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Working Paper No. 197

May 2007

Analysing the Effects of Tax-benefit Reforms on Income Distribution: A Decomposition Approach*

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Subsequently published in "Analysing the Effects of Tax-benefit Reforms on Income Distribution: A Decomposition Approach", Journal of Economic Inequality, 2008, http://dx.doi.org/10.1007/s10888-008-9101-4, Published Online 23 September 2008

Abstract: To assess the impact of tax-benefit policy changes on income distribution over time, we suggest a decomposition methodology based on counterfactual simulations. First, it provides an *absolute* measure of the impact of tax-benefit changes on inequality, which combines changes in policy structure (rules, rates, etc.) and changes in monetary parameters (benefit amounts, tax bands, etc.) against a distributionally-neutral benchmark, i.e., a situation where monetary parameters are nominally adjusted in line with income growth. We apply this measure to analyze the effect of recent policy changes in twelve European countries. Secondly, we focus on France and Ireland to assess the *relative* role of policy changes compared to changes in pre-tax income (distribution, composition, demographic structure, etc.). We conduct this exercise for a battery of poverty and inequality measures and check the sensitivity of the results to the decomposition order.

Key Words: Tax-benefit policy, inequality, poverty, decomposition, microsimulation.

JEL Classification: H23, H53, I32

**Acknowledgement*: We are grateful to Brian Nolan for useful comments. We are indebted to all past and current members of the EUROMOD consortium as well as to those involved in the development of the model. Any remaining errors, results produced, interpretations or views presented are the authors' responsibility. Simulations performed in this study rely on national micro-data sets and on the European Community Household Panel (ECHP) for Austria, Denmark, Greece, Portugal and Spain. The Austrian version of the ECHP is made available by the Interdisciplinary Centre for Comparative Research in the Social Sciences; the Panel Survey on Belgian Households is made available by the Universities of Liège and Antwerp; the Income Distribution Survey is made available by Statistics Finland; the public use version of the German Socio Economic Panel Study is made available by the German Institute for Economic Research (DIW), Berlin; the Survey of Household Income and Wealth is made available by the Bank of Italy; the Family Expenditure Survey (FES) is made available by the UK Office for National Statistics (ONS) through the Data Archive. Material from the FES is Crown Copyright and is used by permission. Neither the ONS nor the Data Archive bear any responsibility for the analysis or interpretation of the data reported here. An equivalent disclaimer applies for all other data sources and their respective providers cited in this acknowledgement. SYSIFF is based on the Enquête sur les Budgets Familiaux made available by INSEE. SWITCH is based on the Living in Ireland Survey made available by the Economic and Social Research Institute. Correspondence to: Olivier Bargain, UCD, Newman Building, Dublin 4, Ireland. Phone: +35317168357. Email: olivier.bargain@ucd.ie

1 Introduction

The evolution of poverty and inequalities within a country is a complex process that combines changes of the macroeconomic environment, of behaviours and institutions, and all their possible interactions. Yet, it is very important for policy makers and researchers to understand the specific role of institutions and, more precisely, the role of tax-benefit instruments which directly affect income distribution. In this respect, the EU's Lisbon agenda includes a high-level goal of achieving greater social cohesion and requires the assessment of policy changes at national levels in order to understand how National Action Plans achieve their objectives in the light of social indicators as those fixed at Laeken in 2001 (Atkinson et al., 2002).

Tax-benefit microsimulation is a pragmatic tool that has been used extensively for this purpose (Atkinson, 2005).[1] However, if economists are to provide useful information for policy purposes, two important questions deserve attention. First, what is the relevant benchmark to be used when evaluating actual policy changes? Second, how to capture the change in the distribution of disposable income due solely to changes in tax-benefit policy?

The present paper suggests a decomposition methodology which helps on both counts. It is based on the construction of appropriate counterfactual distributions using microsimulation. The change in the distribution of disposable income – summarized by any poverty or inequality measures – is decomposed between three types of effects: the change in policy structure, the change in the nominal levels of policy parameters relatively to change in income levels, and other changes not directly linked to tax-benefit policies. The last effect includes changes in the distribution and composition of gross income, i.e. income before taxes and transfers,[2] as well as changes in demographics.[3]

Firstly, disentangling policy changes between structural reforms and changes in nominal levels of tax-benefit monetary parameters (e.g. benefit amounts, thresholds of income tax brackets, etc.) helps to measure the *absolute* effect of policy reforms against a distributionally neutral benchmark, i.e. a situation where monetary parameters are nominally adjusted in line with income growth.[4] This approach is applied to assess policy changes in ten European countries for the period 1998-2001, to France for 1995-2001 and to Ireland for 1994-2000.

Secondly, the full decomposition allows us to assess the *relative* role of policy changes compared to other changes in the underlying population (gross income, demographics, etc.).[5] We conduct this exercise

[1] See Bourguignon and Spadaro (2006) for a comprehensive exposition on microsimulation.

[2] Naturally, tax-benefit changes affect the distribution of gross income and demographics by changing incentives to work, invest, have children, marry, etc. To capture these indirect effects, the approach proposed could well be combined with behavioral models; in particular, it could incorporate labour supply responses (see, among others, Creedy et al., 2006). In the present paper, we ignore these behavioural effects and isolate key issues which would also arise in such wider framework.

[3] Changes in the demographic composition over time affect the distribution of equivalised income of a given non-equivalised distribution.

[4] In other words, lack of adjustment of monetary tax-benefit parameters – or adjustments which are not in line with income growth over the period – will have an impact on inequality.

[5] A few studies, like Nolan and Maitre (2000) for Ireland, suggest a meticulous investigation of policy changes and the way they interact with other factors to explain inequality changes. The present approach provides a framework to disentangle

on France 1995-2001 and Ireland 1994-2000; we find that some of the results are robust with respect to the decomposition method, i.e. whether counterfactuals of policy changes are based on initial or final data. Others vary with the method – especially for Ireland where important changes take place – in which case the need for regularly updated income survey data, or representative panel data, is emphasised.

The layout of the paper is as follows. Section 2 presents the decomposition approach. Section 3 describes briefly the data. Section 4 reports the absolute effects of policy change on inequality in twelve European countries. Section 5 focuses on France and Ireland to gauge the relative effect of policy changes compared to other factors. Section 6 concludes.

2 A Decomposition Approach

2.1 Overview and Definitions

We first introduce some notations and terminology. We denote by household 'gross income' the total amount of capital, labor and replacement incomes (including unemployment benefits and pensions) before taxes and benefits. 'Disposable income' is the household income that remains after payment of taxes/social contributions and receipt of all transfers; in the context of microsimulation studies, this is the relevant concept for measurement of poverty and inequality.

The distribution of disposable income is represented hereafter as a transformation $d_i(p^k, y_j^l)$ of the underlying population y_j^l;[6] the latter is characterized by two reference points: the nominal level of all income variables is that of year l while the distribution of income (and other characteristics like demographics) is that of year j.[7] The nominal level is represented by the average income level of year l, as made clear below. Implicit in transformation d is the effect of the tax-benefit system on households with different gross incomes (and different demographic characteristics). Disposable income thus depends on tax-benefit rules and non-monetary parameters (e.g. tax rates); in the above notations, this 'policy structure' is that of year i. It also depends on p, the set of monetary parameters for tax-benefit calculations (e.g. maximum benefit amounts, threshold level of tax brackets, etc.); the nominal level of these parameters is that of year k.

With the notations above, we can easily represent counterfactual situations. For instance, $d_0(p^1, y_0^1)$ represents disposable incomes when nominal levels of parameters and gross incomes are those of year 1 while the definition of tax-benefit rules and population characteristics (gross income inequality, demographics, etc.) are those of year 0. We are interested in inequality/poverty indices computed from the

these effects and to quantify the relative contribution of policy changes to variations in poverty/inequality.

[6] Generally speaking, y_j^l can be thought of as a matrix where each line represents a household by a vector of characteristics, including various incomes, socio-demographic characteristics, etc. However, we refer to y_j^l as an income vector in the following since income distribution is the main dimension of interest in this study. These are pure notational subtleties since microsimulation models do account for all relevant dimensions (type of income, treatment of family size, etc.) when computing disposable income.

[7] Trivially, data collected in year 0 will contain a series of incomes y_0^0.

(simulated) distribution of disposable income for a given year or for counterfactual situations. Denote G any such measure, expressed in what follows as a function $G\left[d_i(p^k, y_j^l)\right]$ of the distribution of disposable income.

There are, however, some systematic differences between microsimulation estimates of the distribution of income and those based directly on survey measures. In particular, full take-up of transfers is often assumed while there is evidence that non-take-up can be large, hence a quasi-systematic underestimation of poverty by the models (see Hancock et al., 2003). Such differences in levels of poverty need not, however, have much influence on analysis of changes in poverty such as that set out here.

We shall assume that the simulated distribution of disposable income $d_h(p^h, y_h^h)$ for a given year h is the true distribution for that year. Naturally, there are limits to this assumption. Mantovani and Sutherland (2003) discuss the robustness of the simulations using the European model EUROMOD by comparing simulated and official measures of income distribution for years 1998 and 2001. Comparability is not easy since other sources of information about income distribution may use different definitions of equivalence scales, different datasets and years, incorporate in-kind benefits, etc. There are, however, some systematic differences between microsimulation estimates and those based directly on survey measures. In particular, simulations do not take into account possible non-take-up of social benefits, which leads to underestimation of poverty (see Hancock et al., 2003, for take-up correction within microsimulation). In the following empirical application (Section 4), we shall validate our results again external sources.

2.2 Decomposition

Characterize total change Δ in the inequality/poverty index G between initial period 0 and final period 1 as:

$$\Delta = G\left[d_1(p^1, y_1^1)\right] - G\left[d_0(p^0, y_0^0)\right]$$

This change in the distribution of disposable income – as summarized by index G – can be decomposed into the contribution of the change in the tax-benefit policy ('policy effect') and the contribution of other factors like variations in the underlying gross income distribution, in demographics, etc. ('data effect'). Remark that a straightforward application of the initial (final) policy on the final (initial) data may not be correct. For instance, consider the following decomposition:

$$\begin{aligned}\Delta &= \left\{G\left[d_1(p^1, y_1^1)\right] - G\left[d_1(p^1, y_0^0)\right]\right\} + \left\{G\left[d_1(p^1, y_0^0)\right] - G\left[d_0(p^0, y_0^0)\right]\right\} \\ &= \text{(data effect conditional on policy 1) + (policy effect conditional on data 0)}\end{aligned}$$

This decomposition might be acceptable as a first approximation if initial and final years are close enough. However, in the second bracket, the system of year 1 is applied to data of year 0, ignoring the fact new monetary parameters (benefit amounts, levels of tax allowance, etc.) may have been adjusted to account to some extent for price and wage inflation over the period. For instance, the eligibility threshold of social benefits may have been adjusted in line with wage inflation; in this case, the new system will appear more

redistributive than it is if assessed on data 0 (that is, on lower gross income levels). It is thus necessary to evaluate the policy changes in the light of nominally adjusted data (see Callan et al., 2006).

To do so, we apply to both monetary parameters and income levels of year 0 a coefficient α^1 corresponding to the *actual change in average gross income levels* between the two years. If y represents simply the distribution of gross income – a simplified interpretation for the sake of exposition – then the counterfactual $y_0^1 = \alpha^1 y_0^0$ corresponds to initial gross incomes nominally adjusted to year 1. As for parameters, the nominally adjusted schedule is written $\alpha^1 p^0$. Note that it is not equivalent to p^1, which represents the actual set of parameters in year 1, i.e. as decided by the authorities. The actual parameters are not necessarily adjusted in line with progression in average income.[8]

Then we can suggest a first complete decomposition:

$$\begin{aligned} \Delta \quad = \quad & \left\{G\left[d_1(p^1, y_1^1)\right] - G\left[d_0(\alpha^1 p^0, y_1^1)\right]\right\} && \text{(change in policy)} \\ & + \left\{G\left[d_0(\alpha^1 p^0, y_1^1)\right] - G\left[d_0(\alpha^1 p^0, y_0^1)\right]\right\} && \text{(change in data)} \\ & + \left\{G\left[d_0(\alpha^1 p^0, y_0^1))\right] - G\left[d_0(p^0, y_0^0)\right]\right\} && \text{(change in nominal levels)} \end{aligned} \tag{1}$$

where the last term extracts the effect of leveling up both the initial tax-benefit monetary parameters (p^0 to $\alpha^1 p^0$) and the initial incomes (y_0^0 to y_0^1). Conditional on the policy structure of year 0, and for nominal levels of year 1, the second term corresponds to the change in data (underlying distribution of gross income, demographic structure, etc.). The first term captures the effect of the tax-policy change over the period, conditional on final year data. Interestingly, and in line with our objective, it reflects the change in policy structure (d_0 to d_1) but also the actual change in nominal levels of monetary parameters (p^1) compared to a distributionally neutral situation where monetary parameters are exactly in line with average income growth over the period ($\alpha^1 p^0$).

We also introduce the alternative decomposition where the effect of policy changes is conditional on initial rather than final data. Here too, policy changes combine structural changes (from d_0 to d_1) and parameter changes (from $\alpha^1 p^0$ to p^1). Therefore, the policy effect must be conditional on the initial data expressed in nominal levels of the final data. This yields the decomposition:

$$\begin{aligned} \Delta \quad = \quad & \left\{G\left[d_1(p^1, y_1^1)\right] - G\left[d_1(p^1, y_0^1)\right]\right\} && \text{(change in data)} \\ & + \left\{G\left[d_1(p^1, y_0^1)\right] - G\left[d_0(\alpha^1 p^0, y_0^1)\right]\right\} && \text{(change in policy)} \\ & + \left\{G\left[d_0(\alpha^1 p^0, y_0^1))\right] - G\left[d_0(p^0, y_0^0)\right]\right\} && \text{(change in nominal levels)} \end{aligned} \tag{2}$$

where the third term is unchanged compared to (1). The first term is the effect of other changes (gross income distribution, demographics, etc.) conditional on the policy structure and nominal levels of the base period data.

It could be argued that coefficient α^1 should be differentiated by types of income (labor income,

[8] A well-know example is the 'bracket creep', i.e. the non-indexation of tax brackets on income growth that results in fiscal drag (see Immervoll, 2005).

unemployment benefit, pension, capital income, etc.).[9] For instance, one might be willing to compare the actual change in minimum pension levels to a benchmark in line with pension growth. We think, in contrast, that the distributionally-neutral benchmark should reflect the change in the average standard of living. For this reason, we use a single coefficient computed as the growth rate of all pooled incomes. If it is to be distributionally neutral, the reference situation must not distort the relative income levels of, say, pensioners compared to unemployed or salary workers. The structure of income composition in the population participates in shaping gross income inequalities and its change, compared to a situation where all income sources progress in parallel, is captured in the second term of (1) and first term of (2). In contrast, the terms capturing the policy effect ensure that the distribution but also the composition of gross income is held constant.

2.3 Homogeneity Property and Simplification

We argue that the tax-benefit system is often linearly homogenous,[10] that is:

$$d_i(\alpha p^k, \alpha y_j^l) = \alpha d_0(p^0, y_0^0).$$

Clearly, the adaptation of tax rules following the introduction of the Euro has been straightforward in most EU countries. This property can be illustrated by looking at an over-simplified system that captures the essence of most tax-benefit systems. Assume that the first instrument is a progressive tax schedule composed of two brackets with marginal rates t_z and thresholds h_z ($z = 1, 2$). A universal child benefit grants an amount C for each child if household gross income is lower than a threshold F. Finally, a minimum income is computed as a basic income B minus a proportion γ of other incomes. Then disposable income of a household with income y and x children is:

$$\begin{aligned} d &= c + \max(0, B - \gamma c) \\ \text{with } c &= y - \{(y - h_2)t_2 + (h_2 - h_1)t_1\} + \mathbf{1}(y < F).xC \end{aligned}$$

Homogeneity is straightforward when multiplying income y and all monetary parameters B, h_2, h_1, F and C by the same coefficient.

Consequently, a simultaneous change in nominal levels of both incomes and parameters should not affect the relative location of households in the distribution of disposable income. Then, for well-behaved measures G of income distribution which do not change with nominal levels, the function $G \circ d$ should be homogenous of degree zero:

$$G\left[d_0(\alpha^1 p^0, \alpha^1 y_0^0))\right] = G\left[d_0(p^0, y_0^0)\right] \tag{3}$$

[9] A practical reason to refrains from doing so is the impossibility to apply differentiated coefficients when tax-benefit instruments apply to a pool of different income sources (e.g. income tax usually apply to the aggregation of earnings, unemployment benefits, pensions, etc.).

[10] An interesting exception in Europe is the quadratic form of the German income tax system.

and the last terms in (1) and (2) should disappear.[11] Thus the decompositions (1) and (2) simplifiy to:

$$\begin{aligned}\Delta &= \left\{G\left[d_1(p^1,y_1^1)\right] - G\left[d_0(\alpha^1 p^0,y_1^1)\right]\right\} && \text{(change in policy)} \\ &\quad + \left\{G\left[d_0(\alpha^1 p^0,y_1^1)\right] - G\left[d_0(p^0,y_0^0)\right]\right\} && \text{(change in data)}\end{aligned} \tag{I}$$

and

$$\begin{aligned}\Delta &= \left\{G\left[d_1(p^1,y_1^1)\right] - G\left[d_1(p^1,y_0^1)\right]\right\} && \text{(change in data)} \\ &\quad + \left\{G\left[d_1(p^1,y_0^1)\right] - G\left[d_0(p^0,y_0^0)\right]\right\} && \text{(change in policy)}\end{aligned} \tag{II}$$

Then the first term of (I) and the second of (II) are measures of the absolute effect of the policy change on disposable income distribution against a distributionally-neutral situation. On practical grounds, the first measure requires the knowledge of data 1 while the second requires data 0. Typically, microsimulation studies use cross-sections of the initial year (year of data collection) while data of the final year are not available. This can be due to infrequency of data collection or simply the fact that period 1 corresponds to future budgets or hypothetical systems. In consequence, our first empirical exercise (Section 4) will apply the measure suggested by decomposition (II):

$$G\left[d_1(p^1,y_0^1)\right] - G\left[d_0(p^0,y_0^0)\right] \tag{4}$$

using base period data only.

3 Data and Simulation

Simulations for all countries except France and Ireland are performed using the tax-benefit calculator EUROMOD. This model has been designed to simulate the tax-benefit systems of the EU-15 countries. For each country, it computes all direct taxes and monetary transfers, and hence disposable income, for all the households of a representative dataset (see description in Sutherland, 2001). The choice of initial system (1998) and final system (2001) is constrained by what is made available in the latest version of EUROMOD. In addition, we use the French microsimulation model SYSIFF, described in Bargain and Terraz (2001), to simulate the French system in 1995 and 2001, and the Irish model SWITCH, described in Callan et al. (1996) for the Irish system in 1994 and 2000.

The data used in Section 4 are described in Table 1. As aforementioned, the absolute measure of the policy effect using (II) requires data for the initial period only, that is, 1995 for France, 1994 for Ireland and 1998 for all the other countries. As indicated in Table 1, however, the year of collection matches the initial year of simulation only for Austria, Finland, Germany, France and Ireland. For other countries,

[11] Simulations confirm that Lorenz curves obtained using $d_0(p^0,y_0^0)$ and $d_0(\alpha^1 p^0,\alpha^1 y_0^0)$) overlap; inequality measures differ by less than 1% and poverty measures by less than 2%. As previously discussed, this result requires the use of a unique factor on all types of incomes. If differentiated α coefficients were used for each income source, the distribution of gross income would change, i.e. $G(\alpha^1 y_0^0) \neq G(y_0^0)$.

datasets are a bit older so that the previous methodology cannot be applied perfectly. For those, 1998 data are obtained by updating monetary variables using differentiated coefficients for different income sources – but necessarily assuming that there were no other changes (in gross income composition and distribution, in demographic structure, etc.) between the two years

The last column provides the updating coefficient α^1 that allows nominal adjustment between years 0 and 1 for all countries as previously described. It is calculated as the growth rate of average gross income over the relevant period.

The second exercise (Section 5) consists in applying the full decompositions to capture the relative effect of policy changes. In this case, decompositions (I) and (II) require data for both initial and final periods. For that purpose, we focus on France and Ireland for which such data are available. Initial data for France (1995) and Ireland (1994) are described in Table 1. In addition, we use the French Household Budget Survey 2001, which contains 25,803 observations, and the Living in Ireland Survey 2000,which contains 11,450 observations.

Table 1: Data Desciption

Country	Data	Collection year	no. of observations	no. households (weighted)	updating factor*
Austria	European Community Household Panel	1998	7,386	3,238,520	5.7%
Belgium	Panel Survey on Belgium Households	1997	7,057	4,028,723	7.2%
Denmark	European Community Household Panel	1995	7,044	2,531,183	6.2%
France	Household Budget Survey	1994/5	29,158	23,487,099	14.2%
Finland	Income Distribution Survey	1998	25,010	2,355,000	7.4%
Germany	German Socio-Economic Panel	1998	18,227	38,259,778	10.7%
Greece	European Community Household Panel	1995	15,062	3,720,085	15.5%
Ireland	Living in Ireland Survey	1994	14,585	1,130,695	36.1%
Italy	Survey of Households Income and Wealth	1996	23,924	19,816,115	14.2%
Portugal	European Community Household Panel	1996	14,468	3,211,572	9.8%
Spain	European Community Household Panel	1996	18,991	12,347,454	23.9%
UK	Family Expenditure Survey	1995/6	16,586	24,490,138	6.8%

** This factor is computed for the period 1998-2001, except for Ireland (1994-2000) and France (1995-2001).*

4 Absolute Effect of Tax-Benefit Policies

Measure G could be chosen among many inequality and poverty indices. In this section, we simply use the Gini coefficient to illustrate the methodology suggested above. Results are presented in Table 2. The Gini for the initial year corresponds to $G\left[d_0(p^0, y_0^0)\right]$ in (4), also expressed as $G\left[d_1(\alpha^1 p^0, y_0^1)\right]$ due to homogeneity, while the Gini for final year, $G\left[d_1(p^1, y_0^1)\right]$, is obtained by grossing up the data using coefficient α^1. As explained above, the absolute measure captures the distributional impact of changes in policy structure and the actual adjustments in monetary parameters compared to adjustments in line with the growth of average gross incomes.

First of all, the Gini for period 0, as calculated using microsimulation models, are broadly in line with

other findings as indicated by the comparison of the first and last columns of Table 2.

Then, our results point out towards substantial effects of policy changes in France, Finland, Greece, Ireland and the UK. In Greece, the large decrease in inequality reflects changes in policy structure (e.g. social contribution rebate for low earners in 2000) but also nominal adjustment (e.g. large increase in real terms of the social pensions, farmers' basic pension and pensioner social solidarity benefit). In the UK, it may reflect important structural changes (e.g. extension in 1999 of the refundable tax credit for low-earner families) but also nominal changes (e.g. council taxes have been regularly raised above inflation, affecting more families with high incomes; income support for pensioners has been increased). In Finland, inequalities due to tax-benefit policies have increased, partly as a result of a reduction in the progressivity of the tax system; indeed, the (flat-rate) State tax has been increased while (progressive) municipal taxation has been decreased. Results for France and Ireland are detailed in the next Section.

Finally, it is interesting to compare our results to Förster and d'Ercole (2005). The comparison is imperfect since the authors study changes in inequality/poverty over the 1994-1999 period – while we focus on 1998-2001 for most countries. However, periods match quite well for France and Ireland. Interestingly, our results capture the change in inequality due to policy changes while Förster and d'Ercole document the overall change in the Gini. It turns out that the trend in France is similar while results are complete opposite for Ireland, meaning that the policy effect and other factor must play in the same direction in the former countries but in opposed ways in the latter. More precisely, recent Irish policy development must have contributed to increase inequality (as reported in Table 2) while other factors have offset this effect, leading to reduced inequality as documented by Förster and d'Ercole. We quantify these effects in the next section.

Table 2: Absolute Effect on Inequality of the Change in Tax-benefit System

Country	Gini on disposable income				Gini from other sources**	
	Period 0	Period 1*	policy effect (absolute)	policy effect (% change)	source	Gini
Austria	24.5	24.2	-0.3	-1.1%	Dennis and Guio (2003)	26
Belgium	25.3	25.3	0.0	0.1%	Socio-Economic Panel 97	24.8
Denmark	25.4	25.1	-0.3	-1.2%	Danish register data 97	25.7
France	29.9	29.4	-0.5	-1.8%	ECHP, Eurostat, 1995	30
Finland	25.8	26.5	0.7	2.8%	Riihelä et al. (2005)	26
Germany	26.5	26.6	0.1	0.4%	Dennis and Guio (2003)	25
Greece	35.3	34.2	-1.1	-3.0%	Dennis and Guio (2003)	34
Ireland	29.0	30.4	1.4	4.8%	Dennis and Guio (2003)	32
Italy	35.1	34.7	-0.4	-1.1%	Italian Household Budget 98	34.3
Portugal	38.1	38.6	0.5	1.2%	Dennis and Guio (2003)	36
Spain	33.1	33.7	0.5	1.6%	Dennis and Guio (2003)	33
UK	31.9	30.7	-1.1	-3.6%	Dennis and Guio (2003)	32

Gini are based on equivalized income using the modified OECD scale (zeros are bottom-coded as 10E-1)
Period 0 is 1998 for all countries except Ireland (1994) and France (1995); period 1 is 2001 for all countries except Ireland (2000)
** Disposable incomes for period 1 are simulated on the basis of period 0 incomes, nominally adjusted to period 1.*
*** Measures in Dennis and Guio (2003) are based on the ECHP for 1998 incomes; measures based on Danish register Data 1997 are published in the Luxembourg Income Study; those from 'Italian Household Budgets 1998' are published by the Bank of Italy (2000).*

5 Relative Effect of Tax-benefit Policies: France and Ireland

In this section, we decompose the role of policy changes versus other factors in explaining changes in income distribution. Other factors are complex, including changes in the macroeconomic environment, the effect of other policies (unemployment benefits, minimum wage, etc.) and the indirect effect of tax-benefit policies via behavioural responses. We apply both decompositions I and II on France (period 1995-2001) and Ireland (period 1994-2000).

Table 3 presents the results for a battery of indicators. Inequality, as measured by the Gini coefficient and the Atkinson index ($\varepsilon = 0.5$) has slightly decreased in France, by between 2 and 4.5 per cent. In Ireland, there is a somewhat greater fall (between 4 and 8 per cent).[12] The two countries diverge when higher aversion to inequality is assumed: the Atkinson index ($\varepsilon = 1.5$) increases in Ireland and decreases in France. This reflects that income growth has been more homogenous in France while inequality reduction has occurred mostly within the second half of the distribution in Ireland. This is confirmed by the ratio of upper incomes to median, which decreases in Ireland while the gap between upper and lower incomes widens. In addition, the headcount ratio with poverty line at 60% of the median falls slightly in France but rises by around 50% in Ireland.

What is the relative role of tax-benefit policy and of other factors in these developments? In France, policy changes explain most of the change in inequality and poverty measures; this result is confirmed using either decomposition. Other factors play a small role, often not significant or with a diverging sign depending on the index under consideration; in particular, they contribute to an increase in the headcount ratio with a line at 60% of the median but to a decrease in the headcount ratio with line at 50% (not represented) and in the Atkinson index with $\varepsilon = 1.5$.

There was little policy change in the late 1990s and welfare payment rates have been raised only after 1997 to catch up with average income (the most noticeable increase concerns the unemployment assistance, *Allocation de Solidarité Spécifique*, in 1998). It seems that the trend captured in our results rather rather stems from structural changing of years 2000-2001, and in particular the reform of housing benefits and the introduction of a modest refundable tax credit for low-wage individuals, two measures that have benefited primarily to the lowest part of the distribution (see CERC, 2006). Outside of tax-benefit policy, key factors have been the economic recovery of the 1997-2001 period and declining unemployment (from 11.3% in 1995 down to 8.8% in 2001). Recent growth has taken some time to trickle down to poverty levels (see the detailed analyses in CERC 2006 and Demailly and Raynaud, 2006). The number of people on welfare ('RMI' recipients) continued to climb until 1999 then decreased from 1,12 million in 1999 to 1.05 in 2001. Moreover, wage moderation has accompanied the implementation of the new legislation on reduced working time in 2001.

[12] Table 2 shows that the simulated Gini for France is close to the measure obtained using the ECHP. It is however overstated compared to measures using the tax revenue data (INSEE-DGI, *enquete Revenus Fiscaux*, 1996), giving a Gini around 0.27. For Ireland, a Gini of 0.29 in the initial period is lower than measures from the ECHP (0.32) and from the raw data in the Living in Ireland Survey (0.33), probably reflecting the extent of unclaimed benefit in the actual data. Trends observed in Table 3 are nonetheless confirmed by these other sources.

While decompositions I and II lead to similar conclusions in France, results seem more sensitive to the method for Ireland. This is primarily due the fact that effects are much larger in this country, following the dramatic change in the economy in the late 1990s and the very large fall in unemployment rate (from 15% to 5% over the period). Nevertheless, some key results are robust with respect to the choice of decomposition method. The Gini and Atkinson indices, along with the percentile ratios P90/P10 and P50/P10, confirm that the direct influence of policy changes over the period was to increase inequality while other factors tended to decrease it. Both policy changes and other effects contribute to increase the head count, poverty gap ratio and weighted poverty gap ratio with poverty line at 60% median as well as the Atkinson index with high inequality aversion.

As far as policy changes are concerned, income tax cuts have clearly reduced the progressivity of the system and contributed to widen the gap between the second half of the distribution and the bottom, as indicated by the percentile ratios. In addition, welfare payment rates have failed to keep pace with the growth in income so that the relative position of the poorest disimproved in the second half of 1990s, as translated by poverty trends.[13]

As for other factors, not directly due to taxes and benefits, it turns out that the sharp fall in unemployment has acted to reduce most of the inequality measures. There is less indication of the widening in earnings dispersion which accompanied the rapid economic growth in the 90s. As noted by Nolan and Maitre (2000), this trend has been primarily driven by relatively rapid increases for those at the very top of the distribution, which is not captured by the P90 percentile reported here. According to Nolan and Maitre, there was no indication that the bottom has been falling behind the median, as confirmed here by the quasi-stagnation of the P50/P10 ratio for 'other effects'. When the focus is on the poorest, however, the impact of these other factors was to raise the poverty indices (and the Akinson index with $\varepsilon = 1.5$). Instances where falling unemployment has also been associated with a rise in the risk of relative poverty have also been found in Immervoll et al. (2005a).

6 Concluding Comments

This paper suggests a decomposition of the trends in inequality and poverty into the contribution directly due to tax-benefit policy changes and the contribution of other factors, including changes in gross income distribution. This allows us to establish an absolute measure of the policy effect in which the benchmark is distributionally neutral, i.e. in line with income growth over the period. Policy changes which do not adjust monetary tax-benefit parameters along these lines may affect (disposable income) inequality. While not unique, the measure proposed has the merit not requiring the data for the final year while being consistent with the suggested decomposition.

We also apply the full decomposition to two countries. We find that policy changes have had important influences in both Ireland and in France over the late 1990s. For France, policy impacts have tended to

[13] Nolan and Maitre (2000) show that the share of social transfers declined substantially in the period 1994-1997, confirming that social welfare support rates lagged behind the very rapid pace of growth in earnings.

Table 3: Decomposition of the Inequality/Poverty Change

				Decomposition I		Decomposition II	
	Period 0	Period 1	Total change	tax-benefit policy effect	Other effects	tax-benefit policy effect	Other effects
Ireland 1994-2000							
Gini (%)	29.0	27.7	-1.3	0.7	-2.0	1.4	-2.7
Atkinson 0.5	6.7	6.2	-0.5	0.3	-0.8	0.7	-1.2
Atkinson 1.5	18.3	20.6	2.3	1.0	1.3	2.0	0.3
P90/P10	3.5	3.8	0.2	0.3	-0.1	0.5	-0.3
P90/P50	2.0	1.9	-0.2	0.0	-0.2	0.0	-0.2
P50/P10	1.7	2.0	0.3	0.2	0.1	0.3	0.0
FGT0(%) - 60% median	13.4	19.8	6.4	2.8	3.6	6.0	0.5
FGT1(%) - 60% median	1.5	4.4	2.9	1.3	1.6	1.7	1.2
FGT2(%) - 60% median	0.4	1.5	1.1	0.5	0.7	0.4	0.7
France 1995-2001							
Gini (%)	29.9	29.2	-0.7	-0.6	0.0	-0.5	-0.1
Atkinson 0.5	7.4	7.2	-0.2	-0.3	0.1	-0.2	0.1
Atkinson 1.5	20.9	19.8	-1.2	-0.7	-0.3	-0.5	-0.6
P90/P10	3.5	3.4	-0.2	-0.1	0.0	-0.1	0.0
P90/P50	2.0	2.0	0.0	0.0	0.0	0.0	0.0
P50/P10	1.8	1.7	-0.1	0.0	-0.1	-0.1	0.0
FGT0(%) - 60% median	13.3	12.7	-0.6	-1.5	1.0	-1.0	0.5
FGT1(%) - 60% median	2.8	2.4	-0.4	-0.4	0.0	-0.2	-0.1
FGT2(%) - 60% median	1.0	0.9	-0.1	-0.1	0.0	-0.1	-0.1

The tax-benefit policy effect is measured on the basis of data at period 0 (resp. 1) in decomposition I (resp. II). The anchored poverty line is calculated as 60% of the median in period 0 and updated using the same nominal adjustment as for data and tax-benefit parameters for period 1.

equalize incomes and reduce relative income poverty; for Ireland, the reverse is the case. In the Irish case, overall inequality falls because of other factors, including changes in the distribution of gross income as unemployment fell sharply. For France, policy changes were the main driving force in the change in inequality over this period. These results show the value of evaluating policy reforms in conjunction with other structural changes in the population if their influence on inequality is to be understood and measured accurately.

Results for France are not sensitive to the decomposition method, i.e. either based on the initial or the final period. For Ireland, however, some differences are interesting and deserve further investigation. In this line of thought, Musgrave and Thin (1948, p. 510) note that "[...] the less equal the distribution of income before tax, the more potent will be a (given) progressive tax in equalizing income".[14] The assessment of policy change may then depend on the reference point. For Ireland, the regressive effect of recent policy changes appear larger in absolute terms when estimated on the more equal distribution of gross income (i.e. on the final year using decomposition II).

If changes in market income are important and if both initial and final data are not available, microsimulation studies can only give us a partial information. The potential effect of policy on inequalities can be measured but its contribution to overall trends in inequality cannot be assessed. This emphasizes the need for repeated cross section for all years or, ideally, the use of representative panel data for analyzing the redistributive effects of tax-benefit systems.

Finally, it is important to emphasize that if changes in market income are important, microsimulation estimates based only on the initial year only give us very partial information on likely trend in inequality and poverty. This is so not only because tax-benefit policies explain only part of the trend but also because the possible interaction with changes in gross income are not accounted for. The second decomposition suggested in this paper contributes to provide some preliminary information in this respect. A closer analysis of policy impacts would require the use of more regular (ideally, annual) data as a basis for the analysis.

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