Inequality in EU Crisis Countries:

Identifying the Impact of Automatic Stabilisers and Discretionary Policy[1]

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Abstract

The advent of the Great Recession and the widespread adoption of fiscal austerity policies have heightened concern about inequality and its effects. We examine how the distribution of income in the EU countries which were hardest hit during the Great Recession evolved between 2007 and 2013. Using a recently developed framework (Savage et al., 2017, which extends the approach of Bargain and Callan, 2010) the overall change in the Gini coefficient is decomposed into parts attributable to the change in market income inequality, automatic stabilisation effects, and changes in discretionary policy. We implement this approach using the microsimulation software, EUROMOD, linked to EU-SILC survey data, to produce the relevant counterfactual ("no reform") scenarios. Automatic stabilisation effects are found to play an important role in reducing inequality in all of the crisis countries. During the Great Recession, discretionary policy changes –relative to a neutral, indexed policy – also contributed to reductions in the Gini coefficients for disposable income, but to a much lesser extent than the automatic stabilisation effects.

Keywords:

Inequality, Decomposition, Great Recession, Discretionary Policy, Automatic Stabilisation

JEL Subject Codes:

H24, D31, D63

[1] The results presented here are based on EUROMOD version G4.0+. EUROMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from the EU member states. We are indebted to the many people who have contributed to the development of EUROMOD. The process of extending and updating EUROMOD is financially supported by the European Union Programme for Employment and Social Innovation 'Easi' (2014-2020). The results and their interpretation are the authors' responsibility.

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1. Introduction

Income inequality has been rising in most, thought not all, OECD countries since well before the onset of the Great Recession. With the advent of the Great Recession and the widespread subsequent adoption of fiscal austerity policies, concern has heightened about inequality and its effects not only on social outcomes but also in potentially undermining growth in the medium to longer-term. Against that background, it is now important to look beyond the initial impact of the Great Recession to explore how income inequality has evolved as policy has responded to the challenges posed by the crisis, both in terms of the specifics of how tax and welfare systems have been changed and the adoption, to a greater or lesser extent, of macro-fiscal austerity policies to cope with ballooning fiscal deficits. This has been most stark in the four European countries that were unable to continue to finance their debt in the financial markets after the financial crash and had to avail of formal 'bail-out' arrangements with the European Union and IMF, namely Ireland, Portugal, Greece and Cyprus. Spain was also particularly hard-hit and had to receive assistance from the European Stability Mechanism in recapitalising its banks. The experience of these countries has been very varied. Greece at one end of the spectrum remains in crisis mode. Ireland at the other end of the spectrum has successfully completed a stringent bail-out programme, with growth now returned, and the fiscal deficit having come down to the point where debt can be financed at very low interest rates.

The distributional impact of tax-transfer systems can change due to explicit discretionary changes in tax-benefit policies (e.g., higher tax rates or lower welfare payment rates). The distributional impact may also be substantially affected by changes in the underlying population and distribution of income (e.g., a higher proportion of pensioners, or increased unemployment)[3]. Dolls et al. (2012, 2017) concentrate on this latter component, and examine the degree of "automatic stabilisation" of aggregate income inherent in the systems of EU countries and the US, under either an income or an unemployment shock. Their focus is therefore on the redistributive properties of a given tax-transfer system on alternative distributions of market income. A separate literature, initiated by Bargain and Callan (2010) and followed up by Bargain et al (2017) and Paulus and Tasseva (2017) among others, focuses on identifying, for a given population and income distribution, the impact of discretionary changes in tax-transfer policy on measures of income inequality and poverty. In their approach "automatic" responses of existing policies to income or unemployment shocks are not separately identified but included with other factors, such as changes in unemployment or the distribution of market incomes. In this paper we apply an approach which draws on both of these perspectives to identify the impact of tax and benefit policy on the Gini coefficient changes over time in a selection of EU countries, and the breakdown of this change between discretionary and automatic components.

We apply a technique, developed by Savage et al. (2017), which extends the approach of Bargain and Callan (2010) to decompose the change in inequality during the Great Recession into components attributable to changes in market income, changes in discretionary policy, and the automatic stabilisation properties of the pre-existing tax-transfer systems. We study a selection of EU countries who were hard hit by the Great Recession: Cyprus, Portugal, Ireland, Greece and Spain. We use EU-SILC data on incomes and the EUROMOD tax-benefit model to construct appropriate

counterfactuals for the decomposition. Our results give a better understanding of how changes in inequality were generated in a number of European countries.

This paper makes a number a significant contributions to the literature on the impact of the Great Recession and austerity policies. We contribute new evidence on how income distributions changed in a selection of countries most severely affected by the Great Recession. Our methodology is novel in that it allows us to disentangle discretionary policy effects from automatic stabilisation in an ex post context, allowing us to comment on how existing tax-benefit systems as well as new fiscal policies helped to cushion the impact of the Great Recession in the five EU countries which were hardest hit by the Great Recession.

A previous application of this method (Savage et al., 2017), examined how the Gini coefficient in Ireland – a country which experienced one of the most severe economic contractions during the Great Recession – evolved over the years 2008 to 2013. Analysis of the income distribution showed broad stability in the Gini coefficient, largely due to a strong increase in the extent of redistribution through taxes and transfers. Results from a decomposition exercise suggested that over three-quarters of the inequality reduction was due to automatic stabilisation effects, and just under a quarter due to changes in discretionary policy.

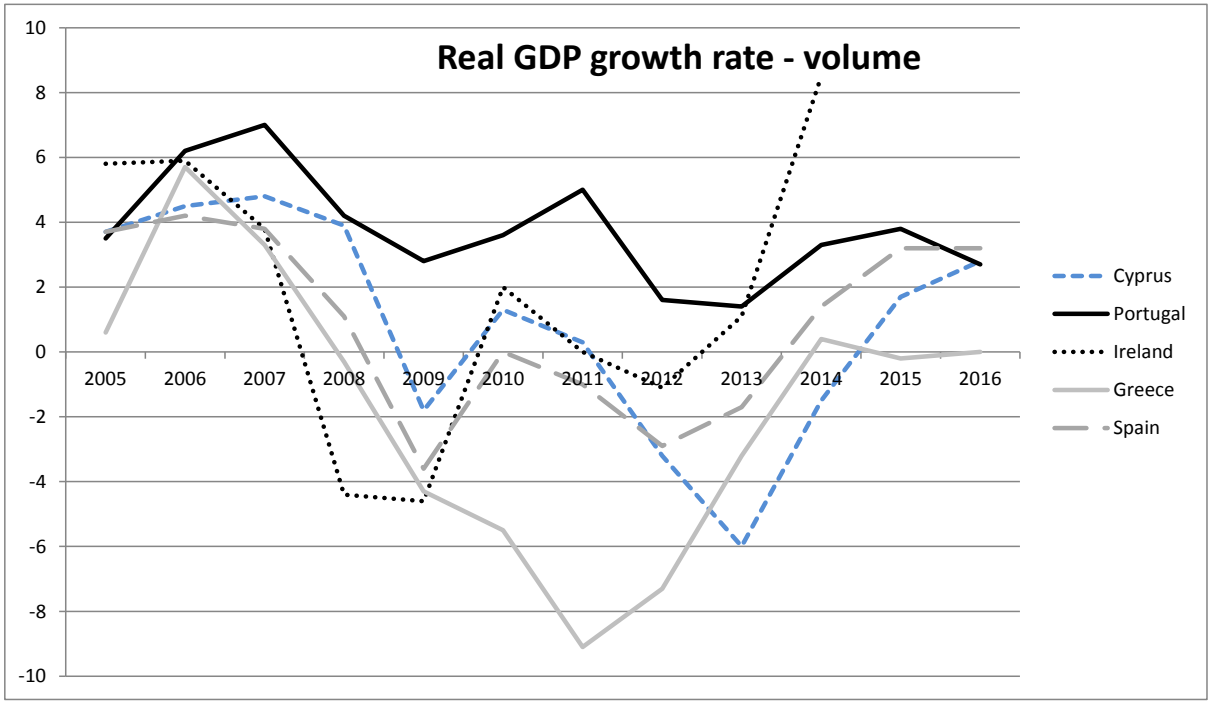
2. Data and Method

2.1 Microsimulation and Data

We use the tax-benefit microsimulation software, EUROMOD, linked to household surveys to simulate disposable income distributions and inequality indices for a base year at the onset of the crisis (2007) and for an end year for which microsimulation models (with the relevant data) are available (usually 2013). Figure 1 shows that this period encompasses all periods of negative GDP growth in the countries concerned (except for Cyprus, which registered slightly negative GDP growth in 2014). We also simulate some counterfactual scenarios, described below. EUROMOD numerically simulates tax-benefit rules, allowing the computation of all social contributions, direct taxes and transfers to yield household disposable income. It is linked to the EU-SILC data for years 2008 (2007 incomes) and 2014 (2013 incomes).[4] One exception is Ireland, for which 2014 data is not yet available in EUROMOD. Therefore, our end year in the Irish case is 2011 which is simulated using 2011 policies linked to 2012 data (2011 incomes). However, we are able to complement the EUROMOD-based analysis for Ireland of 2007-2011 with an analysis of 2008 to 2013, based on the national microsimulation model SWITCH (See Savage et al. 2017).

[4] Started in 2003 for 6 member states (Belgium, Denmark, Greece, Ireland, Luxemburg and Austria), as well as Norway, EU-SILC has been extended to other EU countries in 2004-2005, followed by Bulgaria, Romania, Turkey and Swizerland from 2007. It gathers annual cross-sectional information on European individuals and households (incomes, socio-demographics, social exclusion, life condition). It was originally created to provide the material for structural indices of social cohesion in Europe (Laeken indices). EU-SILC (statistics on income and life conditions) constitute the most recent and important source of microdata for comparative studies on income distribution in Europe.

Figure 1 Real GDP growth rate in crisis countries



Note: Current GDP figures for Ireland are unreliable after 2014. More reliable data will soon be available.
Source: Eurostat

The major advantage of a microsimulation model is that it allows us to examine counterfactual scenarios (e.g. what if tax-benefit policies had simply evolved with indexation?). This allows us to isolate the changes in inequality and poverty that are due to government policy and those that are due to market forces. Using our new decomposition method, we can now break down the "market forces" component into the relative contributions of changes in market income and automatic stabilisation. It is worth noting, however, the standard limitations that accompany the use of microsimulation models. Firstly, the models are static and assume no behavioural response to policy changes. Any behavioural responses occurring between 2007 and 2013 will therefore be picked up in the market income and automatic stabilisation category. Survey data tends to have problems accurately capturing the higher end of the income distribution. However it is these data which are the subject of extensive analysis in the debate about income inequality, and our approach helps to identify what lies behind the headline results. We also take care to compare our simulation inequality indices with those reported in official statistics and find a close correspondence between reported Gini coefficients from EUROMOD and official sources.

Take-up of means-tested benefits is generally not 100% although basic microsimulation of benefits attributes them to all eligible households. We deal with this by introducing random non-take-up, where possible, to certain means-tested benefits which have low reported take-up rates.[5] In addition to this there may be some policy changes that are not captured by a tax-benefit model due to a lack of information in the underlying data that prevents simulation of a tax or benefit. Lastly, indirect taxes are generally not captured in microsimulation models as expenditure information is

[5] This includes in-work benefits in Ireland (Family Income Supplement), social pension and unemployment assistance for older workers in Greece and the Social Supplement for the Elderly in Potugal

often not present in the income surveys used to build a database for the tax-benefit model. See Pestel and Sommer (2016), Decoster et al. (2014), and Savage (2017) for analysis based on imputation of expenditure data into a tax-benefit microsimulation database.

2.2 Decomposition Method

In this section, we outline the methods used to decompose the change in the inequality index into a market income effect, an automatic stabilisation effect, and a discretionary policy effect. We also show how the methods used here relate to the decomposition proposed by Bargain-Callan (2010), BC hereafter.

We start by defining the change in the Gini coefficient[6] based on disposable income[7], as the change in the Gini based on market incomes, $G(M_1) - G(M_0)$, minus the change in the Reynolds-Smolensky (RS) index, $R_1 - R_0$.[8] This starting point makes clear that the change in G(D) over any time period is determined by the degree to which any change in the distribution of market incomes is offset by a change in the amount of redistribution done by the tax-benefit system. It is the second component of the equation that we are particularly interested in. $R_1 - R_0$ is a combination of the impact of automatic stabilisation and the impact of discretionary changes to the tax-benefit system.

$$G(D_1) - G(D_0) = G(M_1) - G(M_0) - [R_1 - R_0] \quad (1)$$
$$= [G(M_1) - G(M_0)] - [[G(M_1) - G(D_1)] - [G(M_0) - G(D_0)]]$$

Using notation common with BC, we can define *G(D)* as the product of a tax-benefit function *d(.)*, which transforms market incomes *M* into disposable incomes *D*, based on monetary tax-benefit paramters *p* (benefit payments, tax thresholds etc.).

We can therefore define the change in the *G(D)*, as:

$$\Delta G(D) = [G(M_1) - G(M_0)] - [G(M_1) - G(d_1(p_1, M_1)) - \{G(M_0) - G\big(d_0(p_0, M_0)\big)\}] \quad (2)$$

To isolate the impact of the discretionary changes in tax-benefit policy from the impact of automatic stabilisation, we introduce a Gini based on a counterfactual distribution of income $G\left(d_0\big(\alpha, p_0, M_1\big)\right)$. This index summarises income inequality in a distribution of disposable incomes calculated using end-year market incomes transformed into disposable incomes under the start-year tax-benefit

[6] The decomposition can be applied to any inequality index defined over the full range of incomes. For clarity, in this section we discuss the decomposition applied to the Gini index, one of the most commonly used indices of income inequality.

[7] Equivalised household disposable income, where the OECD equivalence scale is used to equivalise incomes (1 for the first adult, 0.7 for subsequent adults, 0.5 for children).

[8] The RS index is simply defined as the difference between the Gini based on market incomes and the Gini based on disposable incomes. It is therefore a measure of how much redistribution is done by the tax-benefit system in a given year.

system, where the parameter α indexes monetary tax-benefit parameters p_0 to common end year values[9]. In other words, $d_0(\alpha, p_0, M_1)$ is the distribution of disposable incomes in the end-year if the only changes made to the tax-benefit system throughout the period of analysis was to index parameters in line with the chosen indexation factor.

To equation (2) we add and subtract $[G(M_1) - G(d_0(\alpha, p_0, M_1))]$, giving:

$$\Delta G(D) = [G(M_1) - G(M_0)] - [G(M_1) - G(d_1(p_1, M_1)) - \{G(M_0) - G(d_0(p_0, M_0))\}] + [G(M_1) - G(d_0(\alpha, p_0, M_1))] - [G(M_1) - G(d_0(\alpha, p_0, M_1))] \quad (3)$$

The comparison with the BC decomposition can be made clear at this point. Rearranging terms in equation (3), and cancelling all *G(M$_t$)* gives us the BC decomposition. With all *G(Y$_t$)* cancelled, market income changes are captured in what BC term the "other" effect:

$$G(D_1) - G(D_0) =$$

$$G(d_1(p_1, M_1)) - G(d_0(\alpha, p_0, M_1)) \quad \text{(4a) "policy" effect}[10]$$

$$+ G(d_0(\alpha, p_0, M_1)) - G(d_0(p_0, M_0)) \quad \text{(4b) "other" effect}$$

However, by rearranging equation (3) as follows, we can decompose the overall impact of the tax-benefit system into the impact of the change in the distribution of market income (equation 5a), the impact of discretionary changes to tax-benefit policies (equation 5b), and the impact of automatic stabilistaion (equation 5c):

$$G(D_1) - G(D_0) =$$

$$[G(M_1) - G(M_0)] \quad \text{(5a) Market income effect}$$

$$-\left[G(M_1) - G(d_1(p_1, M_1)) - G(M_1) + G\left(d_0(\alpha, p_0, M_1)\right)\right. \quad \text{(5b) Discretionary policy}$$

$$+\left[G(M_1) - G\left(d_0(\alpha, p_0, M_1)\right) - G(M_0) + G\left(d_0(p_0, M_0)\right)\right] \quad \text{(5c) Auto Stabilisation}$$

These expressions can be simplified by moving to the use of notation based on the fact that the Reynolds Smolensky index (R) is simply the difference between *G(M$_t$)* and *G(D$_t$)*:

$$G(D_1) - G(D_0) =$$

$$[G(M_1) - G(M_0)] \quad \text{(6a) Market income effect}$$

$$-[\ \{R[M_1, d_1(p_1, M_1)] - R[M_1, d_o(\alpha, p_o, M_1)]\} \quad \text{(6b) Discretionary policy}$$

$$+\{R[M_1, d_o(\alpha, p_o, M_1)] - R[M_0, d_o(p_o, M_0)]\}\ ] \quad \text{(6c) Auto Stabilisation}$$

[9] See discussion below for choices on the value of α.
[10] What BC define as the "policy" effect captures only the impact of discretionary policy changes.

The discretionary policy effect above is estimated on final year data. Equally, this effect can also be estimated based on initial-year data, giving the decomposition:

$$G(D_1) - G(D_0) =$$

$$[G(M_1) - G(M_0)] \qquad \text{(7a) Market income effect}$$

$$-[\ \{R[M_1, d_1(p_1, M_1)] - R[\alpha M_0, d_1(p_1, \alpha M_0)]\} \qquad \text{(7b) Auto Stabilisation}$$

$$+\{R[\alpha M_0, d_1(p_1, \alpha M_0)] - R[M_0, d_o(p_o, M_0)]\}\ ] \qquad \text{(7c) Discretionary policy}$$

Results of the decomposition are shown for both initial-year and end-year data, as well as a Shapley value, which is simply the average of the two.

In this analysis, we allow α, the indexation parameter, to take three possible values. The first is the change in average market income between the base and end periods, i.e. it measures each component against a scenario where tax-benefit policy parameters are indexed in line with developments in market income. The second is wage growth, i.e., we index policy parameters in line with average annual wage growth. The third is CPI whereby tax-benefit policies are assumed to evolve in line with the consumer price index. These approaches allow us to account for three different types of indexation, which seem most relevant to make tax-benefit policy parameters in monetary units comparable over time. (These are also the most common indexation types used by governments in practice.) The relevant figures for each indexation assumption are displayed in Table 1. CPI and wage growth are generally positive and well aligned (except for Greece where CPI grew by 14% but wages declined by 22%). Market income growth, by contrast, has been negative in every country except for Spain where market income registered no growth over the period concerned. In what follows, we present results using the wage growth indexing assumption. However, despite the divergence across the three measures, results are not sensitive to this parameter.

Table 1 Measures of price and income growth between 2007 and 2013 (2011 for Ireland)

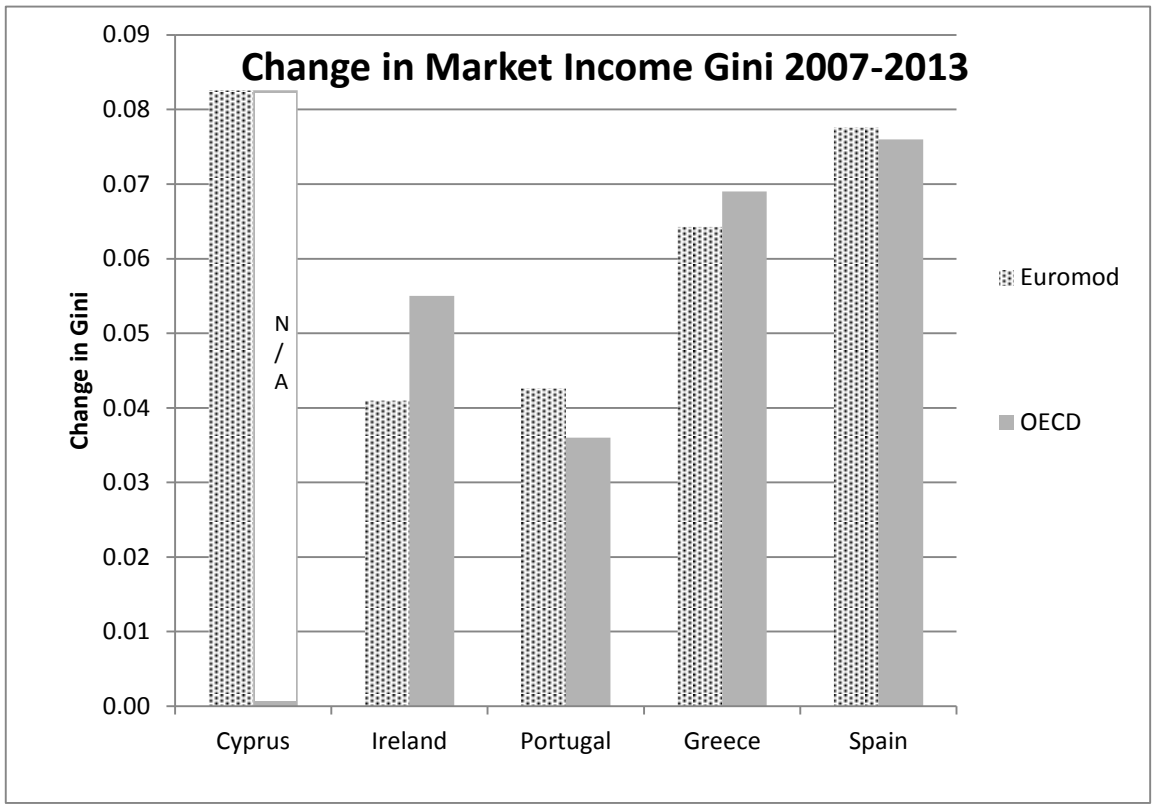
	Market income growth	CPI	Wage growth
Greece	-37%	14%	-11%
Spain	0%	14%	17%
Ireland	-9%	1%	5%
Portugal	-10%	10%	6%
Cyprus	-14%	15%	9%

Market income growth is calculated using EU-SILC data for the base (2007) and end (2011/2013) periods. CPI figures come from Eurostat. Annual wage growth statistics come from the OECD (except for Cyprus, for which it is calculated using EU-SILC data for the base and end periods)

3 The Evolution of Income Inequality over the Great Recession

This section outlines the changes in inequality observed in our selection of countries during the Great Recession. We look at the change in the market income Gini coefficient and the change in the disposable income Gini coefficient to gauge the extent of changes in inequality in market income and in take-home income. We then look at how the Reynolds-Smolensky index, which measures the reduction in the Gini coefficient brought about by the tax and transfer system, has evolved over the Great Recession. This gives us an indication of whether tax-benefit systems are engaging in more or less redistribution since the beginning of the crisis. More detailed indices are reported in the Appendix.

Figure 2 The evolution of the Gini coefficient of market income in EU crisis countries

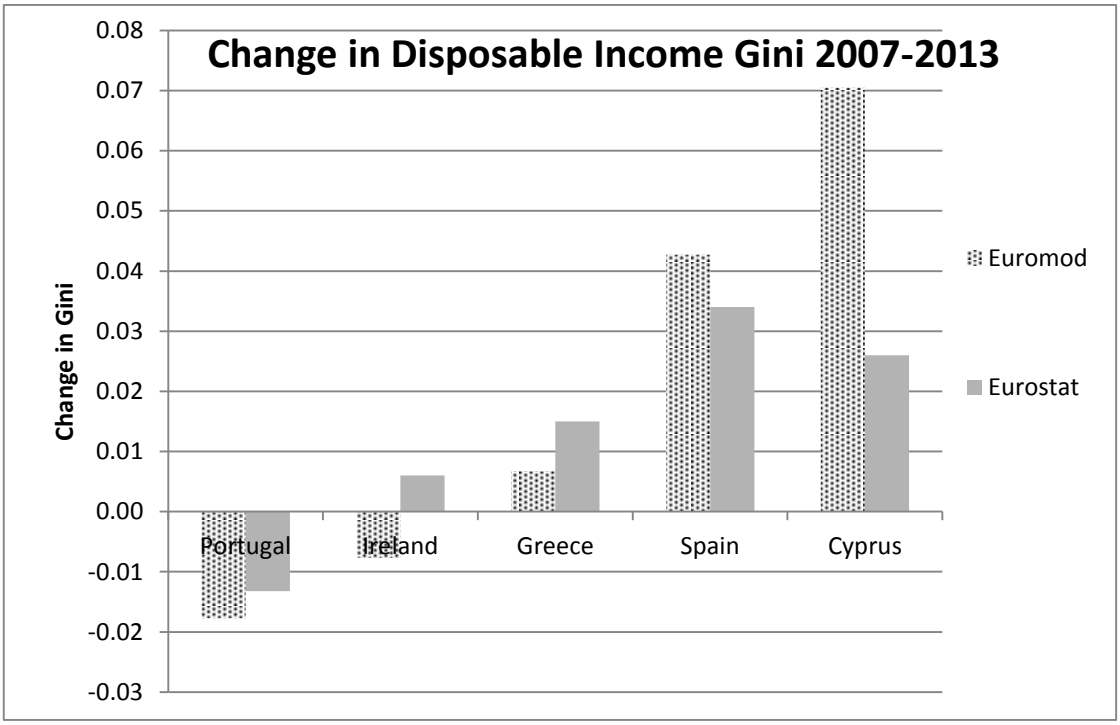


Note: OECD figures compared to own calculations from base year income data (2007 for all countries) and end year income data (2013 for all countries except Ireland, for which the end year is 2011). Official statistics on the market income Gini for Cyprus are not available from the OECD.

Figure 2 shows how the market income Gini has evolved between 2007 and 2013. Simulated changes in EUROMOD are compared to those reported in official OECD statistics. Without exception, this index has increased in all of the countries studied, indicating that inequality in market income increased substantially in the countries studied over the period in question. The largest increases are recorded in Cyprus and Spain, where the market income Gini increased by around 8 points. This increase is followed closely by Greece (recording an increase of 6 points) and then by Ireland and Portugal (around a 4 point increase). In all cases, our simulated changes to the market income Gini are similar to official OECD records.

Figure 3 shows how the disposable income Gini coefficient has evolved over the period in question in Portugal, Ireland, Greece, Spain and Cyprus. Simulated changes in EUROMOD are compared to those reported in official Eurostat statistics. Similar to the case of market income inequality, we find that the largest increases in disposable income inequality over the Great Recession are to be found in Cyprus and Spain. The Gini coefficient increases by 2-3 points in these countries. Greece also suffered an increase in disposable income inequality with the Gini coefficient increasing by 1.5 points between 2007 and 2011. Income inequality in Ireland was stable over the period examined while income inequality in Portugal decreased, as evidenced by the 1 point decrease in the Gini coefficient.

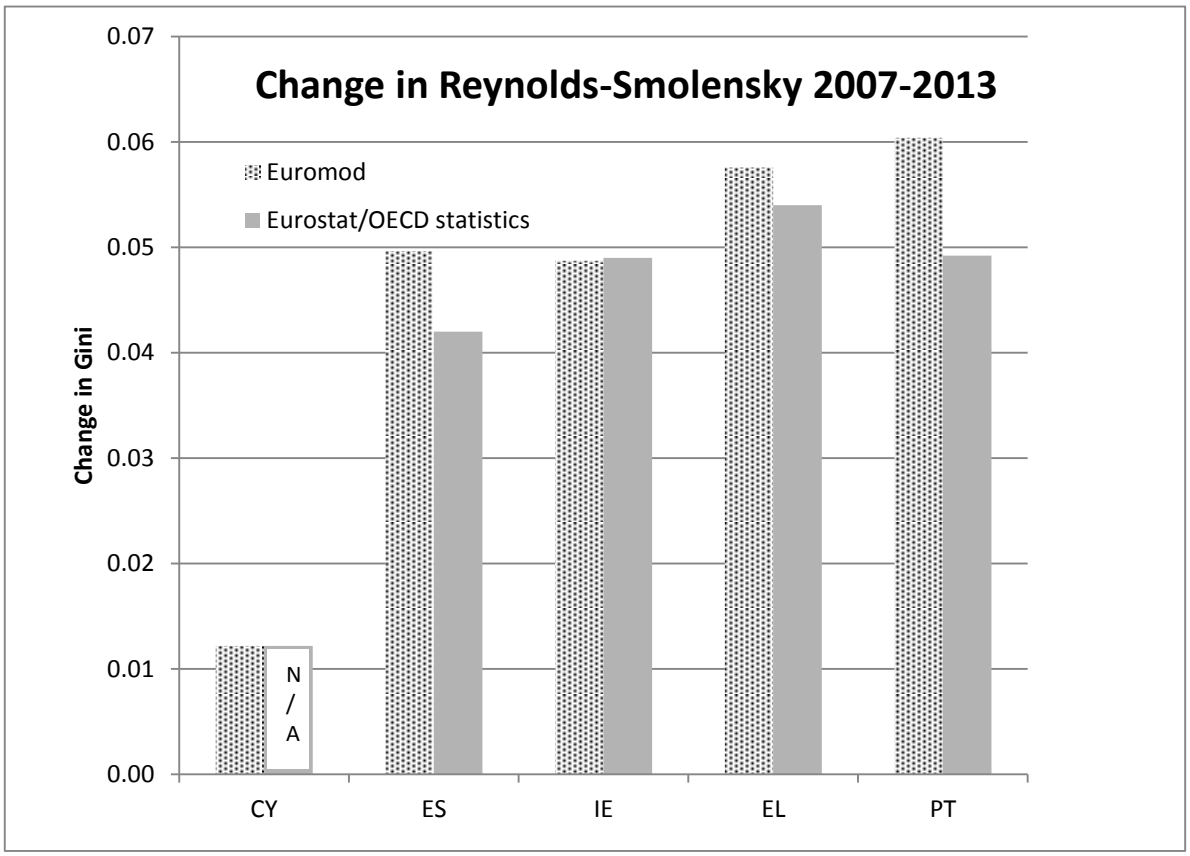
Figure 3 The evolution of the Gini coefficient of disposable income in EU crisis countries



Note: Eurostat figures compared to own calculations from base year EUROMOD policies and income data (2007 for all countries) and end year EUROMOD policies and income data (2013 for all countries except Ireland, for which the end year is 2011).

Finally, Figure 4 shows how the Reynolds-Smolensky index changed between the beginning and the end of the Great Recession. Recall that the Reynolds-Smolensky index measures the redistributive effect of the tax-benefit system. An increase in this index indicates that the tax-benefit system is redistributing more. This is, indeed, what we find in each of the countries studied. By the end of the Great Recession, each country's tax-benefit system was engaged in more redistribution than at the beginning. The largest increase is observed in Portugal, where the Reynolds-Smolensky index increased by 6 points. At the other end of the spectrum is Cyprus which registers an increase of just 1 point.

Figure 4 The evolution of the Reynolds-Smolensky index in EU crisis countries



Note: Eurostat/OECD figures compared to own calculations from base year EUROMOD policies and income data (2007 for all countries) and end year EUROMOD policies and income data (2013 for all countries except Ireland, for which the end year is 2011).

4 The Role of market income, discretionary policy and automatic stabilisation

Cyprus, Portugal, Ireland, Greece and Spain all experienced a significant rise in market income inequality during the Great Recession. However, while Spain and Cyprus also registered large increases in disposable income inequality, Greece, Ireland and Portugal experienced relatively stable or falling disposable income inequality. Clearly, the tax-benefit systems of the latter countries were more effective in cushioning the effects of rising market inequality during the Great Recession. The question of whether this was due to the automatic stabilisation capacities of these systems or due to discretionary policies implemented over the course of the Great Recession is tackled in this section.

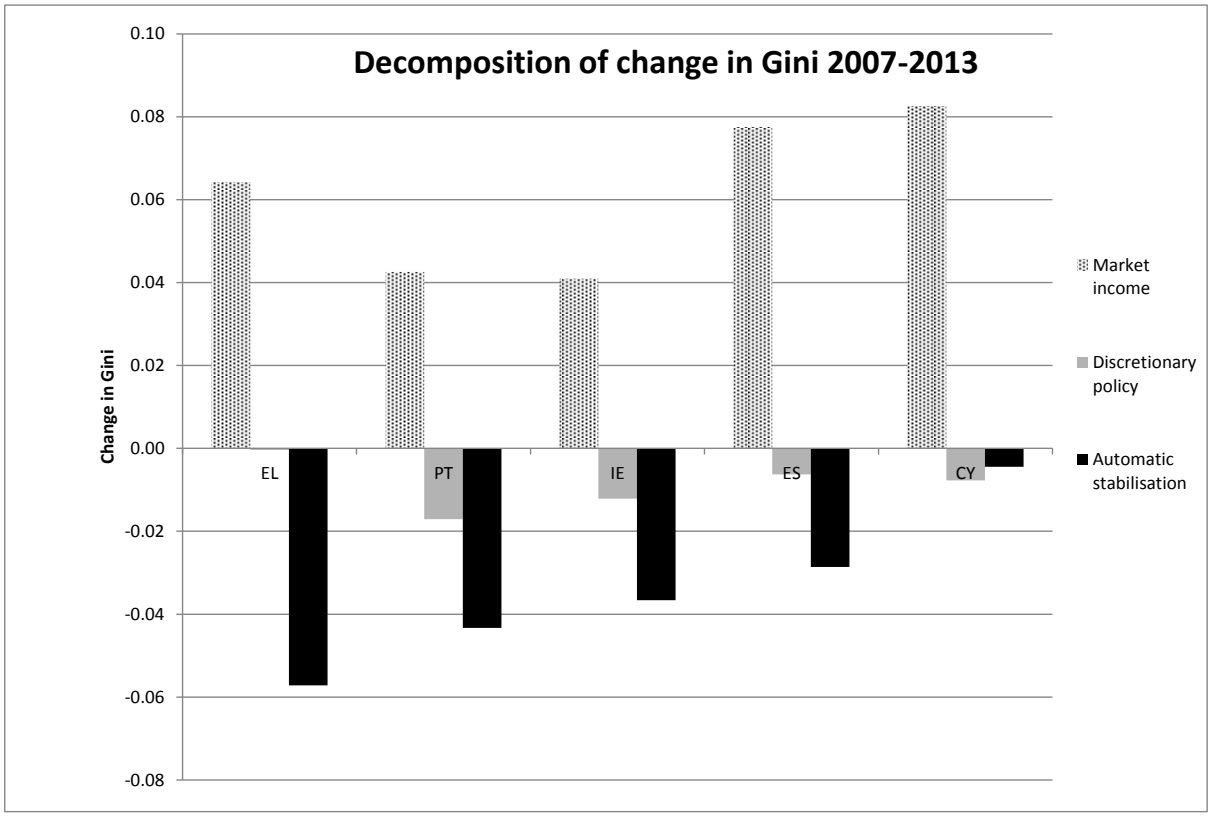
The distributional impact of tax-transfer systems can change due to explicit discretionary changes in tax-benefit policies (e.g., higher tax rates or lower welfare payment rates). But the distributional impact may also be substantially affected by how the tax-benefit system responds to changes in the underlying population and distribution of income (e.g., an increased expenditure on state transfers due to a higher proportion of pensioners, or increased unemployment)[11]. We use the decomposition

[11] This has long been recognised in the literature on tax progressivity; see, for example, Lambert and Thoresen (2009).

elaborated in Section 2 to decompose the change in disposable income inequality (measured by the Gini coefficient) intro the relative contributions of market income changes, discretionary policy changes and automatic stabilisation. Results are displayed in Figure 5. Immediately evident is the fact that changes in market income account for a large proportion of the change in inequality observed over the Great Recession. This is particularly true in Spain and Cyprus. In all countries, changes in market income increase inequality. Turning next to discretionary policy, we find that it was inequality reducing in all countries except Greece, where it has no discernible effect on inequality. Each country in our sample implemented discretionary policies which counteracted some of the increased market income inequality. The effect ranges from a 2 point decrease in the Gini in Portugal to a negligible effect in Greece.

Looking next at automatic stabilisation, we find that this aspect of the tax-benefit system made a more substantial contribution to decreasing inequality in Greece, Portugal, Ireland and Spain. to the In each case, the effect of automatic stabilisation is larger than that of discretionary policy and, in some countries, its magnitude is comparable to that of market income changes. The Irish results presented here (which are for 2007-2011) mirror closely those in Savage et al. (2017), which show that 75-80 per cent of the overall increase in inequality reduction attributable to the tax-benefit system was due ot the automatic stabilisation componenet. For Cyprus, the automatic stabilisation effect is small, despite the very large rise in market income inequality, suggesting that there may be distinctive features of the Cypriot tax/transfer system which merit further investigation. Comparing Figure 5 to Figure 3, we notice that the countries in which disposable income inequality changed little over the course of the crisis are those in which automatic stabilisation played the largest role in cushioning the disposable income distribution. This highlights the importance of the automatic stabilisation properties of tax-benefit systems in these countries in alleviating market income shocks. It is noteworthy that this finding applies both to countries which have been characterised as having a distinctive Southern European variant of the welfare state, and to Ireland, which is often seen as closer to the liberal model of the UK.

Figure 5 Decomposition of the change in the Gini coefficient of disposable income over the crisis period



Note: Own calculations from base year EUROMOD policies and income data (2007 for all countries) and end year EUROMOD policies and income data (2013 for all countries except Ireland, for which the end year is 2011).

5 Conclusions

The impact of the Great Recession and associated austerity policies on poverty and inequality in OECD countries is of central interest, not least in light of the political turmoil and rise of populism to which it may be contributing. Much of the emphasis in research and debate about inequality and fiscal adjustment focuses on discretionary changes in tax and transfer system parameters, explored via tax-benefit simulation models. However, the 'automatic' stabiliser effects as the tax and transfer systems respond to changes in household incomes and employment levels also play a central role. Applying a new approach developed by Savage et al. (2017), we show that automatic stabilisation played a large role in shaping income distributions over the course of the Great Recession. Results for Greece, Portugal and Ireland suggest that automatic stabilisation almost completely counteracted the increased inequality brought about by market income changes. The existing tax-benefit systems in Spain and Cyprus also cushioned market income inequality, albeit to a lesser extent. With the exception of Cyprus, automatic stabilisation played a larger role than discretionary policy in reducing inequality, highlighting the importance of a well-designed tax-benefit system in dealing with unexpected market shocks.

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Appendix

Table 2 The evolution of inequality between 2007 and 2013 (2011 for Ireland)

	Market Income Gini			Disposable Income Gini			Reynolds-Smolensky		
	base	end	change	base	end	change	base	end	change
Greece	0.51	0.58	0.06	0.33	0.34	0.01	0.18	0.24	0.06
Spain	0.45	0.53	0.08	0.30	0.34	0.04	0.16	0.19	0.03
Ireland	0.50	0.54	0.04	0.28	0.27	-0.01	0.21	0.26	0.05
Portugal	0.53	0.57	0.04	0.35	0.33	-0.02	0.17	0.24	0.06
Cyprus	0.38	0.46	0.08	0.27	0.34	0.07	0.11	0.12	0.01

Indices are calculated using 2007 EUROMOD policies linked to 2008 data (base period) and 2013 (2011 for Ireland) EUROMOD policies linked to 2014 (2012 for Ireland) data (end period). Incomes are equivalised using the OECD equivalence scale. The Reynolds-Smolensky index is the difference between the market income Gini and the disposable income Gini.