to stabilize mostly the incomes of households at the bottom and top of the distribution, respectively (European Commission, 2017); while Dolls, Fuest and Peichl

[1] Between 2007 and 2014, GDP fell in 10 EU countries although it increased in the EU-28 on average (+1.5%). Government debt as a % of GDP increased in every EU member state and overall by a staggering 51%. The effect on households was equally severe: the share of unemployed (as a % of the population) increased in all EU countries, except Germany, and overall by 44%. Real wages and salaries, the main source of household income, fell by 4.4%, while income from self-employment dropped by nearly 10% on average. See Eurostat database.

(2011) find that households located at the bottom of the distribution are least protected by policies against shocks.

We aim to contribute to improved understanding of the link between automatic stabilizers and the income distribution by providing an in-depth account of the relative impact of automatic stabilizers and discretionary policy changes on household incomes in the EU in recent years (2007–14), covering the latest economic crisis and postcrisis economic developments. We seek to decompose observed changes in the income distribution into changes due to: (i) discretionary tax-benefit policy changes, (ii) the automatic stabilization response of tax-benefit policies, and (iii) gross market incomes and population changes. Tax-benefit policy changes encompass changes to the design of the tax-benefit system, the statutory uprating of and discretionary (ad hoc) changes to monetary parameters, such as benefit amounts and tax thresholds. Automatic stabilizers capture the automatic changes to benefit entitlements and tax liabilities in response to changes in the distribution of gross market incomes and population characteristics.

In more detail, we construct counterfactual income distributions, which represent what would have happened to household incomes in the absence of changes to a certain factor – either to tax-benefit policies or to market incomes and population characteristics. Comparing the observed and counterfactual distributions allows us to quantify the contribution of each factor to the change in incomes. Our decomposition approach builds on and extends the method by Bargain and Callan (2010). We use the EU tax-benefit model EUROMOD to calculate actual and counterfactual entitlements to cash benefits and direct income taxes and social insurance contributions (SIC) for each household in the micro-data. The micro-data contain information on population characteristics and market incomes and come from the European Union Statistics on Income and Living Conditions (EU-SILC) and, for the UK, from the Family Resources Survey (FRS).

Between 2007 and 2014, market incomes became more unequally distributed in more than a third of the EU countries. In the rest of countries, there was no statistically significant change in inequality as measured by the Gini coefficient. Our results show that discretionary policy changes in 21 countries lowered inequality, consistent with the existing evidence. Our decomposition by tax-benefit policy adds to the evidence by showing that the reduction was achieved mainly through increased generosity of benefit entitlements, rather than through taxes/SIC. In some countries, the impact of benefit changes was enhanced by inequality-reducing tax changes, while in others, benefit changes offset a rise in inequality due to tax changes (e.g. due to the introduction of a flat tax in Bulgaria and Hungary or the reduction in top marginal tax rates in Denmark). Among the countries implementing progressive policy changes overall were not only those where the welfare state expanded in size but also countries, which implemented fiscal consolidation measures in the economic downturn.

Automatic stabilizers also contributed in nearly half of the countries to lower inequality. Although discretionary policies were more often inequality-reducing, the magnitude of the two types of effect was broadly similar when it comes to narrowing the gap between the rich and the poor. A further decomposition of the automatic stabilization effect shows that the effect of benefit stabilization was to reduce inequality in most countries, whereas taxes/SIC had a mixed effect. The impact on net income of the stabilization response of taxes/SIC was negatively associated with changes to market incomes/population characteristics across countries. However, there was effectively no country-level correlation between the latter and the stabilization response of benefits. Compared to taxes/SIC, benefits are overall more responsive to changes in the population structure (such as household composition changes) than changes in market income.

The rest of the paper is structured as follows: Section II explains the decomposition methodology with our refinements and extensions to it. Section III describes the data and the tax-benefit model EUROMOD. Section IV presents and discusses the results and Section V concludes.

2. Methodology

Decomposing discretionary policy changes vs other effects

The central question of the paper is which factors contributed to household income changes in the EU countries between 2007 and 2014. In particular, we aim to disentangle the contribution of discretionary tax-benefit policy changes, automatic stabilizers and changes to market incomes and population characteristics. We separate the effect of each factor by means of counterfactual simulations, where one factor is allowed to vary at a time while the rest are kept fixed. We use the decomposition approach by Bargain and Callan (2010) – BC hereafter – which combines household micro-data with a tax-benefit calculator and allows us to identify the direct effect of policy changes (i) from all 'other effects'.[2] We refine their methodology by identifying a broader range of combinations and explicitly distinguishing between scale-variant and scale-invariant measures of the income distribution. In the second step, we extend the BC approach by splitting the 'other effects' into automatic stabilizers (ii) and changes to the distribution of market incomes and population characteristics (iii).

Following BC, we denote with $I(\cdot)$ a functional of the distribution of household income, such as the Gini coefficient or mean income. Household net incomes in period t are expressed in the form of $d_t(p_t, y_t)$ of which: d is the structure of tax-benefit policies (e.g. means-tested vs universal child benefit), p are the tax-benefit parameters (e.g. €1,000 family income-test threshold), y is a matrix containing information on gross market incomes (e.g. earnings and investment income) and household/individual characteristics, and d transforms p and y into household net income. In the first step, the change in the composite indicator I between two periods ($t = 0, 1$) can be decomposed into the contribution of *discretionary policy changes*, *other effect* and *nominal effect*, yielding the following identity:

$$\Delta I = \underbrace{I[d_1(p_1, y_1)] - I[d_0(\alpha p_0, y_1)]}_{\text{discretionary policy changes}} + \underbrace{I[d_0(\alpha p_0, y_1)] - I[d_0(\alpha p_0, \alpha y_0)]}_{\text{other effect}} + \underbrace{I[d_0(\alpha p_0, \alpha y_0)] - I[d_0(p_0, y_0)]}_{\text{nominal effect}} \quad (1)$$

[2]There is a well-established strand in the economic literature which focuses on decomposing the distribution of individual earnings, for example, Juhn, Murphy and Pierce (1993); DiNardo, Fortin and Lemieux (1996); Lemieux (2002); Fields (2003); Yun (2006), see Fortin, Lemieux and Firpo (2011) for an overview. However, this strand overlooks the role of taxation and ignores other income components. The classical source decomposition of income inequality by Shorrocks (1982) and other related work (e.g. Bourguignon, Ferreira and Leite, 2008; Fiorio, 2011; Brewer and Wren-Lewis, 2015) take a step further by decomposing changes to household income but they do not allow separating out the impact on inequality of policy changes from changes to market incomes.

The terms $I[d_1(p_1,y_1)]$ and $I[d_0(p_0,y_0)]$ capture the value of I in the end- and start-period, respectively; while the terms $I[d_0(\alpha p_0,y_1)]$ and $I[d_0(\alpha p_0,\alpha y_0)]$ are based on intermediate counterfactual distributions. To make nominal amounts from the two periods comparable, policy parameters and/or market incomes in the counterfactuals are adjusted by a factor α, which accounts for developments in nominal levels (e.g. prices, wages) or some other relevant counterfactual benchmark. Price indices appear most appropriate when the aim is to study how people's real living standards have changed, while changes in market incomes are more relevant to understanding shifts in the fiscal balance. In our analysis, we base α on growth in prices (Consumer Price Index, CPI).

The direct effect of *discretionary policy changes* is estimated by simulating each set of policy rules, while keeping gross market incomes and populations characteristics constant (at $t=1$ values in Equation (1)). Discretionary policy changes capture both changes to the structure of the tax-benefit system as well as the effect of statutory uprating of and discretionary changes to monetary parameters, *relative* to α (price growth). Thus, if tax-benefit parameters were changed in line with CPI in practice, our analysis would consider the outcome neutral against our chosen counterfactual benchmark and the measured impact would be zero. If actual tax-benefit parameters were increased slower (faster) than prices, tax liabilities would go up (down) due to bracket creep and benefit entitlements would fall (rise) due to benefit erosion. See Paulus *et al.* (2019) for more discussion on the choice of α and its implications for the measured policy effect.

In turn, by keeping tax-benefit policies fixed (at $t=0$ values in Equation (1)), the *other effect* captures changes in (real) market incomes and the characteristics of the population (e.g. employment), including any behavioural response to the tax-benefit changes. We will return to this component in the next subsection and decompose it further to analyse the effect of automatic stabilizers.

Finally, the *nominal effect* in Equation (1) is a pure scaling effect. For scale-invariant measures, e.g. the Gini coefficient, the nominal effect is zero as long as the tax-benefit system is linearly homogeneous[3], i.e. changing the nominal units of market incomes and the tax-benefit parameters simultaneously would not affect the relative position of households in the income distribution.[4] For scale-variant measures, e.g. mean income, the nominal effect is non-zero as long as $\alpha \neq 1$.[5]

The decomposition in equation (1) is path-dependent, meaning that the order of de-composing the effects matters and there are alternative combinations. Building on BC, we derive six strictly symmetrical combinations (permutations) for the three components, whereas they suggested four combinations because of their pairing of the other effect with the nominal effect.[6] Similar to BC, we distinguish between two types of combination: Type

[3] That is, homogeneous of degree one: $d_0(\alpha p_0,\alpha y_0)=\alpha d_0(p_0,y_0)$.

[4] BC argue that tax-benefit systems are approximately linearly homogeneous, showing it explicitly for France and Ireland, and therefore omit the nominal effect as they focus on distributional measures rather than income changes explicitly.

[5] The nominal effect is approximately $(\alpha-1)I[d_0(p_0,y_0)]$ or $(\alpha-1)\cdot 100\%$ in relative terms. Notice also that the *other effect* for decomposing changes in mean disposable income is approximately zero if $\alpha=\bar{y}_1/\bar{y}_0$, i.e. α is based on changes in average market income.

[6] In principle, one could also consider first deflating I_1 (or inflating I_0) and then decomposing the real value of ΔI, as done e.g. in Herault and Azpitarte (2016), but this implies invoking the assumption of linear homogeneity from the very beginning. For example, denote an inflation factor with i and consider $d_1(p_1,y_1)-id_0(p_0,y_0)=d_1(p_1,y_1)-$

I shows the effect of discretionary policy changes conditional on *end-period* market incomes and population characteristics (P_I) and the other effect conditional on *start-period* tax-benefit policies (O_I). Type II presents the effect of discretionary policy changes conditional on *start-period* market incomes/population (P_{II}) and the other effect conditional on *end-period* policies (O_{II}). Distinguishing between Type I and Type II has a clear practical relevance. While full decomposition can only be carried out once household micro-data become available for the whole period (which inevitably occurs with a time lag), Type II assessments for policy effects only require start-period household data and can be carried out before the policy changes have occurred, hence providing the basis for ex ante policy evaluation.

As there is no obvious reason to prefer a particular combination over the others, BC suggest following the Shorrocks–Shapley line of arguments. This essentially implies averaging the marginal contribution of decomposition terms across all combinations. We hence calculate the average effect due to discretionary policy changes, other and nominal effects using all six combinations, distinguishing between scale-variant and scale-invariant measures, defined as $I[\alpha d_t(p_t, y_t)] = \alpha I[d_t(p_t, y_t)]$ and $I[\alpha d_t(p_t, y_t)] = I[d_t(p_t, y_t)]$, respectively. In the following, the observed (baseline) income distributions in $t = 0, 1$ are denoted with $B_t = I[d_t(p_t, y_t)]$ and the counterfactuals as $C_t = I[d_{1-t}(p_{1-t}, \alpha^{1-2t} y_t)]$. Assuming linear homogeneity of the tax-benefit function $d(p, y)$, the average contribution from discretionary policy changes ($\overline{P}$), other effect ($\overline{O}$) and nominal effect ($\overline{N}$), combining Type I and Type II decompositions for *scale-variant measures* are as follows:

$$\overline{P} = \frac{1}{2}[P_I + P_{II}] = \frac{1}{6}\left[\left(\frac{1}{\alpha} + 2\right)(B_1 - \alpha C_1) + (2 + \alpha)\left(\frac{1}{\alpha} C_0 - B_0\right)\right] \tag{2}$$

$$\overline{O} = \frac{1}{2}[O_I + O_{II}] = \frac{1}{6}\left[(2 + \alpha)(C_1 - B_0) + \left(\frac{1}{\alpha} + 2\right)(B_1 - C_0)\right] \tag{3}$$

$$\overline{N} = \frac{1}{2}[N_I + N_{II}] = \frac{\alpha - 1}{6}\left[\frac{2}{\alpha} B_1 + 2B_0 + C_1 + \frac{1}{\alpha} C_0\right] \tag{4}$$

For *scale-invariant measures*, these expressions simplify further and the average effect due to discretionary policy changes ($\overline{P}$) and the average other effect ($\overline{O}$) are (with the average nominal effect being $\overline{N} = 0$):

$$\overline{P} = \frac{1}{2}[B_1 - C_1 + C_0 - B_0] \tag{5}$$

$$\overline{O} = \frac{1}{2}[C_1 - B_0 + B_1 - C_0] \tag{6}$$

For details on the derivation of the effects, see Appendix A.

We also split the impact on the income distribution of discretionary policy changes by benefits and taxes/SIC, estimating their joint distribution. Changes in mean income

$d_0(ip_0, iy_0) = [d_1(p_1, y_1) - d_0(ip_0, y_1)] + [d_0(ip_0, y_1) - d_0(ip_0, iy_0)]$, which is identical to equation (1) but without the nominal effect (if $i = \alpha$). However, linear homogeneity is assumed already in the second step here, while it was not evoked (yet) in equation (1).

can be expressed simply as a sum of (simultaneous) changes to benefit entitlements and tax/SIC liabilities, keeping gross market incomes fixed. For changes in income inequality (Gini coefficient), we quantify changes in the redistributive impact of benefits and taxes, keeping gross market incomes fixed. The redistributive impact of benefits is measured by calculating the difference between the Gini coefficients based on gross market income versus pretax income (gross market income and benefits). The redistributive impact of taxes/SIC is measured by calculating the difference between the Gini coefficients based on pretax income versus net income (pretax income less taxes/SIC).

Decomposing the other effects: market income/population effect vs automatic stabilizers

In addition to the direct effect of policy changes, tax-benefit policies can affect the income distribution through automatic stabilizers. They capture the extent to which changes (shocks) in the distribution of gross market income and population characteristics (e.g. changes to earnings, varying rate of returns to human and financial capital, etc) translate into changes in the distribution of disposable income through automatic adjustments to benefit entitlements and tax/SIC liabilities. We extend the BC decomposition method by decomposing the *other effect*, separating out the changes in market incomes/population characteristics and the automatic stabilization effect of policies.

To show the contribution of automatic stabilizers to the changes in the income distribution, first we need to distinguish between gross and net incomes. Similar to Figari, Paulus and Sutherland (2015), we define $d_t(p_t, y_t) = y_t + f(d_t, p_t, y_t)$ where f denotes net transfers (i.e. benefits less taxes). Using the term for the *other effect* from equation (1), we can rewrite it as

$$\begin{aligned} &I[y_1 + f(d_0, \alpha p_0, y_1)] - I[\alpha y_0 + f(d_0, \alpha p_0, \alpha y_0)] \\ &= I[y_1] + I[f(d_0, \alpha p_0, y_1)] - I[\alpha y_0] + I[f(d_0, \alpha p_0, \alpha y_0)] + \epsilon \end{aligned} \quad (7)$$

where ϵ is a residual term. The automatic stabilization effect (A) can be derived as the difference between the *other effect* and the contribution of market income/population changes, captured here as $M = I[y_1] - [\alpha y_0]$. For exact decomposition (i.e. $\epsilon = 0$), the measure I needs to be additively decomposable by income source (y and f). While this is a straightforward application to some indicators (e.g. mean income), it is not for all functionals of the income distribution such as the Gini coefficient.[7] Hence, our decomposition of changes to mean income unveils the pure contribution of market income/population changes and automatic stabilizers. When we decompose changes in income inequality our decomposition shows the joint effect of the automatic stabilizers and the residual term.[8]

We denote as $B_t^* = I[y_t]$ the observed (baseline) distribution of gross market incomes and population characteristics in $t = 0, 1$ and as $C_t^* = I[\alpha^{1-2t} y_t]$ the counterfactual distribution. For *scale-variant* measures, the market income and population effect (M), averaged across all Type I and II combinations, equals:

[7] Some methods for decomposing inequality measures link the contribution of a given income source to overall income inequality with the inequality of the income source itself, its share in total income and/or correlation with total income (Shorrocks, 1982; Lerman and Yitzhaki, 1985; Silber, 1993).

[8] Callan *et al.* (2018) similarly separate the impact of automatic stabilizers on the Gini coefficient and have a residual term as well.

$$\overline{M}=\frac{1}{2}[M_I+M_{II}]=\frac{1}{6}\left[(2+\alpha)(C_1^*-B_0^*)+\left(\frac{1}{\alpha}+2\right)(B_1^*-C_0^*)\right] \quad (8)$$

and the average effect of automatic stabilizers:

$$\overline{A}=\frac{1}{2}[A_I+A_{II}]=\frac{1}{6}\left[(2+\alpha)(C_1-B_0-(C_1^*-B_0^*))+\left(\frac{1}{\alpha}+2\right)(B_1-C_0-(B_1^*-C_0^*))\right] \quad (9)$$

For *scale-invariant* measures, the average market income/population effect is

$$\overline{M}=\frac{1}{2}\left[C_1^*-B_0^*+B_1^*-C_0^*\right] \quad (10)$$

and the average effect due to automatic stabilizers is

$$\overline{A}=\frac{1}{2}\left[C_1-B_0-(C_1^*-B_0^*)+B_1-C_0-(B_1^*-C_0^*)\right] \quad (11)$$

For details on the derivation of the effects, see Appendix A.

Furthermore, we break down the change in mean incomes and inequality due to automatic stabilizers by benefits and taxes/SIC. For changes in mean income, we estimate the automatic change to benefit entitlements and tax/SIC liabilities. As with discretionary policy changes, we make use of different income concepts to quantify their contribution to income inequality: gross market income, pretax income and net income.

Finally, standard errors are provided for the change in mean incomes based on Taylor approximations and for the change in income inequality measured by the Gini coefficient by bootstrapping the micro-data samples 1,000 times.

3. Data and the tax-benefit model EUROMOD

The household survey data come from the European Union Statistics on Income and Living Conditions (EU-SILC) and, for the UK, from the Family Resources Survey (FRS). Both surveys are purpose-built income surveys. For most countries, we use SILC waves for 2008 and 2015 (with income reference periods 2007 and 2014) and for the UK FRS waves for 2008/09 and 2014/15 incomes, i.e. the most recent waves available at the time of writing. Due to data availability, income reference years are 2011 and 2014 for Croatia; 2007 and 2013 for Germany; 2008 and 2014 for Malta; and 2006 and 2014 for France. The data are cross-sectional and contain rich information on household and individual incomes and characteristics for a nationally representative sample of households. The data collection and production of EU-SILC in the EU member states have been made as consistent as possible to enable cross-country comparative analyses.

For baseline (counterfactual) simulations, we apply tax-benefit policies – structure and parameters – from one period to the household data on gross market incomes and population characteristics from the same (another) period. This is done by combining the household data with the EU-wide tax-benefit model EUROMOD, which contains information on the tax-benefit rules in a specific period for a given country. The model reads the household survey data and based on the information in the data, it identifies who should pay an income tax/SIC or receive a benefit (e.g. the family or individual), and how much needs to be paid in taxes/contributions and received in benefit entitlements. The model then combines the information on gross market incomes from the household data with the calculated tax liabilities and cash benefit entitlements to derive household net incomes. Similar to the household data, EUROMOD simulations have been made as consistent as possible across all countries for the purpose of cross-country comparative research.

EUROMOD simulation results for each policy year included in the model are validated extensively against administrative data on benefit recipients/tax payers and benefit spending/tax revenues. Tax-benefit simulation routines (e.g. assumptions or limitations), data imputations and validation of the results are documented in detail in Country Reports made available online.[9] In addition, comparative summary reports containing validation and discussion of EUROMOD baseline distributional statistics are published on an annual basis.[10] EUROMOD has been used extensively to address various economic and social policy research questions, see Sutherland and Figari (2013); Figari *et al.* (2015) for literature reviews. In particular, the need for a comparative micro-simulation model for decomposing changes in the income distribution has made EUROMOD an invaluable tool in the related literature.

We deal with cash household net incomes which comprise the sum of gross market incomes (earnings, self-employment income, investment income, income from rent and private transfers), pensions, means-tested and non-means-tested benefits net of personal income taxes and employee and self-employed SIC. Means-tested, universal and some contributory insurance-based benefits as well as direct income taxes and contributions are calculated by EUROMOD while information on the rest of incomes is taken from the household data. Although public pensions are not simulated (due to insufficient information on contributory history in the data), the policy change is approximated through the official indexation factor used by governments to adjust nominally pension amounts over time. In absence of large compositional changes in the population (the period we consider is relatively short), the indexation factor serves as a good proxy for the policy change. In our analysis of distributional changes, the remaining changes in pension amounts such as those due to changing pension age – not captured through indexation – is included in the component of ‘market income/population effect’.

In cases where there is evidence for benefit non-take-up or tax non-compliance, the simulation results are adjusted to account for it. Adjustments are done for benefit non-take-up in Belgium, Estonia, Finland, France, Greece, Ireland, Latvia, Poland, Portugal, Romania and the UK; and for tax non-compliance in Bulgaria, Greece, Italy and Romania (see Appendix B).

The analysis is based on household equivalized incomes. Incomes are equivalized based on the assumptions that individuals share resources equally with other household members and economies of scale occur within the household. Incomes are adjusted by the modified OECD equivalence scale, assigning a value of 1 to the head, 0.5 for each other individual aged $>=14$ and 0.3 for each individual aged <14.

[9] https://www.euromod.ac.uk/using-euromod/country-reports

[10] For the latest issues, see Tammik (2018); EUROMOD (2018). The latter report relies on a EUROMOD tool, which was developed as part of this paper.

4. Results

Changes in mean incomes

The changes to net incomes between 2007 and 2014 are decomposed into the changes due to discretionary policies, automatic stabilizers, changes to gross market incomes and population characteristics as well as the nominal effect. Using the CPI-based benchmark indexation factor, the latter component reflects how prices developed and allows other components to be interpreted in real terms. In the first step, we consider the combined effect of automatic stabilizers and changes to gross market incomes and population characteristics, labelled as 'other effect' in Bargain and Callan (2010). We then extend the standard decomposition approach by distinguishing between the two subcomponents.

While average net incomes increased in nominal terms in the majority of countries, real incomes fell in half of countries and rose in the other half, with the change ranging from −37.8% (Greece) to +33.2% (Bulgaria) – see Table 1. The nominal effect is not shown here as it corresponds closely to the CPI reported in Table C.1 (Appendix C).[11] Figure 1 further ranks countries by the real change in mean household net incomes (black circle). Some of these changes are very substantial and it is remarkable that the extremes occurred in neighbouring countries. Among the countries experiencing a drop in real income were the ones hit badly by the crisis in the late 2000s such as Southern European countries, Ireland and Latvia, while the countries with the highest real income growth include some Eastern European countries as well as Malta, France and Sweden.

Decomposing the total change, our decomposition clearly reveals that changes in average incomes in this period have been driven by market incomes and population changes (white and dark blue bars combined in Figure 1). Furthermore, countries are roughly split by whether changes in market incomes and population characteristics and discretionary policy effects (light blue bars) made a positive or negative contribution to household incomes on average. The two effects went in the same direction in almost all countries, in other words, discretionary policies largely reinforced market and population dynamics. The positive relationship between the two components at the country level suggests that in the cases where economic conditions were favourable – i.e. incomes were growing due to 'other effects' – governments' tax-benefit policies boosted household disposable incomes as well. In contrast, countries experiencing economic contraction implemented fiscal consolidation measures, which squeezed further household budgets. Of course, such a positive correlation is expected at least in the long-term as governments ought to balance their budgets over the business cycle. We return to this point below.

Our results for discretionary policy changes are consistent with those by De Agostini *et al.* (2016). Focusing on policy changes only, they show further that Southern European countries implemented fiscal consolidation measures in both the crisis period (2008–11) as well as in the aftermath (2011–14), reinforcing the drop in mean incomes. On the other hand, they show that the large rise in incomes due to discretionary policy changes in Bulgaria, Sweden, Poland and Denmark was due to fiscal stimulus measures being implemented in both periods.

[11] The sum of all components together with the nominal effect corresponds to the total nominal change in incomes.

TABLE 1

Decomposition of the percentage change in mean household net income

	Total change	*Market income/ population effect*	*Discretionary policy changes*	*Automatic stabilizers*
AT	−0.705	1.206	−2.130***	0.219
	(0.808)	(1.517)	(0.025)	(0.728)
BE	2.471***	0.637	1.565***	0.270
	(0.703)	(1.406)	(0.037)	(0.740)
BG	33.188***	20.127***	17.427***	−4.366***
	(1.747)	(2.099)	(0.179)	(0.543)
CY	−19.106***	−21.445***	−2.767***	5.106***
	(1.045)	(1.377)	(0.060)	(0.387)
CZ	3.006***	0.343	3.226***	−0.563
	(0.664)	(1.004)	(0.035)	(0.387)
DE	1.718**	−2.929**	1.559***	3.088***
	(0.615)	(1.108)	(0.028)	(0.538)
DK	5.876***	0.289	7.035***	−1.447
	(0.908)	(1.977)	(0.044)	(1.153)
EE	14.648***	16.468***	0.997***	−2.818***
	(1.395)	(1.805)	(0.036)	(0.432)
EL	−37.844***	−40.971***	−10.028***	13.155***
	(0.581)	(0.878)	(0.072)	(0.303)
ES	−7.358***	−7.399***	−2.993***	3.033***
	(0.606)	(0.881)	(0.019)	(0.306)
FI	1.753**	0.546	1.098***	0.110
	(0.676)	(1.087)	(0.020)	(0.465)
FR	15.750***	24.782***	−1.469***	−7.563***
	(0.891)	(1.527)	(0.050)	(0.664)
HR	−2.115**	0.749	−1.010***	−1.853***
	(0.808)	(1.289)	(0.014)	(0.539)
HU	−3.413***	−0.867	−2.039***	−0.507
	(0.758)	(1.303)	(0.123)	(0.708)
IE	−17.145***	−12.355***	−8.512***	3.723***
	(0.802)	(1.582)	(0.066)	(0.796)
IT	−15.179***	−22.803***	1.063***	6.561***
	(0.463)	(0.768)	(0.054)	(0.328)
LT	5.802*	0.997	4.449***	0.357
	(2.338)	(3.109)	(0.114)	(0.909)
LU	−1.393	0.006	−1.479***	0.080
	(1.162)	(2.034)	(0.042)	(0.897)
LV	−5.795***	−10.080***	0.396***	3.889***
	(1.382)	(1.793)	(0.058)	(0.526)
MT	23.448***	26.226***	0.743***	−3.520***
	(1.315)	(1.925)	(0.047)	(0.744)
NL	−2.123**	−7.176***	1.328***	3.725***
	(0.750)	(1.332)	(0.024)	(0.627)
PL	18.244***	13.099***	10.790***	−5.645***
	(0.812)	(1.167)	(0.054)	(0.413)
PT	−11.489***	−7.699***	−6.627***	2.837***
	(1.016)	(1.633)	(0.066)	(0.642)

(*continued*)

TABLE 1

Continued

	Total change	*Market income/ population effect*	*Discretionary policy changes*	*Automatic stabilizers*
RO	15.603***	9.993*	11.807***	−6.198***
	(4.322)	(4.762)	(0.688)	(1.140)
SE	16.980***	16.566***	7.117***	−6.703***
	(0.715)	(1.230)	(0.033)	(0.574)
SI	−2.774***	−4.560***	−0.071**	1.857***
	(0.517)	(0.900)	(0.025)	(0.423)
SK	23.103***	25.401***	4.530***	−6.828***
	(0.739)	(1.089)	(0.083)	(0.403)
UK	−4.658***	−8.859***	0.215**	3.986***
	(1.252)	(2.116)	(0.067)	(0.928)

Notes: Standard errors are calculated based on Taylor approximations. Significance levels indicated as $*P<0.1$, $**P<0.05$, $***P<0.01$. Income changes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

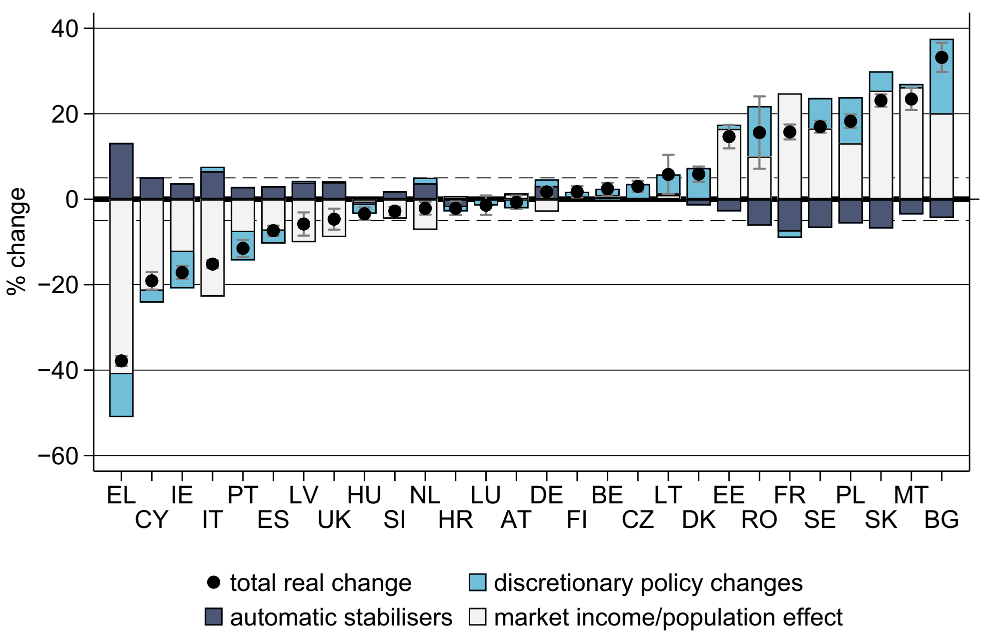

Figure 1. Decomposition of the percentage change in mean net income: discretionary policy changes vs automatic stabilizers.
Notes: Countries are ranked by the total real change in equivalized household net incomes. Income changes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia. 95% of confidence intervals are shown.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

Moving on to automatic stabilizers, in progressive tax-benefit systems, such as the ones in the EU countries, a shock to gross market incomes should be smoothed by fiscal policies. Confirming this, in all countries automatic stabilizers (Table 1 and dark blue bars in Figure 1) worked in the opposite direction to the market income/population effect. Thus, in countries where average gross market incomes fell, part of the negative shock was offset by automatic increases in benefit entitlements and reductions in tax liabilities and social insurance contributions (SIC); conversely, gains in gross market incomes were lowered through automatic reductions to benefits and increases in taxes/SIC. This can be seen more clearly in Figure 2, plotting the automatic stabilization effect and discretionary policy changes against the market income and population effect. More than half of countries are situated in the left upper section of the left panel in Figure 2, highlighting the importance of the tax-benefit system in cushioning the adverse income shocks households endured in the crisis. We estimate a correlation of −0.95 between the effect of automatic stabilizers and the market income/population effect across countries.

The correlation between discretionary policy changes and changes in gross market income and population characteristics is 0.6 (right panel of Figure 2). This reflects governments' resource constraints in broad terms (as already briefly discussed above). However, the result only relates to cash benefits and taxes/SIC affecting household disposable incomes directly. It is conceivable that governments may have counterbalanced these effects through other means, in particular, through adjusting spending on social protection in-kind and public services like health and education as well as changes to indirect taxation. To check that, we have plotted our measure of discretionary (cash) policy changes against these four items (Figure D.1 in Appendix D). We use Eurostat data available on total government spending on social protection in-kind, health and education and calculate changes in spending per capita between 2007 and 2014 in 2007 incomes, as a percentage of per capita disposable income estimated with EUROMOD. The effects of changes to indirect taxation are limited to changes in standard VAT rates, which we approximate by

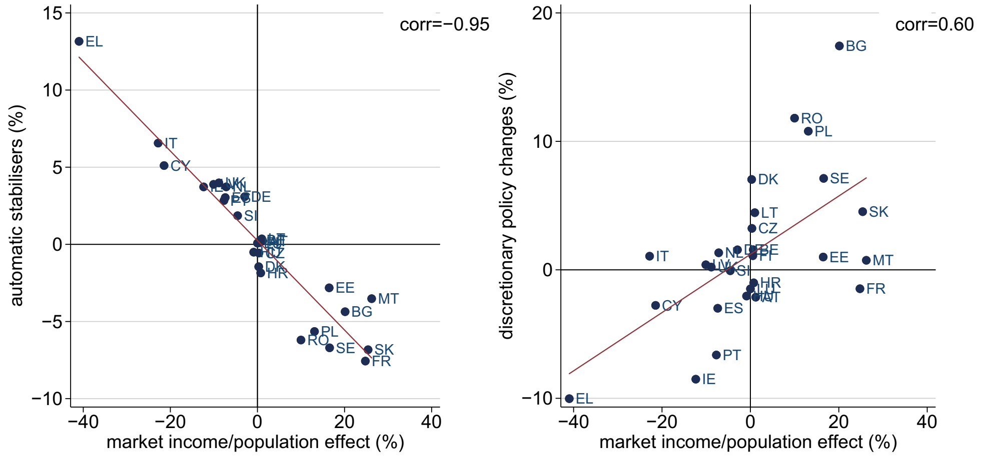

Figure 2. Correlation of automatic stabilizers and discretionary policy changes with the market income/population effect.

Notes: The vertical axis shows the % change in mean net income due to automatic stabilizers or discretionary policy changes. The horizontal axis shows the % change in mean net income due to the market income/population effect. Changes to incomes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.

Source: Own calculations with EUROMOD and EU-SILC/FRS.

assuming that all income is spent on goods and services subject to the standard rate of VAT. We find that the correlation with all four items is positive (stronger in the case of spending measures), suggesting that across countries changes in these policy measures complemented rather than offset the effects of discretionary cash policies.

As such, the positive correlation between discretionary policy changes and the market income/population effect (right panel of Figure 2) shows that when the economy grows, governments have more financial resources at their disposal, through larger tax revenues, and so, they increase their spending overall. However, this result should not be interpreted as evidence for pro-cyclical policy changes, in the sense that the net public spending (benefit spending net of tax revenues) increases (decreases) faster than the economy grows (contracts). To understand how the structural balance of governments' finance varies with the business cycle, we need to measure the effect of policy changes viz-a-viz growth in the economy. We do this by estimating the policy effects *relative to* the growth in mean gross market incomes (labelled as Market Income Index or MII). For policy actions to be fiscally neutral towards household disposable incomes, the net contribution of benefits and taxes to household disposable incomes on average should remain constant over time (as a share of total income). A rising share of benefits would mean that policies have become more generous, while a declining share would reflect fiscal tightening. Figure D.2 in Appendix D plots discretionary policy changes (assessed with MII) against changes in gross market incomes (assessed with CPI) – our proxy for economic growth excluding the effect of policy measures – revealing a weak negative correlation. This suggests that changes in fiscal balances due to direct taxes and cash benefits were, if anything, counter-cyclical.

Changes in mean incomes by policy instruments and income decile groups

The impact on incomes due to discretionary policy changes and automatic stabilizers is further decomposed by benefits and taxes/SIC policies (Figure 3). It clearly shows that automatic responses were mainly realized through taxes and SIC and, on average, benefits played only a modest part. Furthermore, changes to net income due to taxes/SIC as automatic stabilizers were negatively associated with changes to market incomes/population characteristics (correlation of −0.96), while there was effectively no correlation between the stabilization response of benefits and market income/population changes (−0.1) (Figure D.3 in Appendix D). On the other hand, the composition of discretionary policy actions was more balanced and most of the income gains were due to benefits (Figure 3). Unlike with automatic stabilizers, the correlation between discretionary policy changes and the market income/population effect was stronger in the case of benefits compared to taxes/SIC (cf. Figure D.4 in Appendix D). Detailed results on the decomposition of changes to mean incomes can be found in Table D.1 in Appendix D.

We also examine how similar are the impacts of fiscal policies and shocks to the economy on household incomes across the income distribution. We find that the patterns of total change in incomes varied greatly and were neither continuously progressive nor regressive in majority of cases (Figure D.5 in Appendix D). We repeat the decomposition by income decile groups in each country. The effect of discretionary policy changes was pro-poor in most countries, with Hungary and Denmark as the main exceptions (Figure D.6 in Appendix D). In these two countries, the richest income decile groups benefited relatively

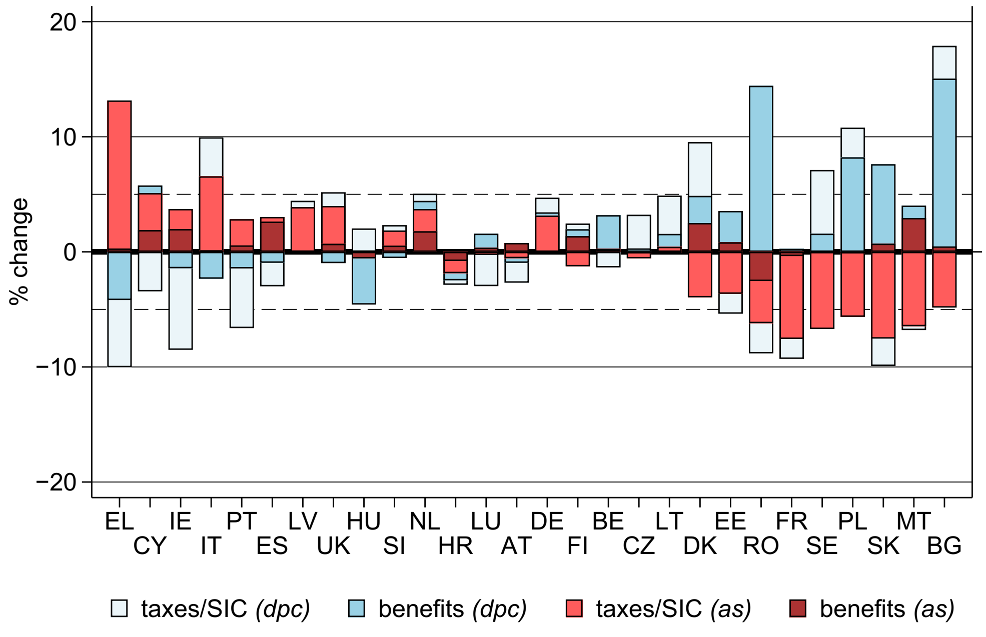

Figure 3. Decomposition of the percentage change in mean net income by type of policy instrument.
Notes: dpc=discretionary policy changes; as=automatic stabilizers. The total change and market income/population effect are omitted. Changes to incomes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

more than households in the rest of the distribution through the introduction of a flat income tax (Hungary) and a reduction in tax rates (Denmark). Overall, changes to taxes and SIC had a mixed effect on the income distribution. On the other hand, policy changes to benefits tended to be pro-poor and resulted mainly in income gains across the distribution. There were exceptions where benefit cuts and/or deterioration in the real value of benefits led to income losses, mostly born by the poorer (in Croatia, Germany, Hungary, Ireland, Portugal and the UK). With the exception of Greece, the indexation of public pensions – generally higher than price inflation – was clearly pro-poor across countries, leading to larger relative income gains at the bottom than at the top of the distribution. In Greece, pension cuts led to larger income losses at the bottom and middle than the top of the distribution.

Benefits as automatic stabilizers responded to market income and population changes primarily at the bottom part of the distribution (Figure D.7 in Appendix D). This is not surprising as many benefits in the EU countries are means-tested and targeted by design at lower-income households. Insurance-based unemployment benefits are also designed to respond to losses in earnings and the latter could push individuals towards the bottom of the distribution. As in many countries households at the bottom saw their market incomes falling, benefits automatically cushioned part of the income loss making their contribution to income changes mostly progressive. Although the impact on the population-mean income of benefits was small in most countries, they contributed to substantial income gains among poorer households (e.g. of more than 5% for the bottom decile in Belgium, Bulgaria, Cyprus, Germany, Estonia, Greece, Finland, France, Lithuania, Latvia, Malta, Portugal and

Slovakia). Nevertheless, across all income decile groups we estimate a weak correlation between changes in gross market incomes and the stabilization response of benefits.[12] This suggests that benefits are more responsive than taxes/SIC to changes in the population characteristics, which may not be fully visible in changes to market incomes. For instance, universal benefits would not provide any stabilization towards income shocks per se but they could reduce income fluctuations which result from changes to household characteristics. An example is the entitlement to universal child benefits in the presence of a child in the household.

In the middle and top of the distribution, income taxes had the biggest stabilization response, which was regressive in some and progressive in other countries. Where market incomes fell throughout most of the income distribution, the automatic stabilization response was regressive as households from the middle/top benefited more than the bottom from the reductions in taxes (in Germany, Greece, Ireland, Italy, Latvia, the Netherlands, Portugal and the UK). In other countries, increases in gross market incomes at the top of the distribution were mitigated by increases in taxes, making their contribution progressive (in Bulgaria, Denmark, Estonia, Spain, France, Malta and Sweden) (Figure D.7 in Appendix D).

Across all income decile groups, with the exception of the bottom one, market income and population changes were strongly and negatively correlated with the stabilization response of income taxes.[13] As the income tax schedule – whether progressive or flat – includes a tax free allowance in all EU countries, households from the bottom decile group pay no or very little taxes as a share of their income.[14] Therefore, income taxes are less responsive to changes in market incomes at the bottom than middle or top of the distribution.

Similarly, we find that SIC as automatic stabilizers are less strongly correlated with changes in market incomes in the bottom decile (estimate of −0.43).[15] Furthermore, we estimate a weaker correlation (of −0.69) for the top decile group than for the preceding eight decile groups, which can be due to a higher share of unearned private income and the presence of the upper limit on the contribution base in most countries. With the latter, if earnings are above the maximum threshold, SIC are levied on the maximum instead of actual earnings, making them non-responsive to changes in earnings in this income range. In the rest of the income distribution, the automatic response of SIC to market income changes was similar in relative terms as SIC are usually levied as a flat rate on earnings (Figure D.7 in Appendix D). The distributional changes are further summarized in the next section.

[12] Our estimates vary between 0 and −0.27 for all income decile groups, apart from the fourth decile group where the correlation is estimated at −0.48.

[13] Our estimate is −0.33 for the first decile group, −0.71 for the second and varies between −0.78 and −0.91 for the rest of the distribution.

[14] After the flat tax reform of 2008, only in Bulgaria individuals start paying income taxes from the first unit of income they earn. However, there are several tax deductions (e.g. for families with children) that act as a tax free allowance for certain household types. Furthermore, our decomposition results show that the stabilization response averaged over the 2007 and 2014 policies and thus they reflect the combined response of the progressive (2007) and flat (2014) tax schedule.

[15] For decile groups 2-9, we estimate a correlation between −0.71 and −0.88.

Changes in income inequality

After studying changes along the income distribution, we turn to income inequality measured by the Gini coefficient. Figure 4 ranks the EU-28 countries by the inequality change between 2007 and 2014 and decomposes it into the same components as previously. Inequality changes ranged from −2.7% points (Latvia) to +5.1% points (Cyprus), increasing roughly in about half of the countries and decreasing in the rest, though the overall changes in inequality are relatively small and not statistically significant in many cases.

However, the way different factors contributed to the total change in the Gini was remarkably similar across countries. First, changes to the distribution of market incomes and population characteristics raised income inequality in nearly all countries (and were statistically significant in more than a third), with the change reaching 8.4% points in Cyprus. Second, our results show that what helped to offset (part of) these increases was the tax-benefit system. Consistent with the previous literature on discretionary policy changes (e.g. De Agostini *et al.*, 2016; Bargain *et al.*, 2017; Paulus *et al.*, 2019), we find that, albeit small in size, they lowered inequality in almost all countries. De Agostini *et al.* (2016) show that in most EU countries inequality fell due to discretionary policy changes in the crisis years (2008-11) as well as in its aftermath (2011-14). In addition, our results show that countries where inequality fell (Figure 4) were not only those where the welfare state expanded but also included those which implemented fiscal consolidation (Figure 1).

Moving to the effect of automatic stabilizers, we can establish that they had a statistically significant impact in about half of the countries, lowering inequality in most of them

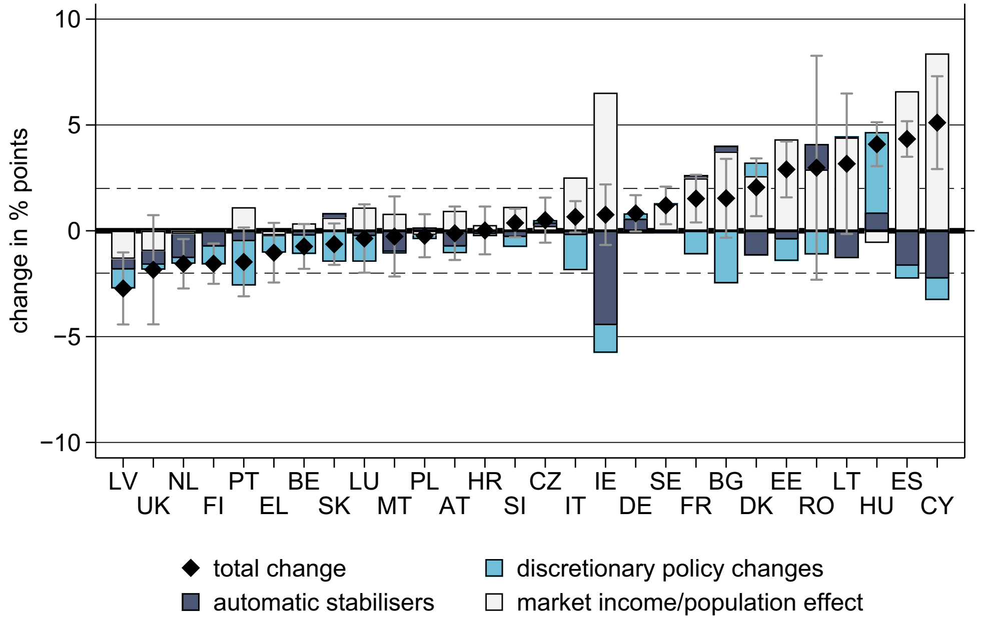

Figure 4. Decomposition of the change in the Gini coefficient.
Notes: Countries are ranked by the total change in the Gini coefficient. Changes to incomes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

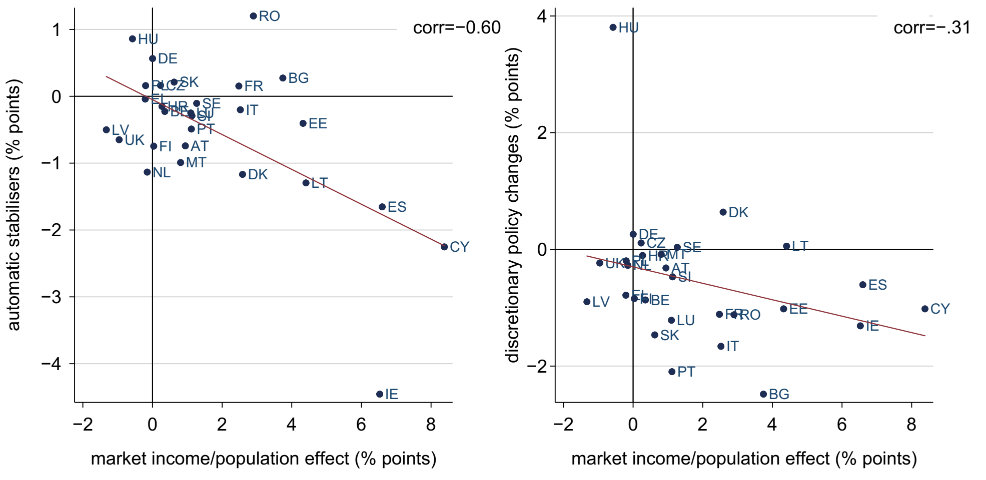

Figure 5. Correlation of automatic stabilizers and discretionary policy changes with the market income/population effect.
Notes: The vertical axis shows the % points change in the Gini coefficient due to automatic stabilizers or discretionary policy changes. The horizontal axis shows the % points change in the Gini due to the market income/population effect. Changes to incomes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

(Figure 4). We find a negative correlation between automatic stabilizers and the gross market income/population effect (see the left graph of Figure 5). However, this correlation is not as strong as with changes in mean incomes. This is expected as automatic stabilizers are foremost a tool for *income stabilization* and not designed to directly react to changes in the *distribution* of incomes but income changes at the individual level. Hence, the sign of the relationship between automatic stabilizers and income inequality is ambiguous *a priori*. In a few countries, the direction of inequality change due to automatic stabilizers was the same as for the change due to the market income/population effect (Latvia, UK, Slovakia, France, Bulgaria and Romania).[16]

Next, we break down discretionary policy changes and automatic stabilizers by benefits and taxes/SIC (Figure 6). We find that the inequality reduction due to policy changes was achieved mainly with benefits. In comparison, Callan, Doorley and Savage (2018) analysing the Southern EU countries (Greece, Italy, Portugal and Spain) and Ireland, find small or no changes to the Gini due to benefit changes, which is also consistent with our results for these countries. In about a third of the EU countries, the inequality-reducing impact of benefit changes was enhanced by tax/SIC changes. In a dozen countries, it offset the rise in inequality due to tax changes, e.g. due to the introduction of a flat tax in Bulgaria or reduction in top marginal tax rates in Denmark. Moreover, in the countries where benefit changes raised income inequality this was (at least partly) the result of erosion in the real value of benefits as their growth lagged behind growth in prices (e.g. in Germany, Hungary, Ireland and the UK).

[16] It is also possible that compared to household net incomes, the effect of automatic stabilizers on inequality is measured less precisely due to the residual term discussed in Section II. However, the fact that our main conclusions for changes to mean incomes and inequality are similar, suggests that the residuals have no critical role.

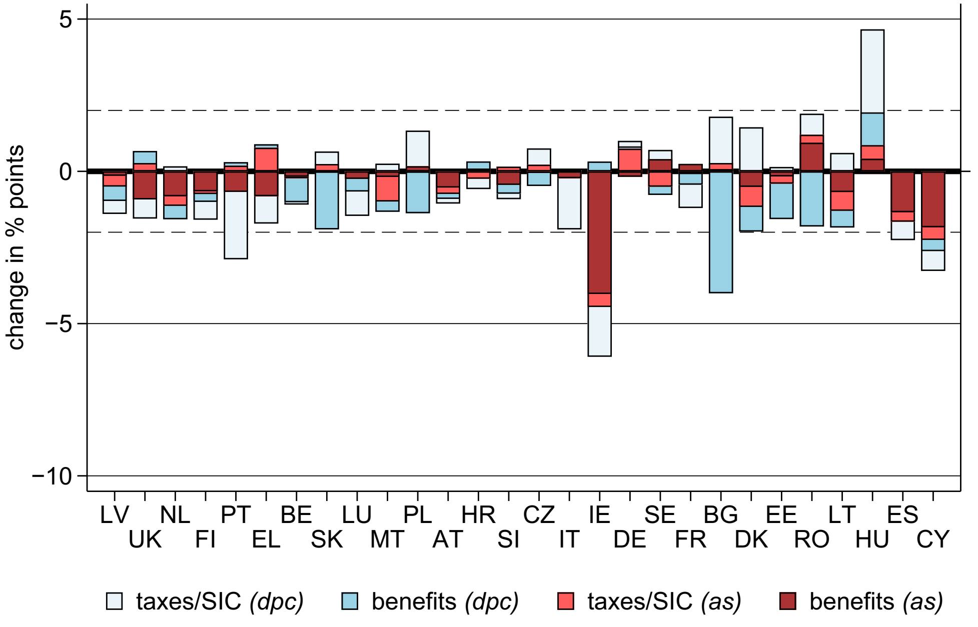

Figure 6. Decomposition of the change in the Gini coefficient by type of policy instrument.
Notes: dpc=discretionary policy changes; as=automatic stabilizers. The total change and market income/population effect are omitted. Changes to incomes are estimated in real terms. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

In their role as automatic stabilizers, benefits also reduced inequality in more countries than taxes/SIC did. They were the main stabilising source among the Southern EU countries and Ireland, consistent with the analysis by Callan *et al.* (2018) for these countries. At times when market incomes of the poor fall, means-tested benefits, at least partly, mitigate their losses. Increases in the unemployment rate, which are linked to an increase in the share of low-income households, triggers a similar response from insurance-based unemployment benefits. Such provision of pro-poor income stabilization contributes towards narrowing the gap between the rich and the poor. However, it also means that when market incomes of the poor grow, benefit withdrawals would lower these gains, increasing the disparity between the bottom and the top of the distribution. How the response of benefits to changes in population characteristics impacts the income distribution is convoluted and depends on the type of population changes and where they occur along the distribution.

For income taxes, their distributional impact as automatic stabilizers generally depends on the size and direction of the income shock across the distribution, the progressivity of the tax schedule and the concentration of people across the tax schedule. Finally, the distributional impact of SIC as automatic stabilizers is more limited as in most countries a flat rate is applied on labour earnings.[17] Detailed results on the decomposition of changes to the Gini can be found in Table 2.

[17] We estimate a weak and positive correlation of +0.1 between the impact of SIC as automatic stabilizers and the market income/population effect, on the Gini. In comparison, for the automatic stabilization effect of taxes and benefits on the Gini, our estimates yield a correlation of −0.48 and −0.53, respectively, with the market income and population effect.

TABLE 2

Decomposing the (% points) change in the Gini coefficient

	Total change	Market income/ population effect	Discretionary policy changes			Automatic stabilizers		
			Benefits	Taxes/SIC	Total	Benefits	Taxes/SIC	Total
AT	−0.117	0.943	−0.163***	−0.156***	−0.319***	−0.533*	−0.208	−0.742*
	(0.644)	(0.856)	(0.025)	(0.020)	(0.038)	(0.239)	(0.181)	(0.338)
BE	−0.739	0.354	−0.787***	−0.080***	−0.867***	−0.177	−0.050	−0.227
	(0.540)	(0.709)	(0.024)	(0.019)	(0.033)	(0.116)	(0.201)	(0.250)
BG	1.535	3.744***	−4.004***	1.523***	−2.481***	0.073	0.200	0.273
	(0.950)	(0.978)	(0.073)	(0.037)	(0.086)	(0.141)	(0.122)	(0.203)
CY	5.110***	8.382***	−0.368***	−0.651***	−1.019***	−1.837***	−0.416	−2.253***
	(1.119)	(1.268)	(0.058)	(0.032)	(0.073)	(0.173)	(0.257)	(0.325)
CZ	0.503	0.231	−0.426***	0.536***	0.110**	−0.055	0.218	0.163
	(0.543)	(0.674)	(0.022)	(0.027)	(0.036)	(0.187)	(0.129)	(0.235)
DE	0.826	0.003	0.077***	0.182***	0.259***	−0.179	0.743***	0.564*
	(0.437)	(0.551)	(0.015)	(0.020)	(0.027)	(0.164)	(0.135)	(0.221)
DK	2.056**	2.586*	−0.811***	1.449***	0.638***	−0.510	−0.658**	−1.168*
	(0.697)	(1.011)	(0.022)	(0.035)	(0.040)	(0.389)	(0.240)	(0.472)
EE	2.899***	4.323***	−1.164***	0.145***	−1.019***	−0.169	−0.236**	−0.405**
	(0.674)	(0.705)	(0.025)	(0.009)	(0.029)	(0.089)	(0.082)	(0.126)
EL	−1.035	−0.208	0.114*	−0.900***	−0.785***	−0.817***	0.775***	−0.042
	(0.719)	(0.750)	(0.048)	(0.051)	(0.077)	(0.077)	(0.135)	(0.158)
ES	4.337***	6.597***	−0.004	−0.603***	−0.606***	−1.342***	−0.312**	−1.654***
	(0.429)	(0.504)	(0.012)	(0.009)	(0.016)	(0.124)	(0.107)	(0.173)
FI	−1.554**	0.036	−0.258***	−0.586***	−0.844***	−0.656***	−0.090	−0.746***
	(0.486)	(0.539)	(0.011)	(0.010)	(0.015)	(0.153)	(0.121)	(0.216)
FR	1.520**	2.480**	−0.347***	−0.766***	−1.113***	0.246	−0.093	0.153
	(0.574)	(0.768)	(0.017)	(0.032)	(0.038)	(0.192)	(0.216)	(0.289)
HR	0.016	0.273	0.235***	−0.340***	−0.105***	0.092	−0.243	−0.151
	(0.576)	(0.760)	(0.012)	(0.010)	(0.017)	(0.253)	(0.196)	(0.337)
HU	4.090***	−0.575	1.077***	2.728***	3.805***	0.412*	0.448	0.860*
	(0.529)	(0.690)	(0.055)	(0.079)	(0.098)	(0.183)	(0.333)	(0.390)
IE	0.760	6.526***	0.324***	−1.634***	−1.310***	−4.028***	−0.428	−4.456***
	(0.729)	(1.115)	(0.035)	(0.046)	(0.058)	(0.570)	(0.281)	(0.660)

(*continued*)

TABLE 2

Continued

	Total change	Market income/ population effect	Discretionary policy changes: Benefits	Discretionary policy changes: Taxes/SIC	Discretionary policy changes: Total	Automatic stabilizers: Benefits	Automatic stabilizers: Taxes/SIC	Automatic stabilizers: Total
IT	0.660	2.523***	0.022	−1.683***	−1.662***	−0.224***	0.023	−0.202
	(0.378)	(0.436)	(0.013)	(0.076)	(0.077)	(0.049)	(0.096)	(0.113)
LT	3.167	4.408*	−0.550***	0.605***	0.055	−0.682**	−0.614***	−1.296***
	(1.693)	(1.729)	(0.060)	(0.047)	(0.085)	(0.238)	(0.152)	(0.315)
LU	−0.363	1.101	−0.415***	−0.800***	−1.215***	−0.247	−0.003	−0.250
	(0.823)	(1.056)	(0.020)	(0.025)	(0.037)	(0.291)	(0.208)	(0.381)
LV	−2.724**	−1.325	−0.472***	−0.426***	−0.898***	−0.146	−0.355*	−0.501*
	(0.869)	(0.854)	(0.028)	(0.027)	(0.041)	(0.121)	(0.145)	(0.210)
MT	−0.269	0.807	−0.338***	0.253***	−0.085	−0.185	−0.806***	−0.991
	(0.966)	(1.229)	(0.039)	(0.016)	(0.047)	(0.440)	(0.216)	(0.506)
NL	−1.559**	−0.151	−0.441***	0.166***	−0.274***	−0.819***	−0.315	−1.134***
	(0.595)	(0.716)	(0.016)	(0.021)	(0.023)	(0.201)	(0.167)	(0.270)
PL	−0.235	−0.197	−1.369***	1.173***	−0.197***	0.166**	−0.007	0.160
	(0.519)	(0.568)	(0.031)	(0.022)	(0.034)	(0.064)	(0.101)	(0.124)
PT	−1.471	1.116	0.117**	−2.214***	−2.097***	−0.675***	0.185	−0.490
	(0.829)	(0.956)	(0.043)	(0.048)	(0.070)	(0.165)	(0.225)	(0.272)
RO	2.979	2.898	−1.813***	0.692***	−1.121***	0.939***	0.262	1.201***
	(2.699)	(2.301)	(0.322)	(0.030)	(0.338)	(0.212)	(0.159)	(0.277)
SE	1.198**	1.269*	−0.269***	0.305***	0.035	0.400**	−0.506**	−0.106
	(0.453)	(0.633)	(0.010)	(0.020)	(0.022)	(0.130)	(0.195)	(0.252)
SI	0.371	1.133*	−0.292***	−0.179***	−0.471***	−0.444***	0.153	−0.291
	(0.343)	(0.463)	(0.022)	(0.014)	(0.029)	(0.109)	(0.150)	(0.187)
SK	−0.632	0.622	−1.879***	0.413***	−1.466***	−0.029	0.240	0.212
	(0.499)	(0.660)	(0.032)	(0.056)	(0.065)	(0.185)	(0.151)	(0.244)
UK	−1.840	−0.956	0.397***	−0.631***	−0.234***	−0.922***	0.272	−0.650*
	(1.316)	(1.521)	(0.024)	(0.065)	(0.071)	(0.208)	(0.331)	(0.330)

Notes: Bootstrapped standard errors after 1,000 replications. Significance levels indicated as *$P<0.1$, **$P<0.05$, ***$P<0.01$. The reference period is 2007–14 for nearly all countries and 2011–14 for Croatia.
Source: Own calculations with EUROMOD and EU-SILC/FRS.

5. Conclusions

Tax-benefit policies can affect the income distribution through two main channels: discretionary policy changes and automatic stabilizers. Although a large body of literature analyses the impact of tax-benefit policy changes on household incomes, little is known about the link between automatic stabilizers and the income distribution. We contribute to the literature by studying in detail the contribution of automatic stabilizers and discretionary policy changes to income changes in the EU countries between 2007 and 2014.

We find that, first, discretionary policy changes raised incomes on average in about two thirds of countries and lowered them in the remaining third. In comparison, on average automatic stabilizers – responding to changes to market incomes and population characteristics – led to income gains in about a third, losses in another third of countries and no statistically significant changes in the remaining third. In terms of income inequality, discretionary policy changes lowered it in more than two-thirds of countries. Progressive policy changes were implemented not only in countries where the welfare state expanded in size but also in countries, which implemented fiscal consolidation measures in the economic downturn. Automatic stabilizers had a statistically significant impact on inequality in about half of countries, lowering inequality in most of them.

Second, discretionary policy changes to benefits – by increasing their level – and the automatic stabilization response of benefits – mostly to income losses at the bottom of the distribution – were the main instruments raising the incomes of low-income households and narrowing the gap between rich and poor. Policy changes to and the automatic stabilization response of taxes/SIC had a mixed effect on the income distribution of the EU countries. While we find that changes in net income due to the stabilization response of taxes/SIC were negatively associated with changes to market incomes and population characteristics, the correlation between the latter and the stabilization response of benefits was much weaker. This suggests that benefits are more responsive than taxes/SIC to changes in the population structure such as household composition changes.

Third, in terms of prevalence, discretionary policy changes lowered inequality in more countries than automatic stabilizers. But in terms of the size of the effects, we cannot conclude that policy changes contributed to inequality reduction more than automatic stabilizers, or vice versa. Thus, our findings show the importance of both discretionary policy changes and automatic stabilizers to redistribute incomes.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Appendix S1. Supplementary materials.