IZA DP No. 7737

Changes in Income Distributions and the Role of Tax-Benefit Policy During the Great Recession: An International Perspective

Olivier Bargain
Tim Callan
Karina Doorley
Claire Keane

November 2013

Changes in Income Distributions and the Role of Tax-Benefit Policy During the Great Recession: An International Perspective

Olivier Bargain
Aix-Marseille University, CNRS, EHESS and IZA

Tim Callan
ESRI, TCD and IZA

Karina Doorley
IZA and CEPS/INSTEAD

Claire Keane
ESRI and TCD

ABSTRACT

Changes in Income Distributions and the Role of Tax-Benefit Policy During the Great Recession: An International Perspective[*]

This paper examines the impact on inequality and poverty of the economic crisis in four European countries, namely France, Germany, the UK and Ireland, and the contribution of tax and benefit policy changes. The period examined, 2008 to 2010, was one of great economic turmoil, yet it is unclear whether changes in inequality and poverty rates over this time period were mainly driven by changes in market income distributions or by tax-benefit policy reforms. We disentangle these effects by producing counterfactual ("no reform") scenarios using tax-benefit microsimulation and representative household surveys of each country. For the period under study, we find that the policy reaction has contributed to stabilizing or even decreasing inequality and relative poverty in the UK, France and especially in Ireland, a country where rising unemployment would have otherwise increased poverty. Market income inequality has nonetheless pushed up inequality and relative poverty in France. Relative poverty and, notably, child poverty, have increased in Germany due to policy responses combined with the increasing inequality of market income.

Corresponding author:

Tim Callan
Economic and Social Research Institute (ESRI)
Whitaker Square
Sir John Rogerson's Quay
Dublin 2
Ireland
E-mail: tim.callan@esri.ie

1   Introduction

The current economic slowdown calls for a careful investigation of how to make tax-benefit systems more cost effective and how to minimize welfare losses and limit the extension of deep poverty at a time of cuts in public spending. For this purpose, lessons from the very recent period, and, notably, the role of policy developments occurring during 2008-2010, the first "dip" in the Great Recession, must be learned. As yet, little is known about the capacity of existing redistribution systems to soften the negative impacts of job and earnings losses,[1] as well as the effectiveness of the policy initiatives that quickly followed the onset of the economic slump. This is not only due to the fact that microdata come with an inevitable delay but also because the different factors affecting the distribution of disposable income are intertwined.[2] In particular, analysts should attempt to disentangle the effect of changes in market income inequality (due to wage cuts, job losses or working time reduction in the private sector, changes to the minimum wage etc.) and the effect of tax-benefit reforms. The latter may indeed have cushioned or exacerbated the effects of the crisis on the income distribution through income tax and social insurance reforms, changes in the generosity of family benefits or welfare programs, etc. Comparing European experiences in this context also seems highly relevant. The effects of each of these factors may have been different across countries depending on how deeply they were affected by the crisis and on the specific nature of the policy responses.

In this paper, we provide some answers to these questions by studying the contribution of tax-benefit policies to changes in inequality and poverty in Europe between 2008 and 2010. We use tax-benefit microsimulation to construct counterfactual situations that show what the post-tax and transfer income distribution would have looked like in 2010 if either tax-benefit policies or the distribution of pre-tax and transfer incomes had remained unchanged between the two years. In this way, we are able to disentangle the pure effect of tax-benefit policy changes occurring over the period from changes in the environment

---

[1]An exception is the study of Jenkins et al. (2013) on the short-term impact of the Great Recession in twenty-one OECD countries. The authors find that the household sector was largely protected from the downturn through the tax and benefit system. Among the six countries that the authors study in detail, the softest landings were found to be experienced by the countries with the strongest welfare states, Germany and Sweden. For most of the countries studied, there was little change in the household income distribution between 2007 and 2009. They note, however, that in the medium- to longer-term, there is likely to be much greater change as a result of fiscal consolidation.

[2]For instance, an approach that consists of measuring the contribution of taxes and transfers to overall inequality/poverty at different points in time, e.g. before and after the first "dip" of the Great Recession, does not allow us to extract the pure effect of policy changes from their interaction with the underlying population. That is, this method cannot tell whether social assistance schemes, for example, may appear more redistributive because of their increased generosity or because of automatic increases in welfare spending as unemployment rises.

in which these policies operate, particularly changes in market income inequality which may have occurred due to job losses or wage cuts.[3] This analysis is carried out for four European countries which were affected differently by the economic crisis, namely France, Germany, Ireland and the UK. For each country, we isolate and quantify the effect of tax-benefit policy changes over 2008-2010 on a range of poverty and inequality measures. We use representative microdata for each country (EU-SILC data) from the beginning of the economic crisis (2007/2008) and from the latest period available (2009/2010), coupled with microsimulation models (SWITCH for Ireland and EUROMOD for France, Germany and the UK), i.e. models that transform gross income into disposable income for each household, taking into account all taxes, transfers and contributions in each period and country. Using these simulations, we can draw conclusions about the effect of the economic crisis on poverty and inequality across countries as well as the effectiveness of tax-benefit policies in responding to the economic crisis in each country.

We find that, while the policy response was actually comparable in the UK and France, it has contributed to stabilize relative poverty only in the UK. Market income changes have pushed up inequality, child poverty and, especially, overall poverty depth more strongly in France so that policy responses have only partly corrected this trend, resulting in an increase in the intensity of poverty and in child poverty. Ireland, in the early part of the crisis, provided an even more progressive policy response than the UK and France, due mainly to sharp increases in income-related taxation with more limited reductions in welfare payments. This policy effect is responsible for an overall reduction in relative poverty and inequality in this country. The UK, France and Ireland have managed to reduce absolute child poverty (i.e. poverty calculated with the poverty line anchored in real terms at its initial level). In contrast, policy responses have been fairly regressive in Germany, with tax cuts and very slow uprating of social transfers resulting in an increase in relative poverty, poverty depth and elderly poverty. Other effects, which include changes in market incomes and non-simulated policies like changes in unemployment insurance in France, have had a relatively modest role despite rising unemployment in Ireland (and to a lesser extent in France and the UK) and work sharing in Germany. Among exceptions are the large contributions of these other effects to the increased poverty rate and depth in France and to child poverty in Germany. Overall, tax-benefit policy responses have

---

[3]This approach is applied in the study of Clark and Leicester (2004) who carefully investigate the distributional effect of policy changes over the 1980s and 1990s in the UK. It is then embedded in a more formal decomposition framework in Bargain and Callan (2010) for France and Ireland and Bargain (2012) for the UK for the period 1999-2001. A related concept for the comparison of tax regimes with respect to progressivity, the transplant-and-compare procedure (Dardanoni and Lambert 2002), is applied by Lambert and Thoresen (2009) for Norway. They isolate the tax policy effect by comparing pre-tax income distributions which have been adjusted to a common base.

played an important role, sometimes explaining most of the time changes in poverty. Further research should make use of more recent years of data and uprated tax-benefit microsimulations in order to identify the impact of policy factors and shifts in market income over the prolonged crisis.

2 Macroeconomic and Policy Background

2.1 Welfare Regimes before the Crisis and the Macroeconomic Context

Our study presents an original perspective by comparing trends in income distributions and policy developments in four European countries which have been impacted differently by the crisis. In the year preceding it, all four countries were relatively close in terms of GDP per capita.[4] France and Germany used to be classified under the conservative/corporatist welfare regime (Esping-Andersen 1990) while the UK represented a more liberal model, although some nuance is required. Despite low income tax rates, the UK offered a safety net in the form of income support schemes and a relatively generous family tax credit for working poor families. In parallel, France and Germany have experienced a significant cut in tax levels since the early 2000s while introducing or increasing transfers to the working poor. In Germany, wage moderation and reforms of the social system in the early 2000s may also have had some regressive impact on the distribution of income but there is no substantial evidence of this. Ireland was traditionally placed at a somewhat intermediary position, with a social protection system described sometimes as "catholic corporatist" (McLaughlin, 1993), due to the role of the Church and the central role of the family, or as competitive corporatist since transfers, taxation and labor market institutions were broadly adapted to competitiveness objectives (Hardiman 2000).

The evolution observed during the first dip of the crisis is particularly contrasted, ranging from the German employment "miracle" (still accompanied by wage moderation) to a strong negative adjustment in the Irish economy, with the UK and France performing somewhere in between. Given these different experiences, we may expect very different trends in market incomes between 2008 and 2010 across these countries. We describe the macroeconomic context in detail below. The importance of automatic stabilizers and discretionary fiscal policy in each country will also, ultimately, determine the extent to

---

[4]In 2007, France, Germany and the UK were 8%, 16% and 17% above the EU-27 average GDP per capita respectively while Ireland was 46% above the average (and the richest country after Luxembourg). Repatriation of multinational profits from Ireland, however, means that GNP was about 80% of the level of GDP, providing a better measure of the national income available to Irish residents – more comparable to that of our three other countries.

which the Great Recession affected overall poverty and inequality measures during this timespan. Policy options in each country are described in the next sub-section.

Germany and France. Germany experienced a strong macro shock in 2008-09 (-4.9% in real GDP) but a return to positive growth of over 4% in 2010 as shown in Figure 1, largely due to strong global demand for German exports (Jenkins et al, 2013). The use of short-time work in particular has prevented an increase in unemployment and, according to Bargain et al. (2012), has partly (fully) limited the increase in relative (absolute) poverty. Unemployment rates in Germany and France prior to 2008 were generally higher than those in Ireland and the UK, as shown in Figure 2. German unemployment rates resumed falling after 2009, reaching their lowest level in recent decades (5.5% in 2012).[5] France was less internationally exposed than other countries like Germany due to a traditionally strong reliance on its internal market. The macro shock was therefore slightly smaller (-3.7% of GDP in 2009) but so was the return to growth in 2010 ($+1.1\%$). This was accompanied by a long-lasting deterioration of labor market conditions (Figure 2), showing an increase in unemployment from a low of 7.8% in 2008 to 9.7% in 2010.

Ireland and the UK. The period 2008 to 2010 saw a recession of unprecedented severity in the Irish economy. GDP had grown strongly over the preceding 15 years, with employment almost doubling and unemployment rates falling sharply (Figure 2). During this 'Celtic Tiger' period, unemployment fell to just over 4% in 2000 and remained around this level until 2008. Over the years 2008 to 2010, real national income fell by close to 10% – more than double the size of the fall in the UK, Germany and France. The economic deterioration was driven by a collapse in the property sector and an accompanying sharp fall in employment in the construction sector, upon which the Irish economy had become heavily reliant, a banking crisis and the worldwide financial crisis.[6] Unemployment more than doubled between 2008 and 2010, increasing from 6.4% in 2008 to 13.9% in 2010. The UK, fuelled by the global financial crisis, also entered its deepest recession since the Second World War in 2008. Significant falls in real GDP were experienced between 2008

---

[5]Burda and Hunt (2011) attribute this 'unemployment miracle' to a variety of factors such as employers reticence to hire in the preceding expansion, wage moderation and an increased adoption of 'working time accounts'. Brenke et al. (2011) also give credit to the expansion of the short-term compensation scheme, which provides financial aid for firms experiencing difficulties if they agree to reduce working hours and pay, describing it as the 'German answer' to the great recession.

[6]The banking crisis resulted in the government guaranteeing both investors and bondholders and led to unsustainable yields on Irish bonds as government debt grew. These unsustainable yields led to the Irish government seeking a financial 'bailout' from the ECB and IMF in 2010. Firm commitments to fiscal austerity formed part of the terms of the economic adjustment package, with further negative consequences for household disposable incomes (see Doorley et al (2013).

and 2010 with a decline of 1.6% in 2008 and 4.6% in 2009, followed by a return to positive growth in 2010 of 1%. A weak recovery was followed by the first double-dip recession in the UK since the 1970s as a return to negative growth occurred in 2012. Unemployment rose from 5.6% in 2008 to 7.8% in 2010.
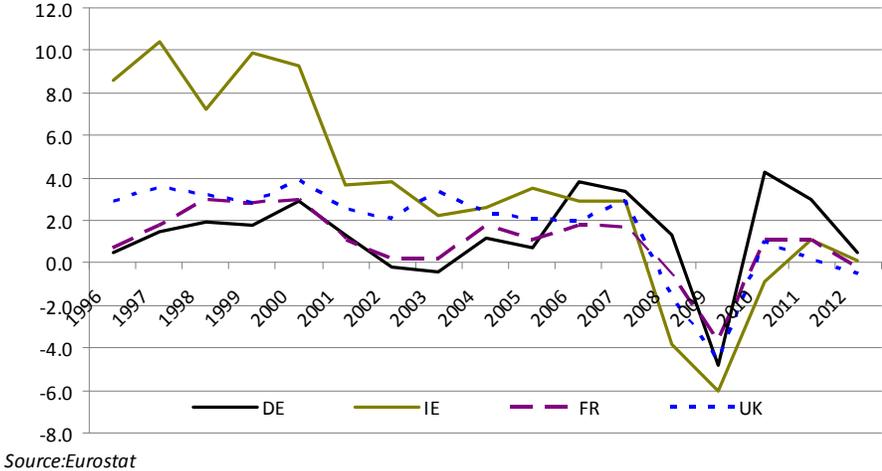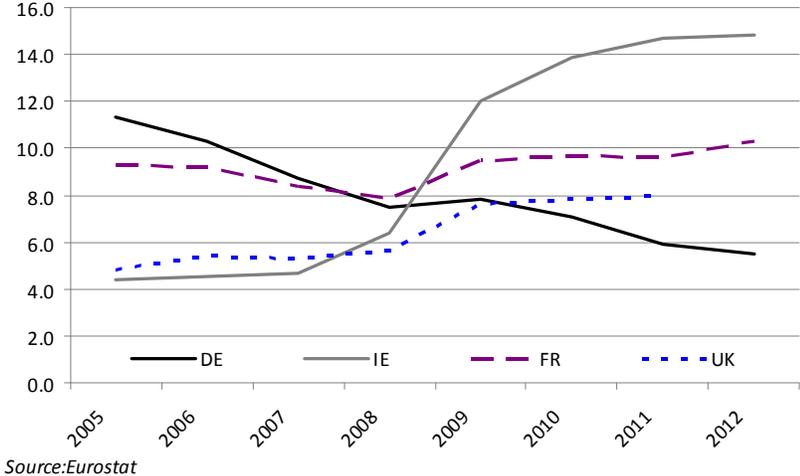
Figure 1: GDP per capita Growth Rate, 1996-2012

Source:Eurostat

Figure 2: Unemployment Rates, 2005-2012

Source:Eurostat

2.2 Policy Reactions to the Great Recession

Our decomposition analysis aims at isolating "policy effect" from "other effects". By "policy effect", we mean the effect of changes in tax-benefit policies related to direct taxation, social security contributions, non-contributory benefits (child and family benefits as well as social assistance) and, for the UK and Ireland, the contributory benefits which are treated as redistribution (essentially Jobseeker's allowances and public pensions). The set of tax-benefit policies which are actually simulated in our analysis and which constitute the scope of our "policy effect" is presented in Table A.1 in the Appendix. By "other effects", we mean all the other factors that can affect the distribution of disposable income: these are primarily changes in gross incomes due to market forces but they also account for other policies (changes in the minimum wage, changes in unemployment benefit or pension rules in France and Germany, etc.). We shall define these effects in more detail in the methodological section and quantify them using our decomposition method. For now, we describe the main policy changes characterizing the period studied, 2008-2010.[7] Tax-benefit policy changes in all four countries are also summarized in Table A.2 in the Appendix.

France. A number of fiscal and social policy reforms were enacted in France during the great recession. The most important structural changes to the welfare system concerns the minimum income. In 2009, the minimum guaranteed income benefit (RMI) and the lone parent means-tested benefit (API) were replaced with a single means-tested benefit (RSA, *Revenu de Solidarité Active*) which incorporates an in-work benefit component. That is, the RSA ensures a minimum income per month, with larger amounts for eligible lone parents, while providing permanent incentives to work due to the taper rate of 38% on earnings, replacing the 100% rate under API and RMI. While the RSA was in operation for only a few months in 2009, our simulation of the 2010 situation should account for the full year effect of this reform compared to the 2008 system. The extension of social assistance to the working poor thanks to the lower withdrawal rate – and despite the low take-up of the "in-work" RSA (33%) – must contribute to decreasing poverty. There is also a progressive effect of welfare payment uprating policies. Over the three years studied, family benefits and social assistance payments have been uprated at around 3%, which is slightly faster than mean wage growth (+1.9%) and mean income growth (our α uprating factor, equal to 0.4% for France). However, the earned income tax credit on

---

[7]For more information on policy reforms during the period under study, see Doorley (2013) for France, Ochmann and Fossen (2013) for Germany, Doorley et al. (2013) and Callan et al (2012) for Ireland and Sutherland (2013) for the UK.

low-wage earners (PPE) was frozen in nominal terms.[8] On the side of income taxation and social contributions, a salient policy measure of the Sarkozy government, the tax rebate on paid overtime, should not impact on our results since it was put in place in August 2007 and withdrawn in 2012, outside the period studied. Slightly progressive tax reforms have taken place in 2009 (the withholding tax on capital was increased from 16 to 18%, and the lowest earners were given relief on two-thirds of their tax bill, an "income tax holiday") and 2010 (the marginal income tax rate for the highest earners increased from 40% to 41% while the RSA was financed with a further 1.1% tax on capital income).[9]

Germany.   The period is characterized by very modest adjustments to social benefits. The basic amount of social assistance (ALGII) was uprated by just 1% between 2008-2010 while payments for rent and heating were frozen. More structural changes in family benefits are also observed in Germany. While the universal child benefit (*Kindergeld*) was higher for each child after the third in 2008, rates increased from the second child onwards in 2009.[10] That same year, education benefits were reformed. Students with children under 10 years of age are now entitled to a more generous top-up of €113 for the first child and €198 for any subsequent children. Means-tested child allowances have also been reformed.[11] Reforms on the tax side also seem of a regressive nature. Taxation of capital income (*Kapitaleinkommensteuer*) was modified in 2009. Until then, capital income was treated like any other income, except for a separate tax free allowance. From 2009 onwards, capital income was taxed separately at a flat rate of 25%, except for a tax-free allowance, which was slightly increased (+6% in 2009). That same year, the lowest income tax rate decreased from 15 to 14%.[12]

---

[8]Also, an exceptional bonus of €150 (*Prime Exceptionnelle*) for families eligible for the "Back to School" means-tested child benefit and of €200 (*Prime de solidarité active*) for low income families were part of a specific anti-crisis package which was not renewed in 2010 (and therefore not relevant for our analysis).

[9]Among other policy developments that may be captured in our "other effects", let us emphasize reforms of the unemployment insurance system. While unemployment benefit duration used to be related to the number of months that the individual had worked for in the previous three years, the 2009 reform switched unemployment insurance to a "one day worked, one day of compensation" system, provided the individual had worked at least 4 months in the last 28.

[10]In addition, in 2009, there was an add-on to the general benefit rate, of €100 per child, which was subsequently abolished in 2010 so that it should not affect our decomposition exercise over 2008-2010.

[11]A child allowance, of a maximum of €140 per month per entitled child, was paid if household income was deemed not to cover the needs of children younger than 25 who live in the same household. From 2009 on, parental leave benefits are included in the income test. The income threshold used to define the childrens' needs is set at a fixed amount of €600 per lone parent and €900 per couple. The fraction of own income that is withdrawn from the benefit amount decreases in 2009 from 70% to 50%.

[12]The "other effects" component of our decomposition may reflect reforms of unemployment insurance in Germany. The period is notably characterized by the introduction of more flexible arrangements for

Ireland. Over the 2008 to 2010 period, austerity measures were focused mainly on tax increases, with substantial increases in income-related taxes. These led to a strongly progressive impact over this period. Recall that the Irish government had become over-reliant on transitory taxes (such as stamp duty on property transactions) and, during the boom, had narrowed the tax base, removing many workers from the tax net entirely. In 2009, an Income Levy was introduced, payable on gross income (excluding social welfare payments). The initial rate was 1% on annual income up to €100, 100 and 2% on income in excess of that. In a 'supplementary' budget of 2009, necessitated by the rapid deterioration in the public finances, the income levy rates increased with an exemption for the first €15, 028 of annual income (with a higher exemption limit, €20, 000, for the over 65's), a rate of 2% charged on income from €75, 036 to €174, 980 and a rate of 6% charged in excess of that level. In addition, the cap on the annual income above which no further social insurance contributions (PRSI) were payable rose in 2009 while the Health Levy (a payment made to fund health services) was doubled (reaching 4%, and even 5% for incomes above €75, 036) in 2010. On the welfare side, the overall reduction in working age benefits for 2008-2010 was just under 1%.[13] Rates paid to old age pensioners remained at the increased level. Universal child benefit was sharply reduced, falling by 10% between 2008 and 2010 with a full offsetting of the impact on welfare recipients through an increase in a more targeted form of child income support. Non-contributory unemployment payments (Jobseekers Allowance) for those aged 18-21 were reduced to €100 per week (compared to €196 for older workers). Public servants experienced two reductions in pay via a 'Pension Related Deduction' (PRD), introduced in 2009, whereby the first €15, 000 of annual earnings were exempt, with 5% paid on the next €5, 000 of earnings, 10% paid on earnings between €20, 000 and €60, 000 and 10.5% on earnings above €60, 000. This affected net pay. A further pay-cut for public sector workers, this time on gross pay, was implemented in 2010 with a reduction of 5% on the first €30, 000 of salary, 7.5% on the next €40, 000 and a 10% reduction on the next €55, 000. These changes to public sector wages are treated here as an extra 'tax' on the public sector and, hence, are modelled explicitly and will fall into our 'policy effect'.

UK. Most social welfare payments increased annually in real terms over the years 2008-2010 using the retail price index (RPI) or by the Rossi price index in the case of means-tested benefits. Since the Rossi index excludes housing costs and local taxes, welfare

---

unemployment benefits and policy reforms targeted at the older segment of the labour force, corresponding to a shift in the generosity of unemployment benefit duration from those under 55 to those over 55.

[13]The 2009 budget saw increases of 3%, before the full scale of the public finance crisis was realised. Budget 2010 reduced the payment rates of the social welfare schemes applicable to those of working age by 4%.

payments have increased faster than overall prices and even faster than wages (Income Support has increased by 8.2% while the mean wage has increased by 1.7%). Universal child benefits have also increased rapidly (+8%). While the basic element of the Child Tax Credit was not uprated, the child increment was increased by 7.2%. Redistribution towards the working poor was also accentuated, with an uprating of 6.7% of the working tax credit. The basic rate limit of income taxation increased in 2009 to £37, 400 and remained constant in 2010 while a third rate of income tax was introduced that year (50% on incomes over £150, 000). The personal tax allowance was increased by £130 for the tax years 2009-10 and removed for incomes above £100, 000 in April 2010. With regards to social insurance rates and bands, the upper earnings limit increased in April 2009 to align it with the threshold of the top income tax rate. The standard rate reduced from 17.5% to 15% in December 2009.

3 Methodology

We use tax-benefit microsimulators linked to household surveys to simulate disposable income distributions and, subsequently, inequality and poverty indices for one year at the onset of the crisis (2008), for a more recent year based on the availability of the microsimulation models (2010) and for counterfactual scenarios as described hereafter.

3.1 Microsimulation and Data

Simulations are performed using the tax-benefit calculator EUROMOD for France, Germany and the UK and SWITCH for Ireland. Both of these microsimulation models numerically simulate tax-benefit rules, allowing the computation of all social contributions, direct taxes and transfers to yield household disposable income. Microsimulators are linked to the Family Resources Survey (FRS) for years 2008/09 and 2009/10 for the UK (collected over the twelve months between April and March), to the EU-SILC data for years 2008 (2007 incomes) and 2010 (2009 incomes) for France and Germany (EU-SILC data is collected over the calendar year), and to EU-SILC data from 2008 (2008 incomes) and 2010 (2010 incomes) for Ireland.[14] The income reference period for the German and

---

[14]The FRS is a well-known source for statistical studies in the UK, notably used in national microsimulation (see Sutherland, 2013). 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. 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, Rumania, 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).

French EU-SILC data is the previous year so that the 2008 data collects 2007 income and the 2010 data collects 2009 income. We account for this delay by uprating all income sources by specific factors in EUROMOD in order to be able to use the 2008 and 2010 policy parameters with the corresponding data for each year. In the Appendix, we compare simulated disposable income distributions with actual distributions (i.e. those from external statistics or directly observed in the data) and discuss the potential discrepancies caused by delayed incomes for these two countries. Finally, notice that EU-SILC data used in SWITCH for Ireland and FRS data used in EUROMOD for the UK make use of current income, i.e. household income in its labor market status at the date of data collection, rather than annual income. Annual income is used for the two others countries but also in external statistics. In the Appendix, we extensively discuss how this other source of differences between observed and simulated distributions may be related to such differences in terms of income definition.

3.2   Aggregate Changes in Incomes, Taxes and Benefits

Table 1 shows mean household gross income, taxes, transfers, social security contributions (SSC) and disposable income for the four countries investigated. These statistics give some preliminary insight into potential tax-benefit policy effects on household disposable income. Gross income decreases in all countries between 2008 and 2010, except for the UK which saw modest income rises. In France and Germany, however, disposable income increases while in Ireland, it decreases less rapidly than gross income. In the UK, there is a more rapid increase of disposable than of gross income. The main reason for these phenomena is the stabilizing effect of tax-benefit systems over the 2008-2010 period, i.e. a decrease in market income for some households is partly compensated by an automatic decrease (increase) in taxes paid (benefits received). On top of this stabilization provided by the initial policy set, there may be also the specific effect of policy changes over the period, the role of which is investigated in the rest of this paper. We can already comment on this using trends in tax and benefit aggregates in Table 1. Yet we must keep in mind that these trends combine the stabilization effect (how taxes paid and benefits received vary due to changes in market incomes) and the effect of policy reforms during the period. Tax changes in Germany and France seem regressive. In particular, in Germany, the tax bill falls substantially between the two periods (-11%), likely due to the change in taxation of capital income previously described. Conversely, tax payments increase in Ireland, following the exceptional measures described above and, in particular, the introduction of a Tax Levy on all gross incomes. Social security contributions increase a lot but mean changes hide the progressive structure of the Health Levy. The tax increase in the UK is small and in line with the gross income increase. In France (and the UK),

10

the transfer system contributes most to the increase in disposable income with households receiving an average of 9% (11%) more in transfers in 2010 compared to 2008, probably influenced by the uprating of social transfers and tax credits and the introduction of an in-work transfer, the RSA, in France as described above. A similar and even stronger redistributive effect can be observed for Ireland, with a 24% increase in transfers between 2008 and 2010 more than compensating for the sharp rise in employee contributions and cushioning much of the dramatic decrease in mean gross income. Policy changes on the benefit side are more modest in Germany, with transfer payments increasing by only 1% over the period. Again, these trends combine the interaction of existing policies with changes in market income, together with genuine tax-benefit policy reforms over the period. The decomposition approach suggested hereafter allows us to disentangle these two factors.

Table 1: Mean Household Income, Taxes and Transfers

	France			Germany			Ireland			UK		
	2008	2010	% Δ	2008	2010	% Δ	2008	2010	% Δ	2008	2010	% Δ
Gross income	2,905	2,865	-1.4%	2,693	2,684	-0.4%	3,383	3,008	-11.1%	2,156	2,177	1.0%
Taxes	523	493	-6%	589	525	-11%	466	499	7%	461	472	2%
Transfers	1,113	1,217	9%	986	993	1%	1,017	1,263	24%	527	587	11%
Employees' contrib.	296	251	-15%	396	409	3%	93	149	59%	152	155	2%
Self-employed contr.	50	48	-4%	37	32	-13%	21	29	38%	11	10	-2%
Disposable income	3,149	3,289	4.4%	2,585	2,638	2.1%	3,817	3,631	-4.9%	2,059	2,126	3.3%
No. of households	10,418	11,042		13,312	13,079		5,247	4,642		25,088	25,200	

Monetary values for Ireland, France and Germany are in current Euros. Monetary values for the UK are in current pounds sterling. German and French results from 2008 and 2010 Euromod systems used with 2008 and 2010 EU-SILC data. UK results from Euromod 2008 and 2010 systems using 2008/9 and 2009/10 FRS data. Irish results from SWITCH 2008 and 2010 using 2008 and 2010 EU-SILC data

3.3 Definitions and the Decomposition Method

First, it is important to define our terminology and the scope of the policy changes that we intend to characterize in what follows. Our analysis focuses on changes in the distribution of household disposable income (after equivalization to account for household size and composition, using the modified OECD equivalent scale). 'Disposable income', as widely used to measure poverty and inequality, is defined as all household incomes net of taxes and social contributions and after receipt of all types of benefits. By household 'gross income' or 'market income', we mean the total amount of labor income (including replacement incomes, i.e., public pensions and unemployment benefits, in France and Germany), capital income and private pensions before taxes and benefits. The only difference of treatment between countries concerns the nature of replacement incomes (public pensions and unemployment benefits). They are considered as transfers in the

UK and Ireland because public pensions and unemployment insurance can be viewed as part of the redistributive system (maximum benefit levels are not tied to the amount of past contributions). For France and Germany, pensions and unemployment benefits are insurance mechanisms, with payments closely related to contributions levels (even if the latter are capped above a certain income level), so that we treat them as replacement income among other sources of gross income.

Our decomposition analysis will isolate a "policy effect" from "other effects", as sketched above. The "policy effect" denotes the contribution of changes in tax-benefit policies related to direct taxation (including tax allowances and tax credits), social security contributions, non-contributory benefits (child and family benefits as well as social assistance) and, for the UK and Ireland, the contributory benefits treated as redistribution (essentially Jobseeker's allowances and public pensions).[15] "Other effects" correspond to all other factors influencing the disposable income distribution, i.e. changes in gross incomes due to market forces but also non-simulated policies (changes in minimum wage, changes in unemployment benefit in France and Germany etc.).[16]

We define four main simulated distributions of disposable income in our analysis. The first two are simply the base and end period disposable income distributions, which we denote (0) and (4) respectively, obtained by applying the tax-benefit rules of base and end period to the corresponding household gross incomes. These income distributions are simulated so Gini indices or poverty rates calculated on the basis of these distributions may not coincide precisely with official data or with Gini and poverty rates calculated from observed disposable incomes at base and end periods. In Appendix 3, we explain in detail how and why simulated inequality and poverty measures differ in *levels* from observed ones at any point in time. We show nonetheless that they are relatively close in terms of *time variation*, which is the key aspect for the validity of our analysis (see Figure A.1 in the Appendix).

The value added of our approach comes precisely from the ability to simulate actual as well as possible income distributions and, essentially, counterfactual distributions. We define scenario (2) as the end year distribution under the assumption that tax-benefit policies have not changed between the two years. Symmetrically, we characterize scenario (3) as the end year distribution assuming no change in all other factors, including the distribution of market incomes (i.e. assuming that the only change over the period is

---

[15]Simulated policies, defining the scope of our policy effect, are listed in Table A.1 in the Appendix while the actual changes in these policies over the period were described in section 2 and summarized in Table A.2 in the Appendix.

[16]For Ireland, changes to public sector wages are also counted in our 'policy effect', as discussed above. Failure to model the pension related deduction affecting public sector pay would mean that the effect of this would not be picked up in the 'other effect' as it affected net and not gross pay.

due to tax-benefit policy reforms). We introduce some notation to describe the construction of these counterfactuals. Denote y a matrix describing the population contained in the data, i.e., each row contains all the information about a given household, including various gross/market income sources and socio-demographic characteristics. Denote d the 'tax-benefit function' transforming, for each household, gross incomes and household characteristics into a certain level of disposable income. Tax-benefit calculations also depend on a set of monetary parameters p (e.g., maximum benefit amounts, threshold level of tax brackets, etc.). Thus, the distribution of disposable income is represented hereafter by $d_i(p^j, y^l)$, for a hypothetical scenario including the population of year l, the tax-benefit parameters of year j and the tax-benefit structure of year i. We are interested in relative inequality/poverty indices I, computed as a function $I\left[d_i(p^j, y^l)\right]$ of the (simulated) distribution of disposable income. Denoting base and end years by 0 and 1 respectively, we first simulate the base and end year situations (0) and (4) as described above, corresponding to $d_0(p^0, y^0)$ and $d_1(p^1, y^1)$ respectively.

To construct our key counterfactual scenarios (2) and (3), we must consider the possibility of nominally adjusting income levels by the uprating factor α^1, i.e., the income growth rate between year 0 and year 1. That is, $\alpha^1 y^0$ retains the structural characteristics of year 0 data (in particular, the distribution of gross income) but adopts the nominal levels prevailing in year 1. Policy changes can combine changes in policy structure d and changes in parameters p (the 'policy uprating'). We define counterfactuals where tax-benefit monetary parameters can be uprated using the same factor α^1 that is used to scale up the distribution of gross income between period 0 and 1. Clearly, the nominally adjusted system, denoted $\alpha^1 p^0$, is not identical to the *actual* set of parameters p^1 as decided by the authorities.[17] Thus, scenario (2) is written $d_0(\alpha^1 p^0, y^1)$, i.e. it is the no-reform counterfactual where the only policy change between years 0 and 1 is an uprating of money parameters in line with income growth, as explained above. It can be used in a first decomposition:

$$
\begin{aligned}
\Delta \;=\; & \left\{ I\left[d_1(p^1, y^1)\right] - I\left[d_0(\alpha^1 p^0, y^1)\right] \right\} && \text{(policy effect)} && \text{(I)} \\
& + \left\{ I\left[d_0(\alpha^1 p^0, y^1)\right] - I\left[d_0(\alpha^1 p^0, \alpha^1 y^0)\right] \right\} && \text{(other effects)} \\
& + \left\{ I\left[d_0(\alpha^1 p^0, \alpha^1 y^0))\right] - I\left[d_0(p^0, y^0)\right] \right\} && \text{(income growth)}.
\end{aligned}
$$

where the policy effect is evaluated while holding the population constant at end year. Scenario (3) is written $d_1(p^1, \alpha^1 y^0)$ and corresponds to the counterfactual where the market income distribution is hold constant (market incomes and policy parameters are just

---

[17]Bargain and Callan (2010) show that gross income inflation is a distributionally neutral factor that seems most appropriate for this decomposition exercise. The choice of the uprating factor is also discussed in length in Bargain (2012).

uprated using the same α^1 factor). It is used in a second decomposition:

$$
\begin{aligned}
\Delta \;=\; & \left\{ I\left[d_1(p^1, y^1)\right] - I\left[d_1(p^1, \alpha^1 y^0)\right] \right\} && \text{(other effects)} && \text{(II)} \\
& + \left\{ I\left[d_1(p^1, \alpha^1 y^0)\right] - I\left[d_0(\alpha^1 p^0, \alpha^1 y^0)\right] \right\} && \text{(policy effect)} \\
& + \left\{ I\left[d_0(\alpha^1 p^0, \alpha^1 y^0))\right] - I\left[d_0(p^0, y^0)\right] \right\} && \text{(income growth)}.
\end{aligned}
$$

where the policy effect is evaluated while holding the population constant at the base year.

In both decompositions, the last term is identical. It depends on another counterfactual scenario $d_0(\alpha^1 p^0, \alpha^1 y^0)$, denoted situation (1) hereafter. Notice that tax-benefit functions $d(p, y)$ are usually linearly homogeneous in p and y, i.e. a simultaneous change in nominal levels (e.g. switching from French Franc to Euro) of both gross incomes and monetary tax-benefit parameters should not affect the relative position of households in the distribution of disposable income. The direct consequence of this is that scenario (0), i.e. $d_0(p^0, y^0)$, should be equal to scenario (1). That is, the 'income growth' component, the third term in both decompositions, should be zero. While this should be the case in France, Ireland and the UK, part of the German system may not fulfill this condition. Germany is characterized by a concave income tax function, in contrast to the piecewise linear income tax schedule of other countries and, therefore, a non-homogenous tax-benefit function. We shall check this empirically in the next section.

Finally, since there is no compelling reason for preferring the first decomposition over the second, we also compute the Shorrocks-Shapley decomposition by averaging the contributions for the two decompositions above, which gives the average policy effect, P, and the average other effect, O:

$$
\begin{aligned}
P \;=\; & 1/2 * [I[d_1(p^1, y^1)] - I[d_0(\alpha^1 p^0, y^1)]] + 1/2 * [I[d_1(p^1, \alpha^1 y^0)] - I[d_0(p^0, y^0)]] \\
O \;=\; & 1/2 * [I[d_0(\alpha^1 p^0, y^1)] - I[d_0(p^0, y^0)]] + 1/2 * [I[d_1(p^1, y^1)] - I[d_1(p^1, \alpha^1 y^0)]].
\end{aligned}
$$

4 Results

The main results are shown in Figures 3 to 5 and we discuss each country separately below. In each graph, we summarize the main trends, with bars representing base year indices normalized to 100, end year indices and index levels under the counterfactual "policy effect" (if only policies had changed, i.e. market income uprated in a distributionally neutral way) and the counterfactual "other effects" (if policies were unchanged, i.e. only uprated in a distributionally neutral way). Tables A.4 to A.6 in Appendix A present the complete decomposition results for Germany, France, Ireland and the UK respectively. In these tables, we report poverty and inequality statistics relating to the base period 0 (corresponding to year 2008) in column (0) of each table and the end period 1 (corresponding

14

to year 2010) in column (4). Three counterfactuals are also presented, as discussed above. Column (1) shows the base period indices where both the data and the policies are uprated to the end period. The difference between column (0) and column (1) is a check of the linear homogeneity property discussed above. We observe that for all inequality and poverty indices, this component is zero so that homogeneity holds and the third component of both decompositions can be ignored.[18] Thus we can concentrate on the main components of the decomposition method. Column (2) shows the poverty/inequality indices for end year data with (uprated) base year policies while column (3) shows indices for (uprated) base year data with end year policies. The difference between columns (4) and (0) depicts the total change in each index between 2008 and 2010. This is decomposed into the (negligible) income growth effect, the tax-benefit policy effect and the "other" effect which encompasses market income changes and all other potential influences. We report three decompositions, the end-period weighted decomposition I, the base-period weighted decomposition II and the Shorrocks-Shapley decomposition, i.e the average of these two. We observe that all three decompositions lead to similar conclusions, which reassures us that results are not sensitive to the decomposition path chosen. Therefore, and for conciseness, we shall base our comments on the Shapley decomposition results. The battery of indices we study includes the Gini, the Atkinson index and percentile ratios for inequality. For the risk of poverty (which we simply denote poverty hereafter for the sake of brevity), we report the headcount ratio (FGT0), the intensity of poverty (FGT1) and the depth of poverty when applying the principle of transfers among the poor (FGT2). (Risk of) poverty is relative, i.e. measured as the proportion of households below a poverty line set at 60% or 50% of the median of equivalized income. We report overall poverty and poverty for sub-population. Child poverty is measured as the poverty rate of households with children under 18, according to the Eurostat definition and elderly poverty is defined as poverty of households headed by adults over 60 years of age. We also calculate changes in a more absolute measure of poverty by simply anchoring the poverty lines to their initial (base year) levels.[19]

---

[18]We have calculated bootstrapped standard errors and find that this difference is not statistically different from zero for all countries (even for Germany where non-homogeneity could be expected due to income taxation, as previously explained).

[19]The anchored poverty measure consists of fixing the the poverty line at 60% of the median income of the base year distribution and adjusting it nominally for the end year and the different counterfactuals. Adjustments are made using α^1 to preserve the homogeneity of the absolute poverty measure, which would not be the case if we used CPI (EUROSTAT definition). In the latter case, the difference between (1) and (0) would simply reflects the people who switch from poor to nonpoor due to a poverty line adjusted by inflation rather than gross income growth (and not a check of the homogeneity property). In this case, nonetheless, results are similar at least in two ways: the sign of the total change (4)-(1) is unchanged and the relative contributions of the policy effect versus other effects are also very similar to

4.1 France

We first see that inequality has increased between 2008 and 2010 in France, with the Gini index rising by 7.1% (from 26.5 to 28.4) and the Atkinson index increasing by 15.9% (from 6.1 to 7). These increases are almost entirely due to changes in market income. A small policy effect working in the opposite direction is obtained with decomposition II but not with decomposition I. For the poorest, relative positions deteriorate since the relative poverty headcount has increased by 13.4%, from 10.3% to 11.7%. This is the result of a strong shock to their market income ("other effects") with just a very small compensation by policy effects. The most spectacular result is the rise in the intensity of poverty, captured by the FGT1. It follows the same pattern as headcount poverty, i.e. the increase of 24.1% is almost entirely due to market income effects, reflecting how increasing unemployment has affected the lower part of the income distribution. Turning to "absolute" poverty changes, i.e. when fixing the poverty line at a constant level in real (income inflation adjusted) terms, we confirm that the standard of living of the poor has increased thanks mainly to the policy effect. We can conjecture that the positive policy effect is largely due to the RSA reform and its in-work component that provided an income top-up to the working poor. Absolute poverty has decreased by 9.9% while it would have decreased by just 3% without actual policy changes. Child poverty is observed to increase by 4.8% over the time period studied. This increase is driven by market income changes although policy effects do compensate for these to some extent. The increase in child poverty would have been 10.5% in the absence of policy changes (notably, the introduction of the RSA). Absolute child poverty is reduced by 19.4% since, in this case, both policy and other effects cumulate so that the living conditions of family with children improve. Relative elderly poverty is stable over the period.

4.2 Germany

In terms of inequality, there have been some small changes between 2008 and 2010 in Germany. The Gini index decreased by 1.7%, from 27.5 to 27.1, over this period (the Atkinson index also decreased from 6.7 to 6.6). This is entirely due to the market income effect. The percentile ratios in Table A.4 show, however, a slight increase in inequality at the bottom of the distribution driven by policy changes, i.e. the ratio of the 50th percentile of income to the 10th percentile. A decline in the relative position of those at the bottom of the distribution is confirmed by the poverty measures. Headcount ratio poverty, with a relative poverty line set at 60% of the median, increased by 6.6% between 2008 and 2010, from 16.1% to 17.2% of the German population. This is mainly due to

our base results (complete tables using CPI instead of α^1 are available from the authors).

Figure 3: Decomposing Inequality/Poverty Change (France, 2008-2010)

Measures based on the simulated distribution of disposable income using Euromod with 2008 and 2010 EU-SILC data (incomes from 2007 and 2009); these indices are expressed relatively to initial period values, normalized to 100.
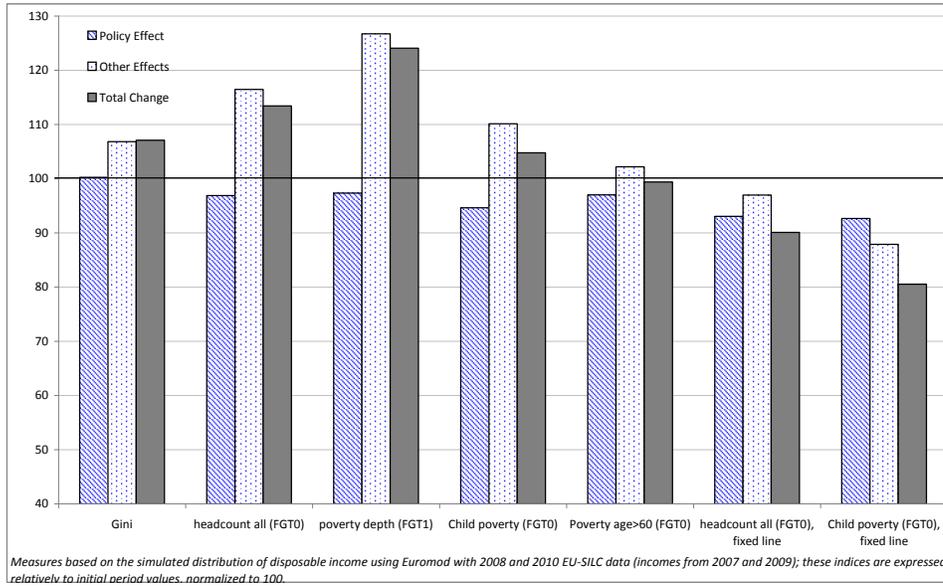
policy changes, with a very small increase also attributable to market income. Like in France, one of the most pronounced changes is the increase in poverty depth (FGT1 and FGT2) over the period, attributable to market income changes for half and to tax-benefit reforms for the other half. These trends reflect changes in the relative position of the lowest income groups but not changes in their absolute standard of living. When fixing the poverty line in real terms, we observe a decrease in the headcount ratio due to the policy effect. Turning to child poverty, we also observe a decrease in their relative position while, this time, all of it is explained by market income changes. There is a compensating effect of policy, indicating that the increase in child poverty would be twice as high in the absence of the policy effect which is likely to be attributable to increases in child benefits and education allowances. When anchoring the poverty line, we see that these policies in favor of families with children had a large compensatory effect and managed to increase the absolute standard of living of these families, despite the negative shock to market income. By contrast, the increase of 4.3% in the headcount ratio for those aged over 60 is entirely due to tax-benefit policy changes. These are likely to include the change in capital income taxation which should disproportionately affect the retired.[20]

---

[20]The "other effects" includes unemployment insurance reforms which can explain some of the increase in absolute standard of living of this group.

Figure 4: Decomposing Inequality/Poverty Change (Germany, 2008-2010)

Measures based on the simulated distribution of disposable income using Euromod with 2008 and 2010 EU-SILC data (incomes from 2007 and 2009); these indices are expressed relatively to initial period values, normalized to 100.
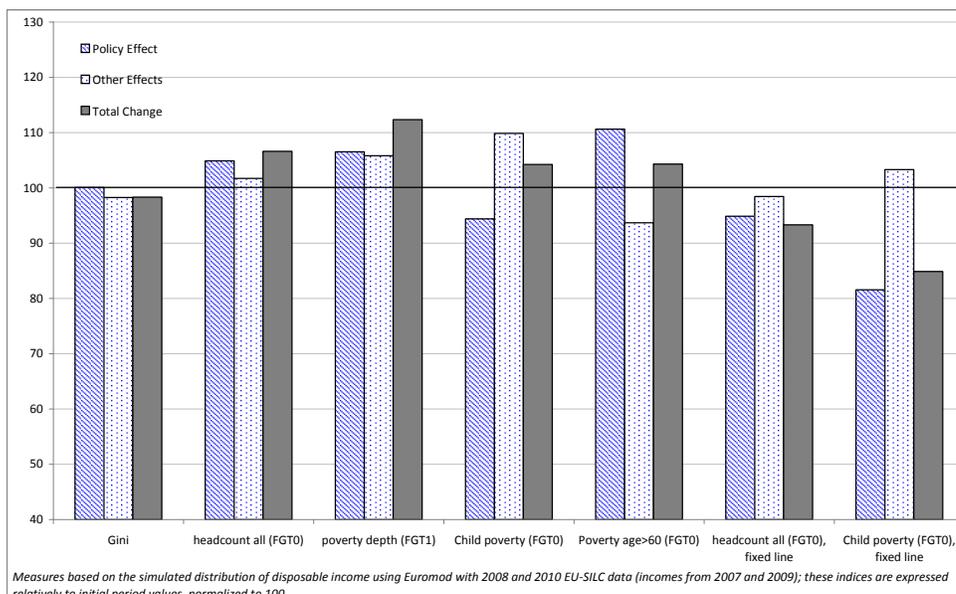
4.3 Ireland

Changes in market income have led to an increase in both inequality and poverty in Ireland. Yet the impact on poverty is relatively modest compared to France and, especially, compared to what could have been expected in a context of massive job losses. This is explained in part by the fact that earnings in the worst hit sector (housing and construction) were relatively high before the crisis. Interestingly, results for the policy effects are particularly clear cut with respect to the intuitions sketched in the policy descriptions of section 2.2. Indeed, policy changes have partly tempered the market effect in the case of inequality and more than compensated for it in the case of relative poverty. More precisely, the Gini index has slightly increased between 2008 and 2010, from 29.1 to 29.2 (+0.5%) as has the Atkinson index (+2.7%). These indices would have risen by 10.2% and 20.3% respectively, had actual tax-benefit policy reforms not taken place, i.e. policy changes have neutralized around 95% of the inequality increase due to the effect of the crisis on the income distribution (see also O'Donoghue et al., 2013). In line with the small change in the Gini, there was little change in the percentile ratios. Regarding poverty, our simulation results show a small, consistent decrease in all poverty measures. The key point from the simulation results is that the decline in relative poverty is the result of a strong policy effect counteracting market forces. In particular, the headcount ratio decreased by 12.2% while it would have increased by 11.3% in the absence of actual policy changes. The strongest upward pressure on poverty from changes in market incomes affects the over

18

sixties (42.1% increase in the absence of policy).[21] The total effect, −18.1%, nonetheless reflects the impact of policy choices benefiting the elderly.[22] The poverty reducing effect for families with children is likely to be due to broadly stable welfare payments and the increased targeting of family transfers, as described above, i.e. the compensation of cuts to the universal Child Benefit by increased payments to welfare recipients.

Figure 5: Decomposing Inequality/Poverty Change (Ireland, 2008-2010)

Measures based on the simulated distribution of disposable income using SWITCH with 2008 and 2010 EU-SILC data; these indices are expressed relatively to initial period values, normalized to 100.
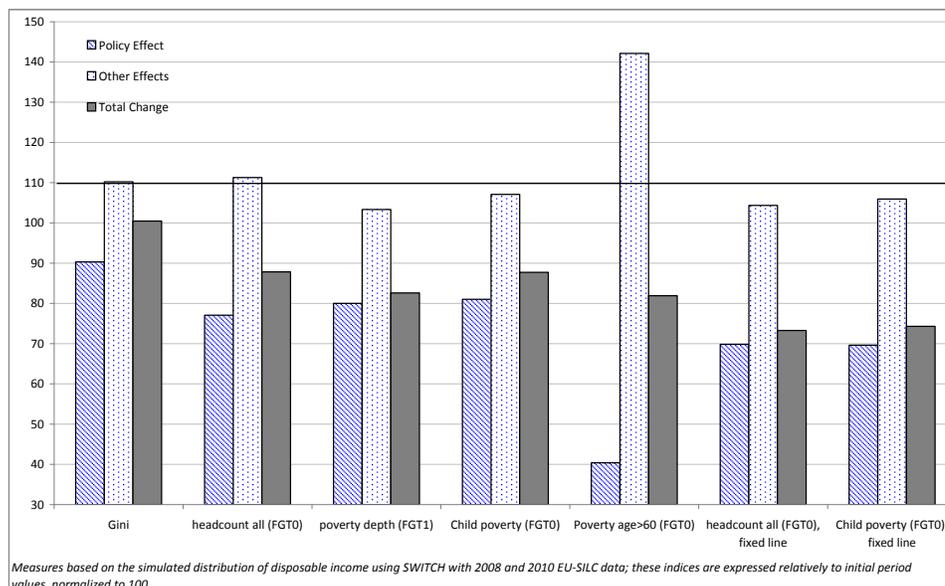
4.4 UK

The Gini measure fell from 32.8 to 31.5 in the UK during the period under analysis (−4.2%) and the Atkinson index also registered a decrease (−17.8%). The decline in inequality seems to occur mainly in the first half of the distribution, with a decrease of the p50/p10 percentile ratio. These changes are driven mainly by tax-benefit policy reforms of the period. Results are in the same line regarding poverty. Relative poverty has slightly decreased (the headcount ratio decreases by 1.9%), driven by tax-benefit policy changes such as the uprating policies for benefits and the working tax credit or the

---

[21]Between 2008 and 2010, a slightly higher proportion of the over sixties define themselves as being retired or unemployed, while a lower proportion report themsleves as being employed or self employed, thus impacting upon the proportion of the over sixties in receipt of employee or self employed income.

[22]Benefit recipients over 65 were the only group to receive an increase in social welfare payment rates in 2009 and not see them decline in later budgets. Moreover, the Income Levy introduced in 2009 also had a higher exemption limit for the over 65's.

lower standard tax rate. These reforms have more than compensated for the tendency of market income changes to increase poverty. This is also reflected in the pronounced drop in absolute poverty (-10.9%). Admittedly, the intensity of relative poverty has slightly increased, driven by market forces, but the depth of absolute poverty has been reduced thanks to tax-benefit policy changes. Child poverty rates saw a sharp decline from 20% to 18.6% in 2010 due to policies, most likely due to increases in child benefit rates ($+8\%$ between 2008 and 2010) and increases in child tax credits, as documented previously. Once again, market income changes actually pushed child poverty rates in the opposite direction but the net overall change was negative. Elderly poverty rates also saw a fall of 1.6 percentage points, mainly due to changes in market income although tax-benefit policy also had a role to play.

Figure 6: Decomposing Inequality/Poverty Change (UK, 2008-2010)
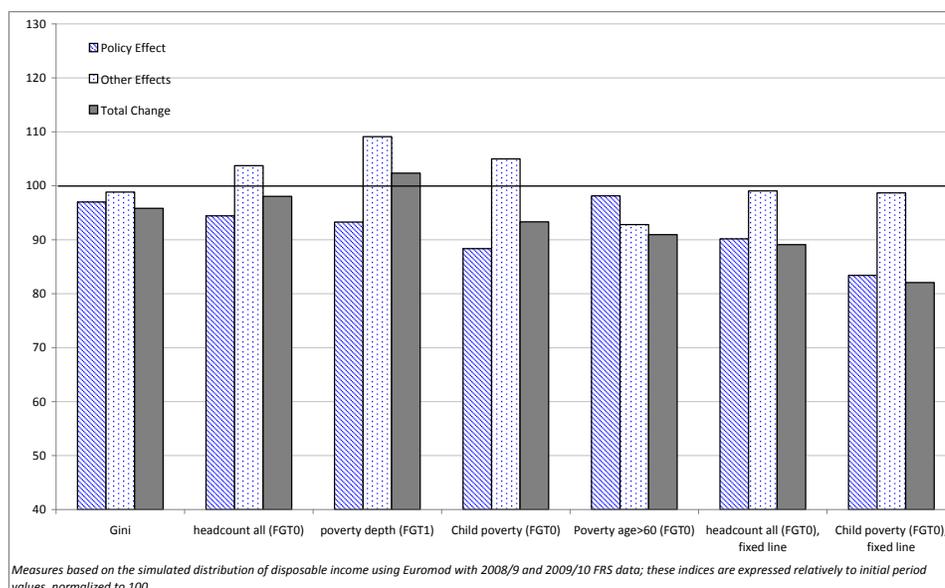
5 Concluding Discussion

This paper examined the impact on inequality and poverty of the first three years of the Great Recession in France, Germany, Ireland and the UK. Using microsimulated counterfactuals, we decompose changes in inequality and poverty measures into the contribution of tax-benefit policy changes and all other factors, notably those impacting on gross income distributions because of the crisis (job losses, work sharing, wage cuts) or because of other, non-simulated policies (e.g. minimum wage changes etc.). To put results in

Figure 7: Decomposing Inequality/Poverty Change: International Comparison
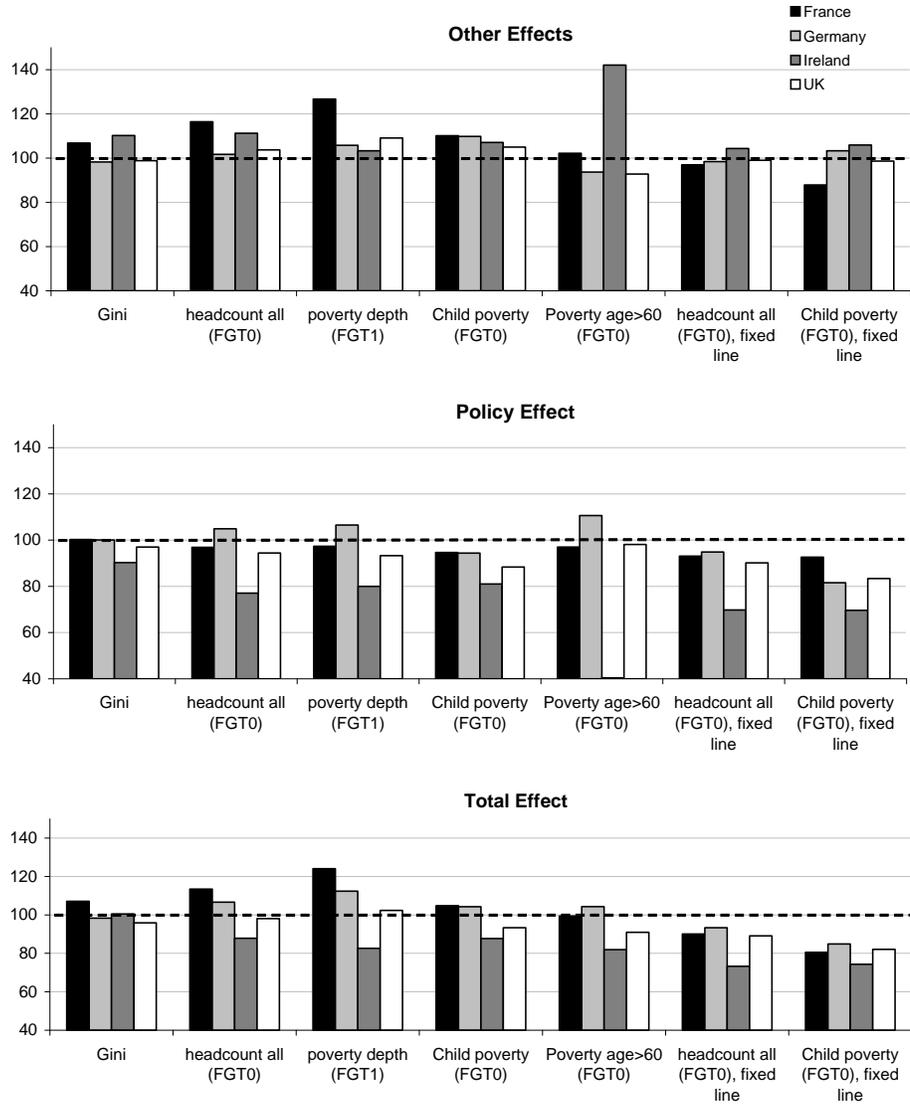
perspective, Figure 7 compares policy and other effects for all countries, unveiling very contrasted trends. Maybe counter to intuition, the country most affected by the economic turmoil, Ireland, implemented a strong and very progressive set of policy responses over this period. To a large extent, this policy response served to offset the rise in inequality and relative poverty which would have arisen from changes in unemployment and market income. While policy effects are comparable in France and the UK, they did not prevent a rise in the relative poverty count and intensity due to market forces in France, while they managed to stabilize or even reduce them in the UK. Another unexpected result is the relatively regressive policy response in Germany. While the period under investigation is too short to draw conclusions regarding a change in the German social model, the years 2008-2010 have, nonetheless, witnessed a combination of regressive tax policy and slow uprating of social benefits for the poorest and these are responsible for increased poverty in this country. Overall, a general conclusion from our analysis is that tax-benefit policy effects have had a very important role, sometimes larger than the shock on market incomes due to the crisis. For instance, policy effects explain almost all of the relative poverty increase in Germany and of the decline in relative poverty in Ireland and the UK. As stressed in the introduction, our analysis unfortunately stops in 2010 due to the unavailability of combined microsimulation and data for more recent years in such a comparative framework as the one we use. It is, nonetheless, important to characterize the policy responses that have followed the onset of the economic slump while our study has performed this for the first dip in the recent recession.

References

[1] Bargain, O., 2012. "The distributional effects of tax-benefit policies under New labor: A Shapley decomposition", Oxford Bulletin of Economics and Statistics, 74(6), 856-874

[2] Bargain, O. & Callan, T., 2010. "Analysing the effects of tax-benefit reforms on income distribution: a decomposition approach," Journal of Economic Inequality, Springer, 8(1), 1-21.

[3] Bargain, O., H. Immervoll, A. Peichl, S. Siegloch, 2012: "Distributional consequences of labor-demand shocks: the 2008–2009 recession in Germany", International Tax and Public Finance, 19 (1), 118-138

[4] Brenke, K., Rinne, U. & Zimmermann, K., 2011. "Short-Time Work: The German Answer to the Great Recession," IZA Discussion Papers 5780, Institute for the Study of Labor (IZA).

[5] Bruckmeier, K. & Wiemers, J. , 2011 : A new targeting: a new take-up? Non-take-up of social assistance in Germany after social policy reforms. Empirical Economics, 43(2), 565-580.

[6] Burda, M. & Hunt, J., 2011. "What Explains the German Labor Market Miracle in the Great Recession," Brookings Papers on Economic Activity, Economic Studies Program, The Brookings Institution, 42(1), 273-335.

[7] Callan, T. & Keane, C. & Savage, M. & Walsh, J., 2012. "Distributional Impact of Tax, Welfare and Public Sector Pay Policies: 2009-2012," Quarterly Economic Commentary: Special Articles, ESRI, vol. 2012(4-Winter).

[8] Clark, T. & Leicester, A., 2004. "Inequality and two decades of British tax and benefit reform", Fiscal Studies, 25 (2): 129-158.

[9] Dardanoni, V. & Lambert, P., 2002. "Progressivity comparisons", Journal of Public Economics, 86, 99-122.

[10] Doorley, K., 2013. "EUROMOD Country Report France, 2009-2012"

[11] Doorley, K., Eichhorst, W. & Kendzia, M., 2013."Report No. 52: The Social and Employment Situation in Ireland (Update February 2013),"IZA Research Reports 52, Institute for the Study of Labor (IZA).

[12] Esping-Andersen, G.1990. The three worlds of welfare capitalism. Cambridge: Polity Press

[13] Jenkins, S., Brandolini, A., Micklewright, J. & Nolan, B. (eds), 2013 "The Great Recession and the Distribution of Household Income", UK: Oxford University Press.

[14] Keane, C., Kelly, E., Timoney, K. & Callan, T., 2013. "EUROMOD Country Report: Ireland, 2009-2012"

[15] Lambert, P. & Thoresen, T., 2009. "Base independence in the analysis of tax policy effects: with an application to Norway 1992-2004", International Tax and Public Finance, 16, 219-252.

[16] McLaughlin, E., 1993. "Ireland: Catholic Corporatism" in, A. Cochrane and J. Clarke (eds) Comparing welfare states: Britain in international context. London: Sage

[17] Ochmann, R. & Fossen, F., 2012. "EUROMOD Country Report Germany, 2009-2012"

[18] O'Donoghue, C., J. Loughrey & K. Morrissey, 2013. "Using the EU-SILC to Model the Impact of the Economic Crisis on Inequality", IZA Discussion Paper No. 7242

[19] Sutherland, H., 2013. "EUROMOD Country Report UK, 2009-2012"

A Appendix

A.1 Description of Tax-Benefit Policies

Table A.1: Description of Microsimulated Tax-Benefit Policies

	France	Germany	Ireland
Taxation and Social Security Contributions			
	Income tax	Income tax	Income tax
	Tax credit (PPE)	Tax allowances	Family Income Supplement
	Solidarity Contribution (CSG, CRDS)	Solidarity Surplus Tax	Income Levy
	Employees' social security contributions	Employees' social security contributions	Employees' social security contributions
	Employers' social security contributions	Employers' social security contributions	
Family Benefits			
	Universal child benefit	Universal child benefit	Universal child benefit
	Back to school benefit	Child Raising Allowance (a)	Maternity benefit
	Additional means-tested child benefits	Benefit for Non-Earning Mothers (b)	Home Carer Tax Credit
Social Benefits			
	Housing benefits	Housing support (c)	Rent/Mortgage Supplement
	Widow benefit	Social assistance (d)	Survivor's & Widow's Benefits
	Minimum pension	Social assistance (d)	Pre-Retirement & old age Benefits
	Disability benefit	Social assistance (d)	Disabled, Invalidity & Injury Benefits
	Social assistance (RMI or RSA)	Social assistance (d)	Long Term Unemployed Benefits
			Social Minimum
	Social assistance for lone parents (API)	Social assistance (d)	Lone Parent Benefits

(a) "Bundeserziehungsgeld" and "Landeserziehu
(b) "Entbindungsgeld"
(c) "Wohngeld"
(d) Sozialhilfe

24

Table A.2: Description of Tax-Benefit Policy Changes over 2008-2010

	France	Germany	Ireland	UK
Structural reforms: Taxes and Contributions				
Tax on capital income	Withholding tax on capital increased by 2 points in 2009; 1.1% tax on capital to finance RSA in 2010	In 2009, introduction of withholding tax on capital income of 25%; tax allowance increased		
Progressive income tax	Two-thirds relief of the tax bill for lowest earners in 2009; top marginal tax rate increased by 1 point in 2010	Lowest income tax rate decreased by 1 point in 2010	Income Levy of 2 to 6% on all gross incomes, by end of 2009	50% top tax rate introduced in 2010
Social security contributions			Health Levy doubled (to 4%, and 5% on high incomes) over the period	Standard rate reduced from 17.5% to 15% in 2009
Structural reforms: Benefits				
Social (and unemployment) assistance	Extension of social assistance to the working poor (RSA) in 2009		In 2010, Jobseekers Allowance reduced for those aged 18-21	
Child benefits, tax credits & social transfer child increments		Reforms of universal child benefit, education benefit and child allowances in 2009	Over the period, decrease in child benefit (see below) compensated for poor families by an increase of 24% in social benefit child increments	Child increment of the Child Tax Credit increased by 7.2% over the period
Uprating policies: % change in tax-benefit monetary parameters between 2008-2010				
Social Assistance payments	2.7%	1.2%	-0.9%	8.2%
Child benefit payments £	3.0%	6.5%	-9.6%	8.0%
SSC thresholds †	6.2%	2.9%	0.0%	7.2%
Income tax thresholds †	1.9%	3.0%	2.6%	6.3%
In-work transfer ‡	0.0%	n/a	2.0%*	6.7%
For comparison: % change in mean wage and income				
Minimum wage	2.7%	n/a	0.0%	5.1%
Mean wage	1.8%	2.3%	-3.9%	1.7%
Uprating factor α *	-1.4%	-0.4%	-11.1%	1.0%

£, the Child Tax Credit in the UK has been frozen nominally

† Social security contribution (SSC) and Income tax thresholds averaged over all thresholds. In Ireland, no change to the SSC ceiling but an increase of 48% in the maximum amount payable.

‡ In-work benefit or tax credit on labor income. In Ireland, Family Income Supplement received is 60% of the gap between family income and an income limit. This income limit increased by 3.3%, hence a 2% increase i.e. 60%*3.3%

* Factor α is the distributionally-neutral uprating factor used in the "no reform" scenarios; it is calculated as the % change in mean income over the period and necessarily smaller than wage progression in time of job losses and work sharing.

A.2 Detailed Decomposition Results

Table A.3: Decomposition of Inequality/Poverty Changes (France, 2008-2010)

data year: uprated to:	0	0 1	1	0 1	1	Total change	Homog- eneity check	Decomposition I		Decomposition II		Shorrocks-Shapley Decomposition	
policy year: uprated to:	0	0 1	0 1	1	1			Policy effect	Other effects	Policy effect	Other effects	Policy effect	Other effects
	(0)	(1)	(2)	(3)	(4)	(4)-(0)	(1)-(0)	(4)-(2)	(2)-(1)	(3)-(1)	(4)-(3)	Mean of (4)-(2), (3)-(1)	Mean of (2)-(1), (4)-(3)
Inequality													
Gini	26.5	26.5	27.8	26.1	28.4	1.9	0.0	0.5	1.4	-0.4	2.3	0.1	1.8
Atkinson 0.5	6.1	6.1	6.8	5.9	7.0	1.0	0.0	0.2	0.7	-0.2	1.1	0.0	0.9
P90/P10	3.04	3.04	3.12	2.98	3.16	0.12	0.00	0.04	0.08	-0.05	0.17	-0.01	0.13
P90/P50	1.81	1.81	1.82	1.80	1.84	0.03	0.00	0.02	0.01	-0.01	0.04	0.00	0.03
P50/P10	1.68	1.68	1.71	1.66	1.72	0.03	0.00	0.00	0.03	-0.02	0.05	-0.01	0.04
Total poverty (60% median income)													
FGT0 (%)	10.3	10.3	11.8	9.8	11.7	1.4	0.0	-0.1	1.5	-0.6	2.0	-0.3	1.7
FGT1 (%)	2.3	2.3	2.9	2.2	2.9	0.6	0.0	0.0	0.6	-0.1	0.7	-0.1	0.6
FGT2 (%)	1.0	1.0	1.3	0.9	1.2	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.3
Total poverty (50% median income)													
FGT0 (%)	4.9	5.0	6.2	4.8	6.4	1.5	0.0	0.2	1.3	-0.2	1.7	0.0	1.5
FGT1 (%)	1.3	1.3	1.7	1.2	1.7	0.4	0.0	0.0	0.4	-0.1	0.4	0.0	0.4
FGT2 (%)	0.6	0.6	0.8	0.6	0.8	0.2	0.0	0.0	0.2	0.0	0.2	0.0	0.2
Total poverty (poverty line fixed at 60% median)													
FGT0 (%)	10.3	10.3	9.9	9.5	9.3	-1.0	0.0	-0.5	-0.5	-0.9	-0.1	-0.7	-0.3
FGT1 (%)	2.3	2.3	2.5	2.2	2.3	0.0	0.0	-0.2	0.2	-0.2	0.2	-0.2	0.2
FGT2 (%)	1.0	1.0	1.1	0.9	1.0	0.1	0.0	-0.1	0.2	-0.1	0.1	-0.1	0.1
Child poverty													
FGT0 (%)	10.5	10.5	11.6	9.9	11.0	0.5	0.0	-0.6	1.1	-0.5	1.0	-0.6	1.1
FGT1 (%)	2.1	2.1	2.0	2.0	2.2	0.1	0.0	0.2	-0.1	-0.1	0.1	0.1	0.0
FGT2 (%)	0.8	0.8	0.6	0.8	0.7	-0.1	0.0	0.1	-0.2	0.0	-0.1	0.0	-0.1
Child poverty (poverty line fixed)													
FGT0 (%)	10.5	10.5	9.1	9.6	8.4	-2.0	0.0	-0.6	-1.4	-0.9	-1.1	-0.8	-1.3
FGT1 (%)	2.1	2.1	1.6	1.9	1.6	-0.5	0.0	0.0	-0.5	-0.1	-0.4	0.0	-0.4
FGT2 (%)	0.8	0.8	0.5	0.8	0.5	-0.3	0.0	0.0	-0.3	-0.1	-0.2	0.0	-0.3
Poverty age>60													
FGT0 (%)	10.5	10.5	9.9	9.4	10.4	-0.1	0.0	0.5	-0.6	-1.1	1.1	-0.3	0.2
FGT1 (%)	1.7	1.7	1.9	1.5	1.9	0.1	0.0	-0.1	0.2	-0.2	0.4	-0.2	0.3
FGT2 (%)	0.5	0.5	0.6	0.4	0.6	0.1	0.0	-0.1	0.2	-0.1	0.2	-0.1	0.2
Poverty age>60 (poverty line fixed)													
FGT0 (%)	10.5	10.5	8.2	8.8	7.5	-3.0	0.0	-0.7	-2.3	-1.7	-1.3	-1.2	-1.8
FGT1 (%)	1.7	1.7	1.6	1.4	1.3	-0.4	0.0	-0.2	-0.2	-0.3	-0.1	-0.3	-0.1
FGT2 (%)	0.5	0.5	0.5	0.4	0.4	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.1	0.0
Other poor													
FGT0 (%)	10.4	10.4	13.3	10.1	13.1	2.7	0.0	-0.2	2.9	-0.3	3.0	-0.2	3.0
FGT1 (%)	2.9	2.9	4.1	2.8	4.0	1.1	0.0	-0.1	1.2	-0.1	1.2	-0.1	1.2
FGT2 (%)	1.4	1.4	2.1	1.3	2.0	0.6	0.0	-0.1	0.7	0.0	0.7	0.0	0.7
Contribution of child poverty to total poverty (%)													
FGT0 (%)	0.3	0.3	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT1 (%)	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1
FGT2 (%)	0.2	0.2	0.1	0.2	0.1	-0.1	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1
Contribution of old age poverty to total poverty (%)													
FGT0 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
FGT1 (%)	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT2 (%)	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Measures are based on equalized income using the modified OECD scale. The poverty line is 60% of the median equalized income. Gini, Atkinson index and FGT poverty measures are multiplied by 100. Period 0 is 2008 (using 2008 data based on 2007 income) and period 1 is 2010 (using 2010 data based on 2009 income).

Table A.4: Decomposition of Inequality/Poverty Changes (Germany, 2008-2010)

data year: uprated to: policy year: uprated to:	0 0 	0 1 0 1	1 0 1	0 1 1 	1 1 	Total change	Homog-eneity check	Decomposition I		Decomposition II		Shorrocks-Shapley Decomposition	
								Policy effect	Other effects	Policy effect	Other effects	Policy effect	Other effects
	(0)	(1)	(2)	(3)	(4)	(4)-(0)	(1)-(0)	(4)-(2)	(2)-(1)	(3)-(1)	(4)-(3)	Mean of (4)-(2), (3)-(1)	Mean of (2)-(1), (4)-(3)
Inequality													
Gini	27.5	27.5	27.0	27.5	27.1	-0.5	0.0	0.0	-0.5	0.0	-0.4	0.0	-0.5
Atkinson 0.5	6.7	6.7	6.6	6.7	6.6	-0.1	0.0	0.0	-0.1	0.0	-0.1	0.0	-0.1
P90/P10	3.29	3.29	3.26	3.31	3.28	-0.01	0.00	0.03	-0.04	0.02	-0.02	0.02	-0.03
P90/P50	1.80	1.80	1.79	1.79	1.79	-0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01
P50/P10	1.83	1.83	1.82	1.84	1.84	0.01	0.00	0.02	-0.01	0.01	0.00	0.02	-0.01
Total poverty (60% median income)													
FGT0 (%)	16.1	16.1	16.4	16.9	17.2	1.1	0.0	0.8	0.3	0.8	0.2	0.8	0.3
FGT1 (%)	4.6	4.6	4.8	4.9	5.1	0.6	0.0	0.3	0.3	0.3	0.3	0.3	0.3
FGT2 (%)	2.3	2.3	2.6	2.5	2.8	0.5	0.0	0.1	0.3	0.1	0.3	0.1	0.3
Total poverty (50% median income)													
FGT0 (%)	9.6	9.6	9.9	10.3	10.4	0.9	0.0	0.5	0.4	0.8	0.1	0.6	0.2
FGT1 (%)	2.9	2.9	3.2	3.1	3.4	0.5	0.0	0.2	0.3	0.2	0.3	0.2	0.3
FGT2 (%)	1.7	1.7	2.0	1.8	2.1	0.4	0.0	0.1	0.3	0.1	0.3	0.1	0.3
Total poverty (poverty line fixed at 60% median)													
FGT0 (%)	16.1	16.1	16.0	15.4	15.1	-1.1	0.0	-0.9	-0.1	-0.7	-0.4	-0.8	-0.3
FGT1 (%)	4.6	4.6	4.7	4.5	4.6	0.1	0.0	-0.1	0.2	-0.1	0.2	-0.1	0.2
FGT2 (%)	2.3	2.3	2.6	2.3	2.6	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.3
Child poverty													
FGT0 (%)	14.3	14.3	16.0	13.8	14.9	0.6	0.0	-1.1	1.7	-0.5	1.1	-0.8	1.4
FGT1 (%)	4.0	4.0	3.9	3.9	3.8	-0.2	0.0	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1
FGT2 (%)	2.1	2.1	2.0	2.0	1.9	-0.2	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Child poverty (poverty line fixed)													
FGT0 (%)	14.3	14.3	15.3	12.2	12.1	-2.2	0.0	-3.1	1.0	-2.1	0.0	-2.6	0.5
FGT1 (%)	4.0	4.0	3.8	3.6	3.3	-0.7	0.0	-0.5	-0.2	-0.5	-0.2	-0.5	-0.2
FGT2 (%)	2.1	2.1	1.9	1.9	1.7	-0.4	0.0	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2
Poverty age>60													
FGT0 (%)	15.3	15.3	14.1	16.7	15.9	0.7	0.0	1.8	-1.2	1.4	-0.8	1.6	-1.0
FGT1 (%)	3.6	3.6	3.5	4.0	3.9	0.3	0.0	0.4	-0.1	0.4	-0.1	0.4	-0.1
FGT2 (%)	1.6	1.6	1.6	1.7	1.7	0.2	0.0	0.2	0.0	0.2	0.0	0.2	0.0
Poverty age>60 (poverty line fixed)													
FGT0 (%)	15.3	15.3	13.9	15.3	13.9	-1.4	0.0	-0.1	-1.3	0.0	-1.4	0.0	-1.4
FGT1 (%)	3.6	3.6	3.4	3.6	3.4	-0.2	0.0	0.0	-0.2	0.0	-0.2	0.0	-0.2
FGT2 (%)	1.6	1.6	1.5	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other poor													
FGT0 (%)	17.4	17.4	18.1	18.3	18.9	1.5	0.0	0.8	0.7	0.9	0.6	0.8	0.6
FGT1 (%)	5.4	5.4	6.0	5.8	6.4	1.0	0.0	0.4	0.6	0.4	0.6	0.4	0.6
FGT2 (%)	2.9	2.9	3.6	3.1	3.8	0.8	0.0	0.2	0.6	0.2	0.6	0.2	0.6
Contribution of child poverty to total poverty (%)													
FGT0 (%)	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT1 (%)	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT2 (%)	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contribution of old age poverty to total poverty (%)													
FGT0 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT1 (%)	0.3	0.3	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT2 (%)	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Measures are based on equivalized income using the modified OECD scale. The poverty line is 60% of the median equivalized income. Gini, Atkinson index and FGT poverty measures are multiplied by 100. Period 0 is 2008 (using 2008 data based on 2007 income) and period 1 is 2010 (using 2010 data based on 2009 income).

Table A.5: Decomposition of Inequality/Poverty Changes (Ireland, 2008-2010)

data year:	0	0	1	0	1	Total change	Homog-eneity check	Decomposition I		Decomposition II		Shorrocks-Shapley Decomposition	
uprated to:		1		1				Policy effect	Other effects	Policy effect	Other effects	Policy effect	Other effects
policy year:	0	0	0	1	1								
uprated to:		1	1										
	(0)	(1)	(2)	(3)	(4)	(4)-(1)	(1)-(0)	(4)-(2)	(2)-(1)	(3)-(1)	(4)-(3)	Mean of (4)-(2), (3)-(1)	Mean of (2)-(1), (4)-(3)
Inequality													
Gini	29.1	29.1	32.0	26.2	29.2	0.2	0.0	-2.8	3.0	-2.8	3.0	-2.8	3.0
Atkinson 0.5	7.1	7.1	8.6	5.9	7.3	0.2	0.0	-1.3	1.5	-1.2	1.4	-1.2	1.4
P90/P10	3.6	3.6	4.2	3.1	3.6	0.0	0.0	-0.6	0.6	-0.5	0.5	-0.5	0.6
P90/P50	1.9	1.9	2.1	1.8	2.0	0.1	0.0	-0.1	0.3	-0.1	0.2	-0.1	0.2
P50/P10	1.9	1.9	2.0	1.7	1.8	-0.1	0.0	-0.2	0.1	-0.2	0.1	-0.2	0.1
Total poverty (60% median income)													
FGT0 (%)	15.7	15.6	17.6	12.3	13.8	-1.8	-0.1	-3.9	2.0	-3.3	1.5	-3.6	1.8
FGT1 (%)	3.8	3.7	3.8	2.9	3.1	-0.6	0.0	-0.7	0.1	-0.8	0.2	-0.8	0.1
FGT2 (%)	1.9	1.9	1.8	1.6	1.7	-0.2	0.0	-0.1	0.0	-0.3	0.1	-0.2	0.0
Total poverty (50% median income)													
FGT0 (%)	7.7	7.6	7.4	5.7	5.7	-1.9	-0.1	-1.7	-0.2	-1.9	0.1	-1.8	-0.1
FGT1 (%)	2.2	2.2	2.1	1.8	1.9	-0.3	0.0	-0.2	-0.1	-0.4	0.1	-0.3	0.0
FGT2 (%)	1.4	1.4	1.4	1.2	1.4	0.0	0.0	0.0	0.0	-0.2	0.1	-0.1	0.0
Total poverty (poverty line fixed at 60% median)													
FGT0 (%)	15.7	15.5	16.2	10.8	11.5	-4.0	-0.1	-4.7	0.6	-4.8	0.7	-4.7	0.7
FGT1 (%)	3.8	3.7	3.5	2.6	2.7	-1.0	-0.1	-0.9	-0.1	-1.0	0.0	-1.0	-0.1
FGT2 (%)	1.9	1.8	1.7	1.5	1.6	-0.3	0.0	-0.2	-0.1	-0.4	0.1	-0.3	0.0
Child poverty													
FGT0 (%)	15.4	15.3	16.1	12.1	13.5	-1.8	-0.1	-2.6	0.8	-3.2	1.4	-2.9	1.1
FGT1 (%)	3.0	2.9	3.0	2.4	2.5	-0.4	0.0	-0.5	0.1	-0.6	0.2	-0.5	0.1
FGT2 (%)	1.3	1.2	1.2	1.1	1.2	-0.1	0.0	-0.1	0.0	-0.1	0.1	-0.1	0.0
Child poverty (fixed poverty line)													
FGT0 (%)	15.4	15.2	15.6	10.0	11.4	-3.8	-0.2	-4.2	0.4	-5.2	1.4	-4.7	0.9
FGT1 (%)	3.0	2.9	2.8	2.1	2.1	-0.8	-0.1	-0.7	-0.1	-0.8	0.0	-0.7	-0.1
FGT2 (%)	1.3	1.2	1.2	1.0	1.1	-0.2	0.0	-0.1	-0.1	-0.2	0.0	-0.1	0.0
Poverty age>60													
FGT0 (%)	10.6	10.6	17.7	6.9	8.7	-1.9	-0.1	-9.0	7.1	-3.7	1.8	-6.3	4.5
FGT1 (%)	1.9	1.9	2.7	1.3	1.9	0.1	0.0	-0.8	0.8	-0.6	0.6	-0.7	0.7
FGT2 (%)	0.7	0.7	1.2	0.6	1.0	0.3	0.0	-0.2	0.5	-0.2	0.5	-0.2	0.5
Poverty age>60 (fixed poverty line)													
FGT0 (%)	10.6	10.5	11.9	5.7	6.4	-4.1	-0.1	-5.5	1.4	-4.8	0.7	-5.2	1.1
FGT1 (%)	1.9	1.8	2.4	1.2	1.6	-0.2	0.0	-0.8	0.5	-0.7	0.4	-0.7	0.5
FGT2 (%)	0.7	0.7	1.1	0.5	1.0	0.2	0.0	-0.2	0.4	-0.2	0.4	-0.2	0.4
Other poor													
FGT0 (%)	20.2	20.1	19.2	17.2	19.1	-1.1	-0.1	-0.2	-0.9	-3.0	1.9	-1.6	0.5
FGT1 (%)	6.1	6.1	5.7	4.8	4.9	-1.2	0.0	-0.8	-0.4	-1.2	0.0	-1.0	-0.2
FGT2 (%)	3.4	3.4	3.1	2.8	2.8	-0.6	0.0	-0.3	-0.3	-0.6	0.0	-0.4	-0.2
Contribution of child poverty to total poverty (%)													
FGT0 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT1 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT2 (%)	0.2	0.2	0.2	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contribution of old age poverty to total poverty (%)													
FGT0 (%)	0.2	0.2	0.3	0.2	0.2	0.0	0.0	-0.1	0.1	0.0	0.0	-0.1	0.1
FGT1 (%)	0.2	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
FGT2 (%)	0.1	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1

Measures are based on equalized income using the modified OECD scale. The poverty line is 60% of the median equalized income. Gini, Atkinson index and FGT poverty measures are multiplied by 100. Period 0 is 2008 (using data with 2008 income) and period 1 is 2010 (using data with 2010 income).

Table A.6: Decomposition of Inequality/Poverty Changes (UK, 2008-2010)

data year:	0	0	1	0	1	Total change	Homog-eneity check	Decomposition I		Decomposition II		Shorrocks-Shapley Decomposition	
uprated to:		1		1				Policy effect	Other effects	Policy effect	Other effects	Policy effect	Other effects
policy year:	0	0	0	1	1								
uprated to:		1	1										
	(0)	(1)	(2)	(3)	(4)	(4)-(0)	(1)-(0)	(4)-(2)	(2)-(1)	(3)-(1)	(4)-(3)	Mean of (4)-(2), (3)-(1)	Mean of (2)-(1), (4)-(3)
Inequality													
Gini	32.8	32.8	32.4	31.8	31.5	-1.4	0.0	-0.9	-0.5	-1.1	-0.3	-1.0	-0.4
Atkinson 0.5	10.4	10.4	9.1	9.6	8.6	-1.9	0.0	-0.6	-1.3	-0.8	-1.0	-0.7	-1.2
P90/P10	3.95	3.95	4.04	3.80	3.91	-0.04	0.00	-0.13	0.09	-0.15	0.11	-0.14	0.10
P90/P50	1.98	1.98	2.00	1.97	1.98	0.00	0.00	-0.02	0.02	-0.02	0.01	-0.02	0.02
P50/P10	1.99	1.99	2.02	1.93	1.98	-0.02	0.00	-0.05	0.03	-0.06	0.04	-0.05	0.04
Total poverty (60% median income)													
FGT0 (%)	17.6	17.6	18.2	16.6	17.3	-0.3	0.0	-1.0	0.6	-1.0	0.7	-1.0	0.7
FGT1 (%)	4.9	4.9	5.3	4.5	5.0	0.1	0.0	-0.3	0.4	-0.3	0.5	-0.3	0.4
FGT2 (%)	2.4	2.4	2.7	2.2	2.5	0.2	0.0	-0.2	0.3	-0.2	0.3	-0.2	0.3
Total poverty (50% median income)													
FGT0 (%)	10.3	10.3	11.0	8.9	10.1	-0.2	0.0	-0.8	0.7	-1.4	1.2	-1.1	1.0
FGT1 (%)	3.1	3.1	3.4	2.9	3.2	0.2	0.0	-0.2	0.4	-0.2	0.4	-0.2	0.4
FGT2 (%)	1.7	1.7	2.0	1.6	1.9	0.2	0.0	-0.1	0.3	-0.1	0.3	-0.1	0.3
Total poverty (poverty line fixed at 60% median)													
FGT0 (%)	17.6	17.6	17.4	15.8	15.7	-1.9	0.0	-1.7	-0.2	-1.8	-0.1	-1.7	-0.2
FGT1 (%)	4.9	4.9	5.1	4.3	4.6	-0.3	0.0	-0.5	0.2	-0.5	0.2	-0.5	0.2
FGT2 (%)	2.4	2.4	2.6	2.1	2.4	0.0	0.0	-0.2	0.2	-0.2	0.2	-0.2	0.2
Child poverty													
FGT0 (%)	20.0	20.0	21.0	17.7	18.6	-1.3	0.0	-2.4	1.1	-2.2	0.9	-2.3	1.0
FGT1 (%)	5.4	5.4	5.6	5.0	5.0	-0.4	0.0	-0.5	0.1	-0.4	0.0	-0.5	0.1
FGT2 (%)	2.6	2.6	2.6	2.4	2.4	-0.2	0.0	-0.2	0.0	-0.2	0.0	-0.2	0.0
Child poverty (fixed poverty line)													
FGT0 (%)	20.0	20.0	19.8	16.8	16.4	-3.6	0.0	-3.5	-0.1	-3.2	-0.4	-3.3	-0.3
FGT1 (%)	5.4	5.4	5.3	4.8	4.6	-0.8	0.0	-0.7	-0.2	-0.6	-0.2	-0.6	-0.2
FGT2 (%)	2.6	2.6	2.5	2.4	2.3	-0.4	0.0	-0.3	-0.1	-0.3	-0.1	-0.3	-0.1
Poverty age>60													
FGT0 (%)	18.2	18.2	16.7	17.7	16.6	-1.6	0.0	-0.1	-1.5	-0.5	-1.1	-0.3	-1.3
FGT1 (%)	3.7	3.7	3.4	3.5	3.3	-0.4	0.0	-0.1	-0.3	-0.2	-0.2	-0.2	-0.2
FGT2 (%)	1.3	1.3	1.2	1.3	1.1	-0.2	0.0	0.0	-0.2	-0.1	-0.1	-0.1	-0.1
Poverty age>60 (fixed poverty line)													
FGT0 (%)	18.2	18.2	15.7	16.8	14.7	-3.5	0.0	-1.0	-2.6	-1.5	-2.1	-1.2	-2.3
FGT1 (%)	3.7	3.7	3.1	3.2	2.8	-0.8	0.0	-0.3	-0.5	-0.4	-0.4	-0.4	-0.5
FGT2 (%)	1.3	1.3	1.1	1.2	1.0	-0.3	0.0	-0.1	-0.2	-0.1	-0.2	-0.1	-0.2
Other poor													
FGT0 (%)	16.0	16.0	17.6	15.3	17.0	1.0	0.0	-0.6	1.6	-0.7	1.7	-0.7	1.7
FGT1 (%)	5.3	5.3	6.3	4.9	6.0	0.7	0.0	-0.3	1.0	-0.4	1.1	-0.3	1.1
FGT2 (%)	2.9	2.9	3.7	2.6	3.5	0.6	0.0	-0.2	0.8	-0.2	0.8	-0.2	0.8
Contribution of child poverty to total poverty (%)													
FGT0 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT1 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT2 (%)	0.3	0.3	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contribution of old age poverty to total poverty (%)													
FGT0 (%)	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT1 (%)	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FGT2 (%)	0.2	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Measures are based on equalized income using the modified OECD scale. The poverty line is 60% of the median equalized income. Gini, Atkinson index and FGT poverty measures are multiplied by 100. Period 0 is 2008 (using data with 2008/9 income) and period 1 is 2010 (using data with 2009/10 income).

A.3 Comparison of Simulated versus Observed Disposable Income

As explained in the text, our decomposition exercise is based on simulated rather than observed data on disposable income. Simulations are precisely the added value of this exercise since they allow us to produce counterfactual distributions to be used in the decomposition to isolate tax-benefit policy effects from other effects. The drawback, however, is that simulated income distributions for actual situations (those of years 2008 and 2010) do not always perfectly match external information. We explain why in what follows. Nonetheless, the important aspect is that while inequality and poverty measures may differ in *levels* at any point in time, *time variations* point in the same direction for both simulated and external data, as can be seen in Figure A.1. In this graph, we compare our simulated trends with official statistics (Eurostat for France and Germany, Households Below Average Income (HBAI) data for the UK and statistics from the CSO for Ireland). The values used to produce these trends are detailed in Table A.7. As mentioned above, we observe important discrepancies in levels in this table, which can be explained by at least three groups of factors. First, these differences may just reveal the imperfect comparison between simulated and external data to the extent that the definition of disposable income, or the way it is calculated, differs in the two sources – we give more detailed explanations country by country below. Second, discrepancies can be attributed to data issues concerning disposable income for some countries where interviews are used and, possibly, contaminated with measurement errors and recall errors (when people are asked how much taxes were paid or benefit received in a particular year). This is not a systematic source of errors: for France, for instance, income information in EU-SILC data is drawn from the Administrative Tax Revenue Data and is, therefore, very accurate. Third, and more likely, differences can be attributed to simplification assumptions made in microsimulation, including (i) the assumption of full take-up of benefits or tax credits (although we do introduce basic take-up modeling for certain benefits, as discussed hereafter), (ii) the assumption of tax compliance (we do not assume any rate of non-compliance, fraud, error or tax evasion); (iii) the amount of tax modeled by higher earners is often larger than the amount of tax actually paid (as they may avail of certain smaller tax relief schemes that are not possible to model in a microsimulation framework); (iv) timing issues such as the fact that reforms take place during the year (in addition, income data for France and Germany are provided with a delay, as discussed in section 3.1 and below). We now provide more detailed explanations country by country (see also Doorley, 2013, Ochmann and Fossen, 2012, Keane et al., 2013, and Sutherland, 2013 for a thorough account of simulation assumptions for France, Germany, Ireland and the UK respectively).

France.   EUROMOD-simulated inequality and poverty rates are underestimated in France, as can be seen in Table A.7. To understand the discrepancies, it is important to bear in mind that no data adjustments are made in EUROMOD in situations where the policy year does not correspond to the data year – except a nominal adjustment of the different types of income since they are recorded for year $t - 1$ in data of year t, as explained in section 3.1. In particular, no adjustment is made for changes in market income distribution that have taken place between $t - 1$ and t. For instance, it is possible that losses in employment may be driving the higher inequality observed in external statistics, but not showing up in EUROMOD. Non-take-up of some means-tested benefits or administrative errors in the implementation of these benefits may play a role in poverty discrepancies. Only the non take-up of general social assistance (RMI/ RSA) is simulated in EURO-MOD and done by simple random draws of non-claiming households. If marginalized, peripheral groups are less likely to claim benefits to which they are theoretically entitled, incomes at the bottom will be inflated in EUROMOD and poverty will be underestimated. Child poverty is also greatly understated in EUROMOD, for the same reason but also for additional factors. For instance, it is possible that non-take up of some means-tested family benefits also accounts for this pattern. Data limitations must also play a role in the observed discrepancies. For instance, accurate simulation of the parental leave benefit was not possible given the information available in SILC, resulting in a substantial overestimation of this benefit compared to external statistics (see Doorley, 2013). Importantly, these limitations are systematic across years so that they should affect trends less than levels. Indeed, Figure A.1 confirms that inequality trends according to our simulation are comparable to external benchmarks. We find a larger increase in poverty risk calculated using the poverty line at 60% of the median (+1.4 percentage points versus +0.2 in external statistics). With a poverty line at 50% of the median (not reported), results are more comparable (+1.5 points versus +0.8 in external statistics).

Germany.   Table A.7 shows that inequality is underestimated in EUROMOD simulations for Germany while poverty is slightly overestimated. Child poverty is largely comparable to external benchmarks. As in the case of France, policy simulations for a year t in Germany rely on income information from year $t - 1$. As a result, changes in work duration or wage inequalities between 2007 and 2008 or 2009 and 2010 may explain the higher inequality observed in the external benchmarks for our base and end years. Moreover, to render the 2008 and 2010 German data comparable, it was necessary to discard the imputation of tax allowances which was introduced only in 2010. This results in an over-estimation of tax liabilities (of around 10% on average).[23] As with the French

---

[23]Nonetheless, a robustness check which re-introduces the imputation of tax-allowances in 2010 does not qualitatively change the results of any of our decompositions for Germany.

social assistance scheme, we also model take-up of social assistance in Germany. Unemployment assistance, old-age assistance and general social assistance are assumed to have take-up rates of 59%, following the available literature on benefit take-up in Germany (Bruckmeier and Wiemers, 2011). It should also be noted that housing benefits have not been simulated in EUROMOD, but simply imputed from the data, because reported information on housing expenditures is not detailed enough. These factors are likely to contribute to the overestimation of poverty observed in our results. These limitations are consistent across years and Figure A.1 shows that simulated and actual trends in total poverty and inequality go in the same direction.

Ireland. External statistics are provided by the Central Statistics Office (CSO) in Ireland but we also refer to information from Eurostat for comparability purposes. As in Germany, simulations for Ireland underestimate inequality and overestimate poverty according to Table A.7. Simulations acknowledge the low take-up levels of the Irish transfer to working poor households (the Family Income Supplement, FIS), imputing a random take-up rate of 33%. As in the French case, however, random imputation may be a crude approximation. In addition, one driving factor for the difference with external sources is the fact that SWITCH is based on current income, while CSO results are based on annual income. Lump sums, such as retirement and redundancy payments which are likely to have increased in importance during the recession,[24] will appear in annual income but not current income. The issue of current compared to annual income will also influence where individuals are found in the income distribution given changes in their employment status over time, especially during a period of rising unemployment. In terms of trends (Figure A.1), external statistics show a larger rise in the Gini (+0.9 percentage points compared to +0.1 in the simulation). Our simulations show a fall in the overall poverty rate (−12.2%) which is confirmed by Eurostat statistics, even if it is substantially smaller (−1.9%).[25] Poverty using 50% of the median also compares better (not reported) with Eurostat indicating a decrease of 12% (starting from a "at risk of poverty" rate of 7.7%) while our simulations give a 25% decline (starting from 8.1%).

UK. External figures for the UK (HBAI) are provided by the Department of Work and Pension and based on the same underlying data source as for EUROMOD, the FRS. While

---

[24]Redundancy payments will have increased in importance as unemployment grew. In addition to this, the 'Incentivised Early Retirement Scheme' will have resulted in larger numbers receiving retirement lump sum retirement payments.

[25]CSO external statistics show a slight rise (+0.3). Note however that our simulation and Eurostat use the modified OECD equivalence scale (which gives a weight of 1 to the first adult in a household, .5 to subsequent adults and .3 to children) while the CSO uses a national equivalence scale (giving a weight of .66 to subsequent adults and .33 to children), which reduces still the comparison possibilities.

the simulated poverty rate is close to the external statistics, the Gini coefficient for the base year is underestimated.[26] In addition to the standard differences mentioned above regarding simulated versus actual data, Sutherland (2013) suggests a possible reason for the discrepancy in the Gini. The external statistics (HBAI) correct for an insufficient number of high income households in the FRS data sample using administrative information from tax statistics. As Sutherland (2013) point out, this will result in an increase in income at the upper end of the income distribution and affect the Gini measure. It is indicated that results from EUROMOD and external statistics become closer once this issue is taken into account. Note also that non-take-up is modeled for the Working Tax Credit, with the same limitation as emphasized above. Despite these potential caveats, simulated trends in inequality and poverty are relatively similar to those based on external statistics for the UK. External statistics for the Gini show a sharper fall (3 percentage points) compared to EUROMOD simulations (1.4 points). The pattern in overall and child poverty rates point in the same direction and are more similar, with the EUROMOD results being slightly lower than the external statistics.

---

[26]Recall the particular nature of the data in the case of the UK, i.e. collected between April and March of the following year, as discussed in Section 3. For comparison, we have simply used official statistics averaged for each pair of years, 2008/09 and 2009/10.
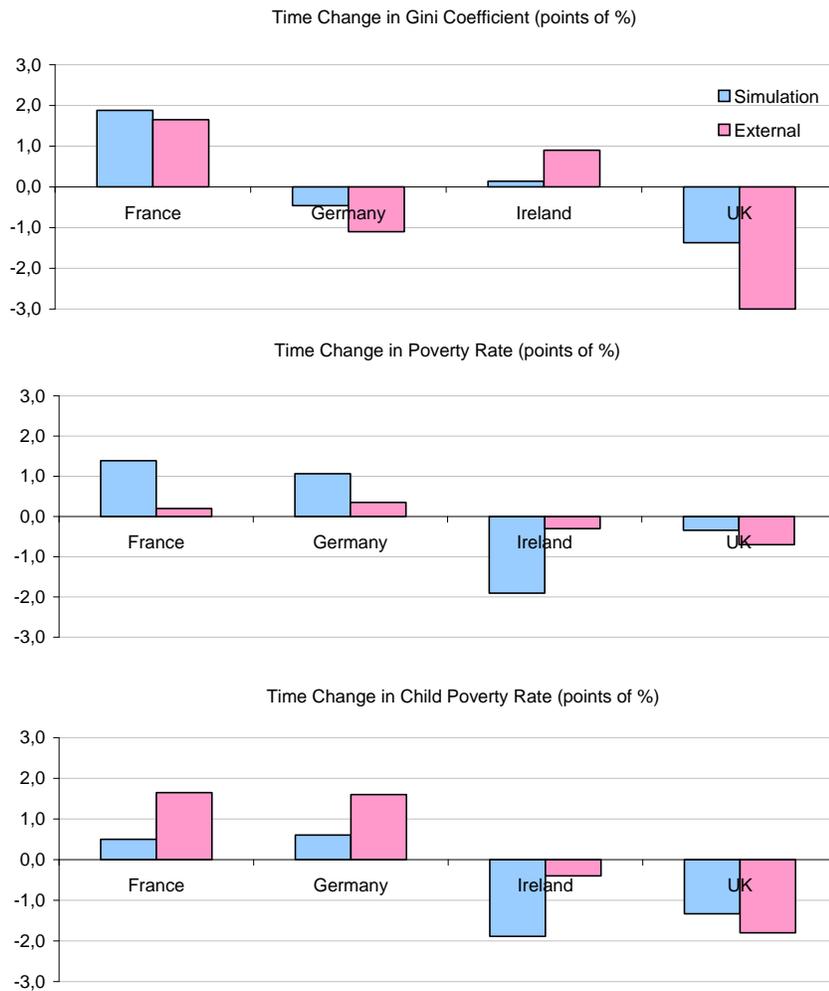
Figure A.1: Comparison of Changes in Income Distribution
2008-2010 using Simulated versus Observed Incomes

Table A.7: Comparing Simulated and Observed Income Distribution: Levels and Trends

	Simulation (S)		External (E)		Δ	Δ	Δ%	Δ%
	base	end	base	end	(S)	(E)	(S)	(E)
France								
Gini	26,5	28,4	28,2	29,9	1,9	1,7	7,1%	5,9%
Poverty rate	10,3	11,7	12,9	13,1	1,4	0,2	13,4%	1,6%
Child poverty rate	10,5	11,0	15,4	17,1	0,5	1,7	4,8%	10,7%
Germany								
Gini	27,5	27,1	30,3	29,2	-0,5	-1,1	-1,7%	-3,6%
Poverty rate	16,1	17,2	15,2	15,6	1,1	0,4	6,6%	2,3%
Child poverty rate	14,3	14,9	14,3	15,9	0,6	1,6	4,2%	11,2%
Ireland								
Gini	29,1	29,2	30,7	31,6	0,1	0,9	0,5%	2,9%
Poverty rate (a)	15,7	13,8	14,4	14,7	-1,9	0,3	-12,2%	2,1%
Poverty rate (b)	15,7	13,8	15,5	15,2	-1,9	-0,3	-12,2%	-1,9%
Child poverty rate*	15,4	13,5	18,8	18,4	-1,9	-0,4	-12,3%	-2,1%
UK								
Gini	32,8	31,5	36,0	33,0	-1,4	-3,0	-4,2%	-8,3%
Poverty rate	17,6	17,3	17,3	16,6	-0,3	-0,7	-1,9%	-4,0%
Child poverty rate	20,0	18,6	21,9	20,1	-1,3	-1,8	-6,7%	-8,2%

External statistics taken from Eurostat for France and Germany, the Department of Work and Prensions for the UK and (a) the Central Statistics Office or (b) EUROSTAT for Ireland. Base year external statistics are for 2008 for Ireland, average over 2007-08 for France and Germany and 2008-09 for the UK. End year external statistics are for 2010 for Ireland, average over 2009-10 for France and Germany and 2009-10 for the UK. Poverty is calculated using observed or simulated disposable incomes after equivalization (modified OECD scale) and using the 60% median poverty line.

* External statistics are for those <17 for Ireland.