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THE IMPACT OF INDIRECT TAXES AND IMPUTED RENT ON INEQUALITY: A COMPARISON WITH CASH TRANSFERS AND DIRECT TAXES IN FIVE EU COUNTRIES

Francesco Figari and Alari Paulus

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GROWING INEQUALITIES' IMPACTS

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The impact of indirect taxes and imputed rent on inequality:

A comparison with cash transfers and direct taxes in five EU countries

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January 2012
DP 28





Table of contents

ABSTRACT	7
1. INTRODUCTION AND MOTIVATIONS	9
2. DATA AND METHODOLOGY	11
2.1.EUROMOD	11
2.2.Income concepts	12
2.3.Estimation of imputed rent.....	14
2.4.Imputation of expenditure data and simulation of indirect taxes.....	15
2.5.Methodological approaches for the redistributive analysis	16
3. COMPOSITION OF HOUSEHOLD INCOME.....	19
4. INEQUALITY OF INCOME DISTRIBUTIONS	23
5. REDISTRIBUTIVE EFFECTS BASED ON THE BENEFIT INCIDENCE APPROACH	25
5.1.Are indirect taxes a regressive form of taxation?	28
6. FACTOR SOURCE DECOMPOSITION ANALYSIS	33
7. CONCLUSIONS	35
REFERENCES.....	39
GINI DISCUSSION PAPERS	41
INFORMATION ON THE GINI PROJECT.....	43





Abstract

This paper examines the redistributive impact of imputed rent (private and public) and indirect taxes (value added tax and excises), comparing this with the effects of cash transfers and direct taxes in five EU countries. The extended income concept, taking into account both imputed rent and indirect taxes, provides a more reliable picture of inequality differences across countries.

Our results show that indirect taxes have a regressive effect with respect to income in all countries considered but always smaller in magnitude than other tax-benefit instruments. Imputed rent reduces overall inequality in particular where the prevalence of individuals living in own accommodation is high even among the poorest (Greece) and where the contribution of the public imputed rent is large (the UK).

Keywords: Imputed rent, indirect taxes, European Union, household income, microsimulation, EUROMOD.

JEL: C81, H23, D63





1. Introduction and motivations

The redistributive effects of personal income taxes and cash transfers across European countries are widely investigated in a number of recent studies (among else, Fuest et al. 2010, Immervoll et al. 2006, Paulus et al. 2009). Most of the studies focus on the concept of disposable (cash) income which despite of its advantages is not a comprehensive measure of household resources. Two major components are often neglected in international comparisons notwithstanding their importance. First, the economic value of private and public in-kind benefits which are an important resource available to households. Second, consumption taxes which determine in a substantial way the spending power of individuals on commodities. They represent typically around 30% of government revenue and are expected to be regressive with respect to household incomes (Decoster et al. 2010). The main reason is the lack of data combining information on monetary income, non-cash income and expenditures and, therefore, most of the existing cross-country studies are limited to one of these items at a time, e.g. O'Donoghue et al. (2004) and Decoster et al. (2010) consider indirect taxes, Frick et al. (2010) imputed rent and Paulus et al. (2010) in-kind benefits. An example of a recent analysis covering direct and indirect taxation, cash and in-kind benefits, is provided by Sung and Park (2011) but limited to a single country.

The theoretical superiority of an extended income concept which also includes in-kind benefits is recognised in the literature (Atkinson and Bourguignon 2000, Atkinson et al. 2002, Canberra Group 2001, Smeeding and Weinberg 2001). The individuals' command over resources depends not only on the available money but also on the value of commodities net of indirect taxes and other resources available through non-market mechanisms (as public and private in-kind benefits). Moreover, the extended income concept provides a more reliable picture of inequality differences across countries.

Using EUROMOD, the EU-wide tax-benefit model which incorporates data on monetary income sources as well as non-cash income, expenditures and indirect tax rules for a selection of European countries (i.e. Belgium, Greece, Hungary, Ireland and the UK), we analyse the redistributive impact of imputed rent (private and public) and indirect taxes (value added tax and excises), comparing this with the effects of other elements of the tax-benefit systems. Our study updates and extends to different countries Garfinkel et al. (2006) who showed that in-kind benefits and indirect taxes lead to narrower differences in inequality across countries.

To the best of our knowledge, our paper provides the first cross-country comparison of the redistributive effects of the components of tax-benefit systems, covering both direct and indirect taxes as well as imputed rent, all estimated at the individual level within the same framework. Previous studies have been either based on micro-

level estimates but focusing only on indirect taxes (O'Donoghue 2004; Decoster et al. 2010) or imputed rent (Frick et al. 2010), or based on aggregate imputations of indirect taxes and limited to a balanced budget analysis where only the aggregate amount of taxes corresponding to social benefits were considered (Garfinkel et al. 2006).

In this paper, we do not consider in-kind benefits other than imputed rent because of the conceptual and methodological challenges involved in their inclusion in the income concept when they are directly related to different individual needs. For instance, Aaberge et al. (2010) show that it is important to use different equivalence scales to adjust for needs and economies of scale in cash and non-cash income. However, imputed rent related to the main accommodation is one of the most important non-cash income concepts and it contributes to the resources available for individuals in a relevant way (Frick et al. 2010). There are different reasons why imputed rent should be considered to achieve a more comprehensive picture of individual well-being. On the one hand, home owners benefit from private imputed rent, facing reduced current housing costs and enjoying a rate of return on their private investment plus potential capital gains and other benefits associated with their assets. On the other hand, families living in subsidised houses clearly benefit from a measure of imputed rent if they pay below-market rent or no rent at all.

The paper is organised as follows. In Section 2 we explain the data used in the analysis and some methodological issues. Section 3 provides a snapshot of the composition of household income across countries followed by the evidence on income inequality in Section 4. In order to disentangle the mechanisms behind the differences in the equalising effect of the tax-benefit systems across countries, we exploit two different paths of analysis. In Section 5, we focus on the redistributive effect of each income concept (cash benefits, social insurance contributions, personal income tax, indirect taxes, and imputed rent) considering the different steps of the transition from original income to the extended income. In section 6, we analyse the overall level of inequality of extended income as expressed by the contribution of each income concept using Shorrocks decomposition. Section 7 concludes with the main lessons and policy implications learned in a cross country perspective.



2. Data and methodology

2.1. EUROMOD

This paper makes use of EUROMOD, the multi-country European wide tax-benefit model. EUROMOD is a static microsimulation model that provides measures of direct taxes, social contributions and cash benefits in a comparable way across countries (see Sutherland 2007 for further information).

For the countries covered in this analysis (Belgium, Greece, Hungary Ireland and the UK), EUROMOD includes an estimation of imputed rent (with the exception of Hungary) and indirect taxes as described in the following two sub-sections. This makes possible to analyse the extended income distribution and the redistributive effects of each component of the tax-benefit systems. The selection of countries included in the analysis is driven by the data availability. Nevertheless, they have different welfare states, housing markets and varying incidence of direct taxes, benefits and indirect taxes. They provide a quite general picture of the redistributive effects of different tax-benefit components in different contexts.

EUROMOD provides a comprehensive and detailed set of information on taxes and benefits, which, among else, facilitates their categorisation in a comparable way across countries. Using the information available in the underlying datasets, it simulates benefit entitlements, direct tax, social insurance contribution and indirect tax liabilities on the basis of the tax-benefit rules in place and assuming full compliance (i.e. complete benefit take-up and no tax evasion). Instruments which are not simulated (due to data constraints), as well as market incomes, are taken directly from the input datasets. Nevertheless, our approach shares a number of limitations with previous studies. First, we focus only on the direct impact of existing taxes and benefits on income distributions and ignore possible indirect effects of government policies through changes in relative prices and household behaviour (e.g. labour supply). Second, as the underlying datasets are cross-sectional we are primarily concerned with redistribution among people rather than across each person's life-cycle.

Table 1 gives basic information on the underlying income and budget surveys used in the analysis as well as the reference time periods. The tax-benefit system simulated in this paper is 2001 for Ireland, 2003 for Belgium and the UK, 2004 for Greece, and 2005 for Hungary. The effect on the results from using different policy years is minimised by focusing on relative measures only. The reference time period for income data matches the policy

year with the exception of Hungary and Ireland for which monetary values have been updated (from 2004 to 2005 and from 2000 to 2001 respectively) with appropriate price and income indices.

Table 1. Data sources and reference time periods

COUNTRY		INCOME SURVEY	BUDGET SURVEY	TAX-BENEFIT SYSTEM
BE	Belgium	EU-SILC 2004	HBS 2003	2003
EL	Greece	HBS 2004/5	HBS 2004/5	2004
HU	Hungary	EU-SILC 2005	HBS 2005	2005
IE	Ireland	Living in Ireland Survey 2000	HBS 1999	2001
UK	UK	Family Resources Survey 2003/4	Family Expenditures Survey 2003/4	2003

Note. EU-SILC: European Union Statistics on Income and Living Conditions. HBS: Household Budget Survey. In the EU-SILC data the reference time period for incomes is the year before the data collection (e.g. in the EU-SILC 2004 the incomes refer to 2003)

2.2. Income concepts

In our analysis we use primarily an extended income concept, calculated as disposable income less indirect taxes plus imputed rent (see Box 1). Disposable income is constructed as the sum of market income and social benefits less (employee and self-employed) social insurance contributions and personal taxes. In order to disentangle the redistributive effects of public intervention, social benefits are further divided into three groups: public pensions, non means-tested benefits and means-tested benefits.

Box 1: Main income concepts

	Market income (<i>employment and self-employment income, income from property (rent), investment income, private pensions, private transfers</i>)
+	Social benefits (<i>public pensions, family benefits, health related benefits, unemployment benefits, social assistance benefits, housing benefits</i>): here divided into (a) public pensions, (b) non means-tested benefits and (c) means-tested benefits
–	Social insurance contributions (<i>employee, self-employed</i>)
–	Personal taxes (<i>national and local income taxes, other direct taxes</i>)
=	Disposable income
–	Indirect taxes (<i>VAT and excises</i>)
=	Post-indirect-tax cash income
+	Imputed rent (<i>private and public</i>)
=	Extended income

Source: Adapted from Paulus et al. (2009).



Public pensions include old-age pensions, survivors' pensions, invalidity pensions and means-tested pension top-ups, received by those aged 65 or more. Public pensions are added straight after market income and one could even argue that the two concepts should not be separated because public pensions represent enforced savings for retirement which contribute to the intra-individual redistribution over the life-cycle rather than to the inter-individual redistribution of resources at each point in time.

Other public transfers are differentiated by whether they depend on other resources (i.e. income and/or assets) benefit recipients have or not. Non means-tested benefits usually include unemployment benefits, some invalidity benefits and universal family benefits. Means-tested benefits are targeted at those with largest needs or lowest resources, such as social assistance benefits, housing benefits, and family benefits. Detailed information on how individual benefits in each country were categorised can be found in Paulus et al. (2009).

Indirect taxes (value added tax and excises) are subtracted from disposable income giving us a measure of post-indirect-tax cash income which represents the real value of consumption of goods and services (i.e. net of taxes) plus any savings (which can be either positive or negative). Savings differentiate current income and expenditure (the tax base of indirect taxes), raising a number of issues related to consumption smoothing and potential measurement errors, affecting income and expenditures reported in the surveys (and possibly in different ways). In the conclusions, we return to the reasons why one could evaluate the individual well-being in terms of expenditure rather than considering income. However, given the interest in comparing the redistributive effects of the different tax-benefit instruments and following previous empirical analysis (among else, Barnard 2009) we stick to the income as the key concept of analysis.

Imputed rent (both private and public, see below) is then added to get the extended income, which represents our comprehensive measure of individuals' command over resources, considering the value of commodities net of indirect taxes and other resources available through non-market mechanisms, such as the imputed rent related to the main accommodation.

The sequence adopted above is not without potential criticisms. We deduct indirect taxes after disposable income in order to consider all cash components first, and indirect taxes come naturally after disposable income. The treatment of imputed rent is less straightforward, because one could argue for adding imputed rent to disposable income in order to consider income side first. Moreover, on the basis that imputed rent contributes to the expenditure capacity of individuals this may affect consumption on which indirect taxes are based. Furthermore, if imputed rent would be taxed then it would be natural to add it together with (cash) market incomes.

2.3. Estimation of imputed rent

Following the EU Commission guidelines the imputed rent can be defined as “the value that would be paid for a similar dwelling as that occupied, less any rent actually paid, subsidies received, minor repairs or refurbishment expenditure incurred” (EU Commission Regulation No. 1980/2003).

Different methods have been applied in the literature to derive a measure of imputed rent: i) rental equivalent or opportunity cost approach, ii) user cost or capital market approach, iii) self-assessment approach. The rental equivalence approach estimates the opportunity cost of housing in a non-subsidized rental market. This is done through a two-step procedure, correcting for selection bias into the owner status if needed. In the first step, the rent is estimated as a function of dwelling characteristics and household income based on the sample of tenants in the private market. In the second step, a rent is imputed to home owners based on the same set of characteristics. The user cost approach focuses on the alternative use of capital which can be used to buy a dwelling or invested into equal risk-adjusted financial assets. A drawback of this approach is that it is based on the homeowner’s subjective estimation of the current market value, which possibly suffers from distortions and, further it may be sensitive to the selection of the interest rate. Finally, the self-assessment approach is based on the assessment of respondents of the rental value of their home and of course can also suffer from distortions due to subjective estimates.

See Frick et al. (2010) for a comprehensive background of the theoretical foundations of imputed rent, the different methodological approaches and a review of the empirical studies on the impact of imputed rent on income distribution.

In this paper, we use a measure of net imputed rent (i.e. deducting operating and maintenance (excluding heating) costs, mortgage interest payments and property taxes), based on the opportunity cost approach, and in the case of Belgium and Greece, with a correction for the selection bias (by applying the Heckman selection correction). Furthermore, we distinguish between the private imputed rent, i.e. the net benefit that home-owners can enjoy by living in their own house, and public imputed rent, i.e. the benefit enjoyed by families living in accommodations rented from the public sector at a below-market price or living in houses provided for free.



2.4. Imputation of expenditure data and simulation of indirect taxes

With only few exceptions, most of the socio-economic surveys do not include information on both income and consumption, preventing any micro-level analysis on the combined effect of direct and indirect taxation. A solution to overcome this data limitation for the surveys containing detailed socio-demographic characteristics and income values (i.e. those underlying EUROMOD and reported in Table 1) is to impute information on expenditures (see Decoster et al. 2010 and references cited there on the methodological challenges faced in the imputation procedure). This is done with the help of national expenditure surveys which contain a list of very detailed expenditure variables. The goods have been aggregated according to the highest level of the Classification of Individual Consumption by Purpose (COICOP), identifying, for example, aggregates such as food, private transport, durables etc. The imputation of expenditures into income surveys has been done by means of Engel curves based on the same variables present both in income and expenditure datasets. Individual indirect tax liability has been simulated according to the VAT and excise legislation in place in each country, considering a weighted average tax rate for each COICOP category of goods imputed in the data.

The VAT structure differs across countries quite substantially (Decoster et al. 2010). The standard rates are 17.5% in the UK, 18% in Greece, 20% in Ireland, 21% in Belgium and 25% in Hungary with a budget share spent in goods subject to this rates ranging between 36% in Ireland and 58% in the UK. However, the striking differences are in the reduced rates and the share of goods exempted from VAT. In Belgium, Hungary and Greece there are two reduced rates (between 4% and 15%), while there is just one reduced rate in Ireland (12.5%) and the UK (5%). In Hungary only 8% of goods are exempted from VAT and 16% in Greece. In Belgium, Ireland and the UK the share of goods exempted from taxation is around 40%. A synthetic measure of the coverage of VAT is given by the C-efficiency indicator which reveals that the VAT collected in Hungary is around 71% of the VAT that could be raised by applying the standard VAT rate on the same consumption budget. The C-efficiency indicator is equal to 63% in Greece, 60% in the UK and below 50% in Belgium and Ireland (Decoster et al. 2010).

Alcoholic products, fuel and tobacco constitute the largest part of the tax base for excises across countries. However, the value of excises differs substantially across countries with alcohol and tobacco relatively highly taxed in the UK and fuel subject to a higher tax in Hungary and Ireland.

2.5. Methodological approaches for the redistributive analysis

There are several methods for analysing the redistributive effect of income components. First, the “benefit incidence” method which evaluates the effect of each income component in turn on the basis of marginal change in income inequality when the given component is added to the income distribution (among else, Immervoll et al. 2006, Mahler and Jesuit 2006, OECD 2008, Paulus et al. 2009). Components are added sequentially which makes results also depend on the order in which components are considered. This makes the method vulnerable in situations where there are no strong arguments for choosing a particular order.¹ In our case we analyse changes in income inequality starting from original income and adding various components until arriving at our extended income concept in the same order as shown in Box 1.

We evaluate the redistributive effect of each income concept by using the Reynolds-Smolensky index (1977) based on the variation in the Gini coefficient achieved by the tax or benefit:

$$RS = (G_{\text{before}} - G_{\text{after}}) = VE - \text{reranking effect}$$

where the vertical redistribution (VE) is given by the difference between the Gini index and the concentration index of the income distributions, respectively, before and after the inclusion of a given income concept. The reranking effect is given by the difference between the Gini index and the concentration index of the income distribution after the inclusion of a given income concept.

As shown by Lambert (2001), The RS index can be decomposed as follows

$$RS = (g/1-g)K - \text{reranking effect}$$

where $g/(1-g)$ is the tax level (or average incidence of a given income concept) and K is the Kakwani index (1977) of disproportionality. The Kakwani index is given by the difference between the concentration index of the specific tax/benefit distribution and the Gini index of the income distribution before the inclusion of that tax/benefit component.

The second method is “factor source decomposition” (Shorrocks 1982a, b) which allows us to calculate the contribution of each income source (positive or negative) to the overall inequality without making assumptions about the order in which components are added together. The approach works in a simultaneous way, with the

¹ In addition to progressing from original income to extended income, one could also compare extended income before and after the exclusion of a given income concept (Immervoll et al. 2006, Paulus et al. 2009). This approach imposes weaker assumptions about the order of components.



contribution to overall inequality of each component of extended income calculated independently of other components (for empirical applications see, among else, Jäntti 1997).

In the factor source decomposition method, the contribution of each income source, s_k , to the overall inequality can be expressed as:

$$s_k = \rho_k(\mu_k/\mu)(CV_k/CV)$$

where ρ_k is the correlation between income source k and total income, μ_k/μ is the share of income source k in total income, and CV_k/CV is the inequality of income source k relative to total inequality (measured by the coefficient of variation).

Factor components with a positive value s_k make a disequalizing contribution to the inequality in extended income; factor components with negative values make an equalizing contribution.

Fuest et al. (2010) explore the redistributive effects of social contributions, direct taxes and cash transfers across Europe using both methods. They find different redistributive effects depending on the approach used and attribute the differences due to the different normative focus of the two approaches. The first method emphasises the redistributive effects of benefits while the second approach highlights the redistributive effects of taxes and contributions.

A criticism both to the benefit incidence and the decomposition method is that they do not consider potential behavioural changes of individuals due to the receipt of a particular benefit or the payment of a given tax. Furthermore, individuals might not evaluate non-cash incomes (e.g. in-kind benefits and imputed rent) at their monetary amount in their utility maximization process. However, Garfinkel et al. (2006) argue that the monetary amount is a good approximation of their value.

An alternative method is the “behavioural approach” which evaluates the value of net public support by the estimated demand function, measuring the consumption changes induced by reforms in public transfers (Ravallion et al. 1995). However, there are serious limits in getting unbiased estimators due to simultaneity and omitted variables (van de Walle 1998). Moreover, the computational burden implied by this method has led to more widespread empirical applications of the first two approaches.





3. Composition of household income

Before analysing the redistributive effect of each income concept identified in Box 1, we focus on the composition of household income, by looking at the average size of income components at the household level expressed as a percentage of average household disposable income (Table 2). The same information is provided for all households, and separately for those in the bottom and top income decile². Positive numbers refer to benefit payments (or tax refunds as in Greece for the individuals in the bottom decile) while negative numbers express tax burden. The composition of household income allows us to have an overview of the magnitude and the incidence along the income distribution of the different resources available to individuals which determine the inequality of the extended income distribution.

Overall, original income exceeds disposable income in Belgium, Ireland and the UK meaning that direct taxes and social contributions are larger than cash benefits. The opposite is true in Greece and Hungary due to relatively generous public pensions. Focusing on the poorest households, the share of original income is much lower than disposable income, with again Greece and Hungary clustering together and being the only countries where average public pensions are smaller than the average original income. This is due to a higher prevalence of (low-paid) employees in the first decile relative to pensioners compared with other countries. As expected, at the top of the distribution, original income is higher than disposable income in all countries, with social contributions and taxes reducing substantially the resources available to individuals. The relatively generous pension systems in Greece and Hungary make the average public pensions larger than in other countries even among the richest individuals.

Differences between welfare systems are characterised by the channels through which the public support is implemented. Bismarkian countries (Belgium, Greece, Hungary) show higher relevance of public pensions and other non means-tested benefits (e.g. disability, health related, early retirement benefits), while Beveridgean countries (Ireland and UK) rely more on means-tested benefits (as well as private pensions which are here considered as part of original income). By construction, means-tested benefits (Ireland, UK) are targeted at households in the lower part of income distribution. However, even non means-tested benefits (Belgium and Hungary) determine a relatively generous support at the bottom of the distribution. Greece clearly stands out with most of the support channelled through public pensions rather than any other benefits.

On the government revenue side, the combination of social contributions and income tax results in a much higher total burden in Belgium and Hungary than in other countries. In Greece and Hungary social insurance contributions are more important than personal taxes, while in Belgium, Ireland and the UK it is the opposite. It is

² Deciles are based on equalised household disposable income.

evident that the tax burden of the households in the top decile is much higher, ranging from 35% in Ireland to 68% in Belgium of disposable income. On the other hand, also people in the bottom decile can end up with a relatively high tax burden: in Greece and Hungary due to social insurance contributions and the UK due to the joint effect of income tax and council tax on properties.

As expected from previous studies (for a recent review, see Warren 2008), the pattern of indirect taxes with respect to income is regressive, with average tax burden for the poorest households being at least twice of that for the richest households (except in Belgium). However the cross-country differences are striking with much higher average tax rates in Greece and Hungary for the individuals at the bottom of the income distribution (37.7% of disposable income in Greece, 24.6% in Hungary). There are three main factors which explain the incidence of indirect taxes: rate structure (i.e. how different goods are taxed), consumption pattern (i.e. relative importance of goods consumed across income deciles) and propensity to consume (i.e. household expenditure compared to household income across income deciles). Greece and Hungary, the countries with the highest incidence in particular at the bottom of the distribution, are characterized by the lowest percentage of expenditures being VAT exempt or taxed at lower rate. It is common that average expenditures in the bottom deciles exceed average income (see e.g. Decoster et al. 2010; Wolff and Zacharias 2007) and, in our case, this is particularly true in Greece, Hungary and Ireland. This is expected when looking at cross-sectional data as people smooth their consumption over time. Although this relationship might be affected by measurement errors it still demonstrates the importance of considering the impact of indirect taxes which affect, in particular, the command over resources of the poorest individuals.

Overall the average value of imputed rent (private and public) is comparable with that of indirect taxes in Ireland and the UK (around 10% of disposable income) but lower in Belgium (6%) and Greece (12%). The incidence of imputed rent is much higher at the bottom of the income distribution in particular in Greece, Ireland and the UK (where the average value of public imputed rent is also highest).



Table 2. Average household income by source, % of disposable income

INCOME COMPONENT	ALL HOUSEHOLDS						BOTTOM DECILE						TOP DECILE							
	BE	EL	HU	IE	UK	BE	EL	HU	IE	UK	BE	EL	HU	IE	UK	BE	EL	HU	IE	UK
<i>original income</i>	106.1	94.4	93.8	103.0	105.7	18.3	58.1	70.8	19.9	16.4	155.6	122.3	137.3	132.6	139.4					
public pensions	16.6	19.4	18.7	6.8	7.0	38.1	38.4	8.0	25.9	28.1	5.6	10.1	8.2	0.9	1.2					
means-tested benefits	1.5	0.1	0.8	4.5	9.1	8.9	1.1	13.1	33.4	53.3	0.1	0.0	0.0	0.3	0.3					
non means-tested benefits	16.4	10.0	20.6	5.1	6.5	37.7	12.5	41.0	21.5	14.0	6.5	6.6	15.3	1.2	1.2					
social insurance contributions	-13.8	-13.5	-17.1	-3.7	-5.8	-2.4	-10.3	-27.5	-0.3	-0.2	-19.6	-12.5	-22.3	-4.9	-6.6					
personal taxes	-26.9	-10.5	-16.7	-15.7	-22.6	-0.5	0.3	-5.5	-0.5	-11.5	-48.1	-26.6	-38.6	-30.1	-35.4					
<i>disposable income</i>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0					
indirect taxes	-11.1	-16.0	-15.9	-10.0	-10.8	-15.3	-37.7	-24.5	-18.7	-20.2	-9.9	-11.9	-13.7	-6.2	-8.2					
<i>post-indirect-tax cash income</i>	88.9	84.0	84.1	90.0	89.2	84.7	62.3	75.5	81.3	79.8	90.1	88.1	86.3	93.8	91.8					
imputed rent (private)	5.8	12.5	-	10.5	8.2	9.8	38.0	-	20.9	29.1	4.7	8.0	-	7.7	4.7					
imputed rent (public)	0.3	0.0	-	0.0	1.0	1.4	0.0	-	0.0	4.8	0.1	0.0	-	0.0	0.0					
<i>extended income</i>	95	96	-	100	98	96	100	-	102	114	95	96	-	102	97					

Notes: Decile groups are formed by ranking individuals (i.e. contain the same number of individuals) according to equivalised household disposable income using the modified OECD equivalence scale, i.e. weighing the head of household with 1, any other adult with 0.5 and a child (younger than 14 years) with 0.3. Social insurance contributions refer only to the share of employees and self-employed. Public pensions include old age and health related pensions received by people aged 65+; war pensions, early retirement and non-integral social pensions are included in other benefits. Source: Authors' analysis based on EUROMOD D25.





4. Inequality of income distributions

Inequality of income distributions at each step of the transition from original income to extended income is reported in Table 3 by means of the Gini index (which is more sensitive to changes in the middle of the distribution) as well as Atkinson (0.5) and Atkinson (1.5) inequality indices, which are more sensitive to changes close to the top and bottom of the distribution, respectively (Lambert, 2001).

Table 3. *Inequality of income distributions*

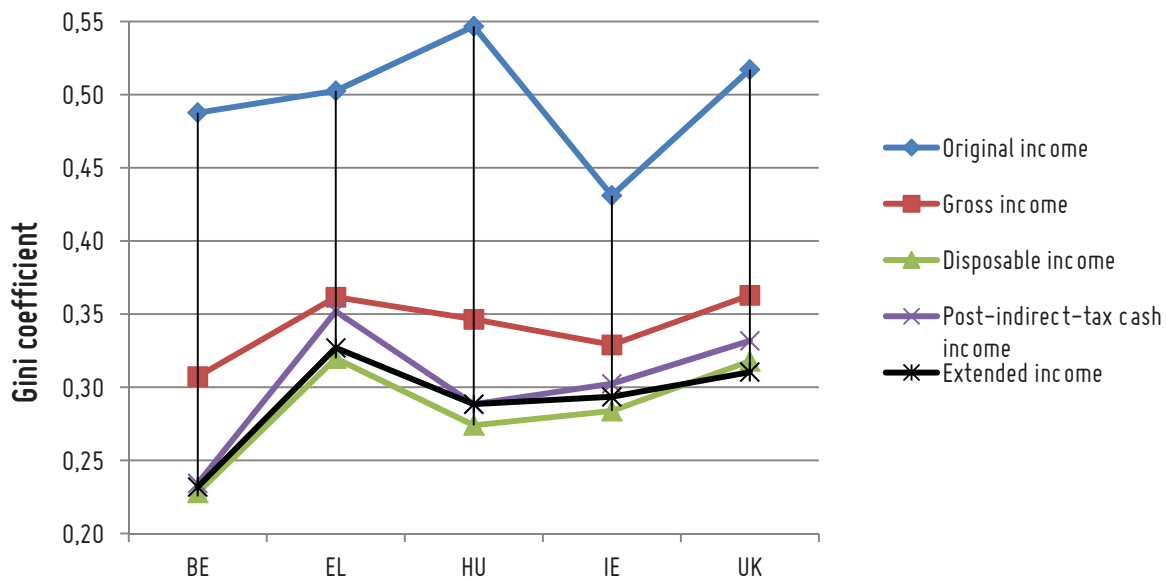
	INEQUALITY MEASURE	ORIG	ORIG + PUBLIC PENSION	ORIG + PUBLIC PENSION + NMT BENEFITS	GROSS	GROSS-SICs	DISP = GROSS - SICs - PIT	POST-IND	DISP+IR	EXTENDED INCOME
<i>Belgium</i>	Gini	0.488	0.398	0.318	0.307	0.293	0.228	0.234	0.226	0.232
	A(0.5)	0.282	0.173	0.086	0.079	0.072	0.045	0.044	0.044	0.044
	A(1.5)	0.951	0.843	0.384	0.352	0.330	0.217	0.148	0.203	0.152
<i>Greece</i>	Gini	0.503	0.399	0.362	0.362	0.363	0.320	0.352	0.302	0.327
	A(0.5)	0.273	0.148	0.112	0.111	0.113	0.088	0.096	0.077	0.086
	A(1.5)	0.508	0.345	0.292	0.291	0.289	0.273	0.296	0.229	0.270
<i>Hungary</i>	Gini	0.547	0.441	0.354	0.347	0.333	0.274	0.288	-	-
	A(0.5)	0.319	0.193	0.109	0.104	0.095	0.064	0.072	-	-
	A(1.5)	0.609	0.477	0.272	0.250	0.237	0.176	0.199	-	-
<i>Ireland</i>	Gini	0.431	0.391	0.363	0.329	0.325	0.284	0.302	0.277	0.293
	A(0.5)	0.207	0.158	0.121	0.088	0.085	0.065	0.073	0.062	0.069
	A(1.5)	0.538	0.407	0.383	0.250	0.243	0.195	0.215	0.185	0.204
<i>UK</i>	Gini	0.517	0.476	0.436	0.363	0.356	0.318	0.332	0.300	0.310
	A(0.5)	0.295	0.237	0.174	0.108	0.105	0.083	0.090	0.074	0.080
	A(1.5)	0.977	0.954	0.671	0.286	0.276	0.241	0.258	0.205	0.219

Notes: ORIG = original cash income, NMT = Non means-tested, MT = means-tested, GROSS = gross cash income: ORIG + public pension + NMT benefits + MT benefits, SICs = Social Insurance contributions, PIT = Personal income tax, DISP = disposable cash income, POST-IND = post-indirect cash income, IR = imputed rent; EXTENDED income = POST-IND + IR. All incomes are equalised using the modified OECD scale. Source: Authors' analysis based on EUROMOD D25.

The Gini index of original income ranges between 0.43 in Ireland and 0.55 in Hungary. Altogether, public transfers, i.e. public pensions, non means-tested benefits and means-tested benefits, and direct taxes, i.e. social insurance contributions and personal (income) taxes, contribute to a reduction in inequality resulting in the Gini index of disposable income ranging between 0.23 in Belgium and 0.32 in Greece. Indirect taxes (when deducted from disposable income) increase income inequality in all countries with the change in the Gini ranging from 0.6pp in Belgium to 3.2pp in Greece. Finally, the inclusion of imputed rent reduces inequality in all countries, resulting in the Gini index of extended income being similar to the Gini of disposable income (i.e. ranging between

0.23 in Belgium and 0.32 in Greece). See Figure 2 for a graphical representation of the Gini coefficients associated with the different income distributions.

Figure 2. Inequality of income distributions by the Gini coefficient



Notes: see Table 4. Source: Authors' analysis based on EUROMOD D25. Source: EUROMOD

The redistributive effects associated with tax-benefit instruments vary greatly across countries and play an important role in shaping the extended income distribution. The equalising effect of the welfare system is larger, both in absolute and relative sense, in Belgium, Hungary and the UK and smaller in Greece and Ireland. The country ranking changes as well. On the one hand, Ireland shows the lowest level of inequality of original income but ranks in the middle in terms of inequality of disposable income and extended income. On the other hand, the large redistributive effects of tax-benefit instruments allow Belgium to show the lowest inequality of extended income.

Looking at the extended income distributions, the same country ranking can be observed on the basis of the Atkinson indexes, while looking at the original income distributions countries rank in a different order. Tax-benefit instruments have a different redistributive effect at different points of the distributions.

5. Redistributive effects based on the benefit incidence approach

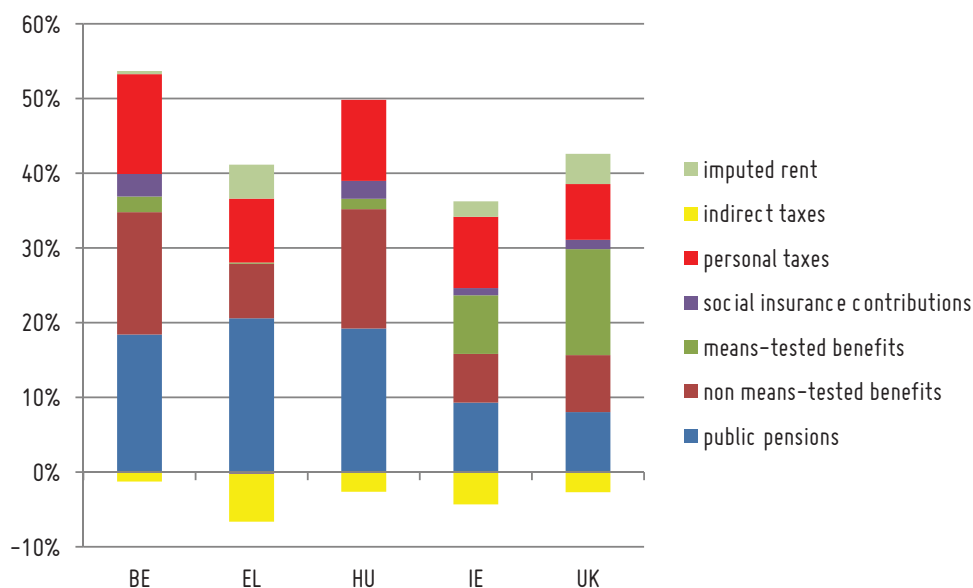
The redistributive effects of tax-benefit instruments based on the incidence approach are shown in Table 4 by means of the Reynolds-Smolensky indices, calculated in a sequential way at each step of the transition from original income to extended income. Moreover, Figure 3 reports the Reynolds-Smolensky indices expressed as a percentage of the Gini index of original income showing the redistributive effects relative to the inequality before the operation of the tax-benefit instruments.

Table 4. Redistributive effects – Reynolds-Smolensky index

INCOME COMPONENT	BE	EL	HU	IE	UK
<i>original income</i>					
public pensions	0.090	0.104	0.105	0.040	0.042
non means-tested benefits	0.080	0.037	0.087	0.028	0.039
means-tested benefits	0.010	0.001	0.008	0.034	0.073
social insurance contributions	0.015	-0.001	0.013	0.004	0.007
personal taxes	0.065	0.043	0.059	0.041	0.039
<i>disposable income</i>					
indirect taxes	-0.006	-0.032	-0.014	-0.019	-0.014
<i>post-indirect-tax cash income</i>					
imputed rent	0.002	0.023	n/a	0.009	0.021
<i>extended income</i>					

Notes: see Table 2. Source: Authors' analysis based on EUROMOD D25.

Figure 3. Reynolds-Smolensky index as % of the Gini index of original income



Notes: see Table 5. Source: Authors' analysis based on EUROMOD D25.

Source: EUROMOD

The largest redistributive effects are due to public pensions in Belgium, Greece and Hungary followed by non-means tested benefits in Belgium and Hungary. As expected, means-tested benefits play an important redistributive role in the UK and Ireland. Personal income taxes have a larger redistributive effect in Belgium and a broadly similar effect in other countries. Imputed rent contributes to reduce inequality in particular in Greece and the UK. The positive redistributive effects of direct taxes, cash transfers and imputed rent are counterbalanced by the negative redistributive effects of indirect taxes, which are particularly sizeable in Greece.

In order to disentangle the redistributive role at each step of the transition from original income to extended income, we focus on the contribution of each tax-benefit instrument in terms of average payment (i.e. average tax (benefit) rates, expressed as the amount paid (received) over the pre-tax (pre-benefit) income concept), and disproportionality (i.e. progressivity or regressivity as measured by the Kakwani index).

Table 5 reports the average tax (benefit) rates, with positive entries related to tax rates and negative entries related to benefit rates. Table 6 reports the Kakwani index, with positive values related to taxes meaning progressive structure and negative values meaning regressive structure. The opposite is true for benefits with negative values showing that poorer individuals get more.

Table 5. Average tax/benefit rates

INCOME COMPONENT	BE	EL	HU	IE	UK
<i>original income</i>					
public pensions	-0.128	-0.172	-0.164	-0.053	-0.055
non means-tested benefits	-0.133	-0.084	-0.189	-0.050	-0.059
means-tested benefits	-0.012	-0.001	-0.007	-0.040	-0.079
social insurance contributions	0.100	0.111	0.131	0.032	0.046
personal taxes	0.211	0.097	0.145	0.136	0.185
<i>disposable income</i>					
indirect taxes	0.110	0.162	0.158	0.100	0.106
post-indirect-tax cash income					
imputed rent	-0.066	-0.142	n/a	-0.111	-0.096
<i>extended income</i>					

Notes: see Table 2. Source: Authors' analysis based on EUROMOD D25.



Table 6. Disproportionality of income concepts – Kakwani index

INCOME COMPONENT	BE	EL	HU	IE	UK
<i>original income</i>					
public pensions	-1.073	-1.006	-1.102	-0.965	-0.923
non means-tested benefits	-0.790	-0.766	-0.695	-0.632	-0.773
means-tested benefits	-0.947	-0.772	-1.132	-0.945	-1.064
social insurance contributions	0.138	0.003	0.124	0.131	0.140
personal taxes	0.252	0.413	0.380	0.270	0.176
<i>disposable income</i>					
indirect taxes	-0.047	-0.142	-0.072	-0.161	-0.108
<i>post-indirect-tax cash income</i>					
imputed rent	-0.102	-0.230	n/a	-0.133	-0.301
<i>extended income</i>					

Notes: see Table 2. Source: Authors' analysis based on EUROMOD D25.

Moreover we also report the reranking term (Table 7) albeit this is mostly very small. It is relatively larger in Belgium, Hungary and Greece for public pensions and non means-tested benefits.

Table 7. Reranking effect

INCOME COMPONENT	BE	EL	HU	IE	UK
<i>original income</i>					
public pensions	0.032	0.044	0.050	0.008	0.007
non means-tested benefits	0.013	0.023	0.023	0.002	0.004
means-tested benefits	0.001	0.000	0.000	0.002	0.004
social insurance contributions	0.001	0.002	0.006	0.000	0.000
personal taxes	0.002	0.001	0.005	0.001	0.001
<i>disposable income</i>					
indirect taxes	0.000	0.005	0.001	0.001	0.001
<i>post-indirect-tax cash income</i>					
imputed rent	0.004	0.006	n/a	0.005	0.005
<i>extended income</i>					

Notes: see Table 2. Source: Authors' analysis based on EUROMOD D25.

Focusing on the income concepts with a larger redistributive impact, it is notable that average incidence and disproportionality do not follow the same pattern across tax-benefit instruments. On the one hand, in countries where public pensions (Belgium, Greece and Hungary) and means-tested benefits (Ireland and the UK) have an important redistributive role they show both larger benefit rates and larger negative values of the Kakwani index. Overall, public pensions and means-tested benefits are in all countries more targeted to the poorer than non-means tested benefits. On the other hand, personal (income) taxes show larger average tax rates in countries such Belgium

and the UK where their progressivity is smaller, due to a relative large tax base. The redistributive effect of indirect taxes varies across countries and cannot be generalised: they show the largest average rate in Greece and Hungary but they are much more regressive in Greece than in Hungary.

Imputed rent shows a negative Kakwani index in all countries revealing that overall poorer individuals benefit more in relative terms and more so in Greece and the UK. This is reinforced by Table 8 which shows imputed rent as a percentage of disposable income by decile groups. Imputed rent is clearly more pronounced at the bottom of the income distribution in particular in Greece, due to more than 70% of the individuals living in own accommodation even among the poorest (Figari et al. 2011), and in the UK, due to a large share of individuals living in social housing.

Table 8. Imputed rent as % of disposable income by decile

DECILE	BE	EL	HU	IE	UK
1	22.0	96.6	-	44.0	66.9
2	15.6	57.4	-	47.5	44.0
3	16.2	48.5	-	44.2	31.0
4	16.2	40.7	-	36.1	28.9
5	15.8	39.2	-	44.0	26.1
6	15.0	36.2	-	30.9	22.8
7	14.7	32.9	-	33.5	20.5
8	13.9	31.3	-	31.1	17.7
9	13.4	28.1	-	27.1	15.0
10	11.4	21.7	-	20.2	10.5
Total	14.3	34.2	-	31.1	21.4

Notes: decile groups are formed by ranking individuals according to equivalised household disposable income using the modified OECD equivalence scale. Source: Authors' analysis based on EUROMOD D25.

5.1. Are indirect taxes a regressive form of taxation?

Looking at the redistributive role of indirect taxes, expressed by the increase in inequality indices when indirect taxes are subtracted from disposable income, we can conclude that indirect taxes are a regressive form of taxation with respect to income.

However, as pointed out above, the sequence of income concepts can be questionable. Imputed rent contributes to the expenditure capacity of individuals and hence provides an argument in favor of adding imputed rent to disposable income before deducting indirect taxes. For this reason, Table 3 reports the inequality indexes for the disposable income plus imputed rent as well. The redistributive effect of indirect taxes, measured as the difference



between the inequality indexes of the extended income and disposable income plus imputed rent, is still negative but smaller (in particular in Greece and the UK) than if it is measured as the difference between post-indirect cash income and disposable income. Since imputed rent is relatively more important at the bottom of the income distribution, its inclusion in the income concept used to measure the redistribution due to indirect taxes reduces the regressive effect of indirect taxes.

The regressivity of the indirect taxes is also confirmed if we look at indirect tax payments as a percentage of disposable income by income decile groups (Table 9): poorer individuals pay a much larger proportion of their income in indirect taxes compared to richer individuals.

Table 9. Indirect tax payments as % of disposable income by income decile

DECILE	BE	EL	HU	IE	UK
1	15.3	37.7	24.5	18.7	20.2
2	12.0	23.4	19.8	15.5	13.5
3	11.7	19.8	18.3	13.8	12.6
4	11.6	18.4	16.7	10.6	12.4
5	11.4	17.6	16.4	11.9	11.8
6	11.0	16.0	15.7	11.2	11.6
7	10.9	16.0	15.5	10.1	11.1
8	10.8	14.9	15.4	9.3	10.7
9	10.5	14.2	15.2	8.5	9.9
10	9.9	11.9	13.7	6.2	8.2
Total	11.1	16.0	15.9	10.0	10.8

Notes: decile groups are formed by ranking individuals according to equivalised household disposable income using the modified OECD equivalence scale. Source: Authors' analysis based on EUROMOD D25.

This is particularly true in Greece and Hungary where the share of goods being VAT exempt or subject to a lower VAT rate is much smaller than in other countries and, on average, expenditures are higher than income at the bottom of the distribution (Decoster et al. 2010). Incomes are more volatile than expenditures and might represent a misleading indicator of individual well-being in a given point in time, while consumption pattern is a smoothed average of borrowing and saving. Due to consumption smoothing expenditure might be a better measure of individual well-being, although the focus on the effects of tax-benefit instruments constrains most of the empirical analysis to use income distribution as a benchmark. Moreover, the use of expenditure rather than income as a welfare measure is itself controversial, and we return to this in the conclusions.

Nevertheless, if we focus on indirect tax payments expressed as a percentage of household expenditure the overall picture changes completely. Table 10 and 11 show that poorer individuals pay a smaller proportion of their total expenditure in VAT and excises compared with richer individuals. This is true when we rank individuals

both by income deciles (Table 10) and expenditure deciles (Table 11). The main reason for the lower incidence of indirect taxes at the bottom of the distribution is that the goods being VAT exempt or subject to a lower rate (e.g. food, power, domestic fuel, children’s clothing) represent a much larger share of total spending of poorer individuals than of richer individuals. Looking at the incidence of indirect tax payments as a proportion of expenditure we might conclude that the indirect tax systems across Europe do not seem to be regressive. However, one could argue whether the VAT reductions and exemptions are an effective redistributive channel given that they are not well targeted to the poorest individuals. Empirical evidence related to the UK (Crawford et al. 2011) shows that the imposition of a uniform VAT rate would be a regressive policy reform. However, if only part of the lost revenue due to VAT reductions and exemptions was used to increase the current income-related benefits the individuals in the lowest three deciles would gain on average while the top four deciles would experience highest losses, showing that there are better redistributive tax-benefit instruments than VAT reductions to help poor individuals.

Table 10. Indirect tax payments as % of expenditures by income decile

DECILE	BE	EL	HU	IE	UK
1	11.3	13.5	17.8	11.9	13.9
2	11.8	13.9	17.6	12.2	14.0
3	12.1	14.3	17.8	12.3	13.8
4	12.5	14.2	17.5	12.2	13.8
5	12.7	14.2	17.7	13.1	14.1
6	12.8	14.1	17.7	13.4	14.3
7	13.1	14.6	17.8	13.1	14.5
8	13.3	14.2	18.0	12.8	14.7
9	13.5	14.3	18.2	13.1	14.6
10	13.9	14.1	18.5	12.2	14.4
Total	12.9	14.2	18.0	12.7	14.3

Notes: decile groups are formed by ranking individuals according to equivalised household disposable income using the modified OECD equivalence scale. Source: Authors’ analysis based on EUROMOD D25.



Table 11. Indirect tax payments as % of expenditures by expenditure decile

Decile	BE	EL	HU	IE	UK
1	11.6	13.4	17.2	11.8	12.0
2	11.9	14.1	17.2	11.9	13.0
3	12.2	14.3	17.4	12.9	13.7
4	12.3	14.6	17.5	12.8	13.9
5	12.7	14.6	17.6	12.7	14.2
6	12.8	14.5	17.9	13.1	14.3
7	12.9	14.2	17.9	12.7	14.6
8	13.2	14.5	18.1	12.8	14.7
9	13.4	14.0	18.3	13.2	14.8
10	13.9	13.8	18.6	12.4	14.5
Total	12.9	14.2	18.0	12.7	14.3

Notes: decile groups are formed by ranking individuals according to equivalised household expenditure using the modified OECD equivalence scale. Source: Authors' analysis based on EUROMOD D25.





6. Factor source decomposition analysis

The benefit incidence approach applied so far allows us to disentangle the redistributive effect of each income concept in a sequential way, given the inequality of original income as a starting point.

Following the bulk of the literature, we consider the benefit incidence approach as the reference approach in analysing the redistributive effects of tax-benefit instruments. However, in order to have overall inequality explained in terms of each component independently of others, we implement the factor source decomposition approach. Although this was not designed to analyse the redistributive effects of tax-benefit instruments, it can be used to show the extent to which the overall inequality is explained by each income source due to its share in total income, the inequality of its distribution, and the correlation with total income (Shorrocks 1982a, b).

Table 12 shows the contribution of each income concept to the inequality of extended income. Factor components with a positive value make a disequalizing contribution and factor components with a negative value make an equalizing contribution to the inequality of extended income.

The factor source decomposition shows that original income is by far the largest contributor to the extended income inequality: it accounts for most of the inequality in all countries ranging from 140 per cent in Greece to 195 per cent in Belgium. Original income is the main income source and hence is always highly correlated with extended income, showing the largest disequalising contribution to overall inequality.

Benefits altogether account for a relative minor contribution to extended income inequality, with an equalising effect in Belgium, Ireland and the UK and a disequalising effect in Greece and Hungary, due to the relative generosity of public pensions and non means-tested benefits. Imputed rent, without distinguishing between private and public imputed rent, shows overall a disequalising contribution to the inequality of extended income. At first sight, such a pattern can appear in contrast with the redistributive effects of public benefits as measured by the benefit incidence approach. However, as already observed in other recent applications (Fuest et al. 2010; Jenkins et al. 2011), this should not come as a surprise given the small share of benefits in the extended income in general and the other factors determining inequality contributions.

On the revenue side, personal income taxes show the largest equalising contribution to total inequality in all countries, ranging from around 35 per cent in Greece and Ireland to around 60 per cent in Belgium and Hungary. Social insurance contributions make an equalising contribution though there is huge variation in its magnitude, ranging from 5 per cent in Ireland and the UK to 28 per cent in Hungary. Indirect taxes also reduce inequality in

all countries, ranging from 3 per cent in Ireland to 11 per cent in Hungary, reflecting the fact that in absolute terms richer people pay more indirect taxes.

Table 12. Factor source decomposition analysis: contributions of each income concept to the inequality of extended income, %

INCOME COMPONENT	BE	EL	HU	IE	UK
<i>original income</i>	195.2	133.7	179.9	145.5	167.3
public pensions	-2.5	5.9	7.9	-2.7	-0.9
non means-tested benefits	-4.5	6.0	11.4	-2.4	-1.5
means-tested benefits	-2.2	-0.1	-1.5	-4.7	-6.9
social insurance contributions	-22.8	-11.1	-27.6	-5.0	-5.5
personal taxes	-61.3	-34.5	-59.3	-36.4	-50.8
indirect taxes	-7.6	-6.9	-10.8	-2.9	-4.8
imputed rent	5.8	7.0	- - -	8.6	3.0
<i>extended income</i>	100.0	100.0	100.0	100.0	100.0

Notes: see Table 2. The contribution of each income concept k is the statistics s_k as in Shorrocks 1982 a, b. Source: Authors' analysis based on EUROMOD D25.



7. Conclusions

Due to the differences in the distribution of original incomes, tax-benefit systems, consumption patterns and housing markets, cross-country comparability of income distributions can be improved by using an extended income concept. Nevertheless, the country ranking (although constrained to the limited number of countries considered in our analysis) in terms of inequality levels, does not change when moving from disposable income to extended income which also accounts for indirect taxes and imputed rent.

Focussing on the redistributive impact of income components, the paper provides a comparison of the effects of indirect taxes and imputed rent with the effects of cash transfers and direct taxes. The redistributive effects of different tax-benefit instruments are subject to individual choices (assumed to be given in our analysis) but also to government decisions in the use of tax-benefit instruments.

Following the benefit incidence approach and considering the inequality of original incomes as a starting point, we have shown that public pensions and direct taxes have a large redistributive impact in most of the countries. Public pensions mainly due to disproportionality and direct taxes due to the size of average incidence. In addition to public pensions, non-means tested benefit are relatively important in countries characterised by Bismarkian contribution-financed benefits (Belgium, Greece and Hungary) while means-tested benefits have larger redistributive effects in countries relying on the principles of Beveridge (Ireland and the UK). Indirect taxes have a regressive effect with respect to income in all countries but the effect is always smaller in magnitude than that of other tax-benefit instruments. Finally, imputed rent reduces the overall inequality in particular in Greece and the UK, due to the prevalence of individuals living in own accommodation even among the poorest and to the large contribution of the public imputed rent, respectively.

At the same time, the factor source decomposition approach, although initially not designed to analyse the redistributive effects of tax-benefit instruments, shows the extent to which original income is the major source of overall inequality. A more formal reconciliation between the benefit incidence approach and the factor source decomposition approach is beyond the scope of this paper but surely deserves further research.

Summarising the factors which drive income inequality, it is important to recognise the endogeneity of the redistributive effects to the existing tax-benefit instruments. There is a notable strand of literature on the relationship between inequality and economic growth with arguments as well as empirical evidence going in both directions. The argument that transfers and progressive taxation can reduce the inequality and hence favour economic growth is counterbalanced by the fact that generous benefits and high taxes can introduce inefficiency and economic dis-

tortions which may prevent economic growth. It also matters how economic growth (or lack of it) shapes the distribution of market incomes which drive inequality of disposable income in all countries. To establish the existing relationship is out of the scope of this paper, however it is important to recognise that although public interventions reduce the inequality of disposable income there might be an indirect effect on the distribution of original income which is not captured by our analysis.

Furthermore, the relative incidence of indirect and direct taxes can have a different impact on the distribution of original income. According to the view that the taxation of consumption is less distortionary than the taxation of labour, it can have a different impact on labour supply and hence on overall market income (Auerbach, 2006; Capéau et al. 2009). The regressive effects of indirect taxes with respect to income could be lowered by applying lower tax rates on goods consumed relatively more by poor individuals (e.g. food). However, this would be against the efficiency aspects which suggest higher tax rates on goods with low elasticity and it would not be effective in terms of redistribution given the existence of other instruments with a larger redistributive impact like benefits and progressive income tax (Atkinson and Stiglitz, 1976).

Overall, the inclusion of indirect taxes in the analysis of the redistributive effects of tax-benefit instruments, raises the important issue of the proper welfare concept and the normative setting to be used in the analysis of individual well-being. On the one hand, expenditure represents a better indicator of individuals' standard of living than their income which is more volatile over the life-cycle. On the other hand, the consumption pattern represents individual tastes rather than opportunities given by individual endowments for which individual are less responsible for (Decoster et al. 2010).

In the interpretation of the results it should be borne in mind that in this paper we assume full tax compliance. However, it is well-known that, at least in some countries included in our analysis, namely Greece and Hungary, shadow economy is a widespread phenomenon which accounts for around 25% of GDP (Schneider et al. 2010). Accounting for tax evasion is out of the scope of this paper. However, recent studies focusing on income taxes (Benedek and Lelkes, 2011; Matsaganis et al. 2010) show overall inequality higher when tax evasion is accounted for (with a percentage increase of the Gini index of disposable income equal to 3.5pp in Greece and 6.8pp in Hungary) and the personal income tax system being less progressive and hence less redistributive (with a percentage reduction of Reynolds-Smolensky index around 25pp) than its legal structure implies. We are not aware of empirical studies on the redistributive effects of VAT evasion in the countries considered in our paper. However, as Matsaganis et al. (2010) suggest, the evasion of VAT and other taxes is likely to reinforce these adverse redistributive effects.

From a policy perspective, the redistributive impact of indirect taxes and imputed rent need to be taken into account in the evaluation of actual or potential policy reforms. For example, a recent analysis by Callan et al. (2011) on the distributional effects of austerity measures introduced in Europe as a response to the Great Recession shows the regressive incidence of the increases in indirect taxes, involving large losses for the individuals at the bottom of the income distribution (in particular in Greece and UK). Another example by Figari et al. (2011), in the context of the increasing debate on the necessity to enlarge the tax base of the personal income tax to include private imputed rent, provides evidence that such a reform (either with increasing public revenue or ensuring revenue neutrality) might lead to a reduction in the overall inequality.





References

- Aaberge, R., Bhuller, M., Langørgen, A., and Mogstad, M., 2010. The Distributional Impact of Public Services when Needs Differ. *Journal of Public Economics* 94: 549-562.
- Atkinson, A.B., and Bourguignon, F., 2000. *Introduction: income distribution and economics* in Atkinson, A.B., and Bourguignon, F. (Eds), Handbook of income distribution. Amsterdam: Elsevier.
- Atkinson, A.B., and Stiglitz, J.E., 1976. The design of tax structure: direct versus indirect taxation. *Journal of Public Economics* 6: 55-75.
- Atkinson, A.B., Cantillon, B., Marlier, E., and Nolan, B., 2002. *Social indicators: the EU and social inclusion*. Oxford: Oxford University Press.
- Auerbach, A., 2006. The choice between income and consumption taxes: a primer. NBER Working Paper 12307. Berkeley, CA: University of California-Berkeley.
- Barnard, A., 2009. The effects of taxes and benefits on household income, 2007/08. *Economic & Labour Market Review* 3(8): 56-66.
- Benedek, D., and Lelkes, O., 2011. The distributional implications of income under-reporting in Hungary. *Fiscal Studies* 32(4): 539-560.
- Callan, T., Leventi, C., Levy, H., Matsaganis, M., Paulus, A., and Sutherland H., 2011, The distributional effects of austerity measures: a comparison of six EU countries, Social Situation Observatory Research Note 02/2011.
- Canberra Group, 2001. *Expert group on household income statistics: final report and recommendations*. Ottawa.
- Capéau, B., Decoster, A., De Swerdt K., and Orsini, K., 2009. *Welfare Effects of Alternative Financing of Social Security - Some Calculations for Belgium*, in A. Harding, P. Williamson and A. Zaidi (Eds.) New Frontiers in Microsimulation Modelling, Ashgate, 2009.
- Crawford, I., Keen, M., and Smith S., 2010, *Value Added Tax and Excises*, in J. Mirrlees (Chair) Dimensions of tax design. The Mirrlees Review. Oxford: Oxford University Press.
- Decoster, A., Loughrey, J., O'Donoghue, C., and Verwerft, D., 2010. How regressive are indirect taxes? A micro-simulation analysis for five European countries. *Journal of Policy Analysis and Management* 29(2): 326-350.
- Figari, F., Paulus, A., Sutherland, H., Tsakloglou, P., Verbist, G., and Zantomio, F., 2011, Taxing the benefit of homeownership. Distributional effects of including net imputed rent in taxable income, mimeo.
- Frick, J.R., Grabka, M.M., Smeeding, T.M., and Tsakloglou, P., 2010. Distributional effects of imputed rents in five European countries. *Journal of Housing Economics* 19: 167-179.
- Fuest, C., Niehues, J., and Peichl, A., 2010. The redistributive effects of tax benefit systems in the enlarged EU. *Public Finance Review* 38: 473-500.
- Garfinkel, I., Rainwater, L., and Smeeding, T.M., 2006. A re-examination of welfare states and inequality in rich nations: how in-kind transfers and indirect taxes change the story. *Journal of Policy Analysis and Management* 25: 897-919.
- Immervoll, H., Levy, H., Lietz, C., Mantovani, D., O'Donoghue, C., Sutherland, H., and Verbist, G., 2006. *Household incomes and redistribution in the European Union: quantifying the equalizing properties of taxes and benefits* in Papadimitriou, D. B. (Ed.), The Distributional Effects of Government Spending and Taxation. Palgrave Macmillan.
- Jenkins, S. P., Brandolini, A., Micklewright, J. and Nolan, B., 2011. *The Great Recession and the Distribution of Household Income*. Fondazione Rodolfo De Benedetti.



- Jänni, M., 1997. Inequality in five countries in the 1980s: the role of demographic shifts, markets and government policies. *Economica* 64: 415-440.
- Kakwani, N.C., 1977. Measurement of tax progressivity: an international comparison. *Economic Journal* 87: 71-80.
- Lambert, P., 2001. *The distribution and redistribution of income*. 3rd edition. Manchester: Manchester University Press.
- Mahler, V. A., and Jesuit, D. K., 2006. Fiscal redistribution in the developed countries: new insights from the Luxembourg Income Study. *Socio-Economic Review* 4 (3): 483-511.
- Matsaganis, M., Benedek, D., Flevotomou, M., Lelkes, O., Mantovani, D., and Nienadowska, S., 2010, *Distributional implications of income tax evasion in Greece, Hungary and Italy*. MPRA Paper No. 21465.
- OECD (2008) *Growing unequal? Income distribution and poverty in OECD countries*. Paris: OECD.
- O'Donoghue, C., Baldini, M., and Mantovani, D., 2004, *Modelling the redistributive impact of indirect taxes in Europe: an application of EUROMOD*. EUROMOD Working Paper No. EM7/01.
- Paulus, A., Čok, M., Figari, F., Hegedüs, P., Kump, N., Lelkes, O., Levy, H., Lietz, C., Lüpsik, S., Mantovani, D., Morawski, L., Sutherland, H., Szivos, P., and Vörk, A., 2009. *The effects of taxes and benefits on income distribution in the enlarged EU* in Lelkes, O. and Sutherland, H. (Eds.), *An Enlarged Role for Tax Benefit Models: assessing policies in the enlarged European Union*, Asghate.
- Paulus, A., Sutherland, H., and Tsakoglou, P., 2010. The distributional impact of in kind public benefits in European countries. *Journal of Policy Analysis and Management* 29(2): 243-266.
- Ravallion, M., van de Walle, D., and Gautam, M., 1995. Testing a social safety net. *Journal of Public Economics* 57: 175-99.
- Reynolds, M., and Smolensky, E., 1977, *Public expenditures, taxes and the distribution of income: the United States, 1950, 1961, 1970*. New York: Academic Press.
- Schneider, F., Buehn, A., Montenegro, C., 2010, New Estimates for the Shadow Economies all over the World, *International Economic Journal* 24(4): 443-461
- Shorrocks, A., 1982a. Inequality decomposition by factor components. *Econometrica* 50: 193-211.
- Shorrocks, A., 1982b. The impact of income components on the distribution of family incomes. *Quarterly Journal of Economics* 98: 311-326.
- Smeeding, T.M., and Weinberg, D.H., 2001. Toward a uniform definition of household income. *The Review of Income and Wealth* 47(1): 1-24.
- Sung, M. J., and Park, K., 2011. Effects of taxes and benefits on income distribution in Korea. *The Review of Income and Wealth* 57(2): 345-363.
- Sutherland, H., 2007. *EUROMOD: the tax-benefit microsimulation model for the European Union* in Gupta, A., and Harding, A., (Eds.), *Modelling Our Future: population ageing, health and aged care*, International Symposium in Economic Theory and Econometrics, Vol 16. Elsevier.
- Van de Walle, D., 1998. Assessing the welfare impacts of public spending. *World development* 26: 365-378.
- Warren, N., 2008. *A review of studies on the distributional impact of consumption taxes in OECD countries*. Paris: OECD.
- Wolff, E. N., and Zacharias, A., 2007. The distributional consequences of government spending and taxation in the U.S., 1989 and 2000. *Review of Income and Wealth* 53: 692-715.



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Information on the GINI project

Aims

The core objective of GINI is to deliver important new answers to questions of great interest to European societies: What are the social, cultural and political impacts that increasing inequalities in income, wealth and education may have? For the answers, GINI combines an interdisciplinary analysis that draws on economics, sociology, political science and health studies, with improved methodologies, uniform measurement, wide country coverage, a clear policy dimension and broad dissemination.

Methodologically, GINI aims to:

- exploit differences between and within 29 countries in inequality levels and trends for understanding the impacts and teasing out implications for policy and institutions,
- elaborate on the effects of both individual distributional positions and aggregate inequalities, and
- allow for feedback from impacts to inequality in a two-way causality approach.

The project operates in a framework of policy-oriented debate and international comparisons across all EU countries (except Cyprus and Malta), the USA, Japan, Canada and Australia.

Inequality Impacts and Analysis

Social impacts of inequality include educational access and achievement, individual employment opportunities and labour market behaviour, household joblessness, living standards and deprivation, family and household formation/breakdown, housing and intergenerational social mobility, individual health and life expectancy, and social cohesion versus polarisation. Underlying long-term trends, the economic cycle and the current financial and economic crisis will be incorporated. Politico-cultural impacts investigated are: Do increasing income/educational inequalities widen cultural and political 'distances', alienating people from politics, globalisation and European integration? Do they affect individuals' participation and general social trust? Is acceptance of inequality and policies of redistribution affected by inequality itself? What effects do political systems (coalitions/winner-takes-all) have? Finally, it focuses on costs and benefits of policies limiting income inequality and its efficiency for mitigating other inequalities (health, housing, education and opportunity), and addresses the question what contributions policy making itself may have made to the growth of inequalities.

Support and Activities

The project receives EU research support to the amount of Euro 2.7 million. The work will result in four main reports and a final report, some 70 discussion papers and 29 country reports. The start of the project is 1 February 2010 for a three-year period. Detailed information can be found on the website.

www.gini-research.org





GINI GROWING INEQUALITIES' IMPACTS

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