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## **Distributional effects of non-cash incomes in seven European countries**

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## Abstract

Most empirical distributional studies in developed countries rely on distributions of disposable income. From a theoretical point of view this practice is contentious since a household's command over resources is determined not only by its spending power over commodities it can buy in the market but also on resources available to the household members through non-market mechanisms such as the in-kind provisions of the welfare state and the use of private non-cash incomes. The present paper examines the combined effects of including three of the most important non-cash incomes enjoyed by private households in the concept of resources in seven European countries (Belgium, Germany, Greece, Italy, Ireland, the Netherlands and the UK). These non-cash incomes are imputed rent, public education services and public health care services. Further, limited evidence is presented on the likely distributional effects of home production and fringe benefits. The empirical results show that, in a framework of static incidence analysis, the inclusion of these non-cash income components in the concept of resources leads to a substantial decline in the measured levels of inequality and poverty. The main beneficiaries appear to be elderly individuals and, to a lesser extent, households with children. Nevertheless, the inclusion of non-cash incomes in the concept of resources does not lead to either substantial change in the ranking of the countries according to their level of inequality or significant changes in the structure of inequality. The welfare interpretation of some of the findings is not straightforward, especially regarding the universally provided public health and education services that have a strong life-cycle pattern. If adjustments are made to the equivalence scales used in the analysis to take account of differences in needs for health and education services, the distributional effects of these transfers appear to be far more modest.

## 1. Introduction

The great majority of empirical studies analyzing cross-national differences in the levels of inequality and poverty as well as the redistributive effectiveness of welfare state policies utilize data on the disposable income of the population members. Such studies focusing in Europe tend to confirm hypotheses about distinct welfare state regimes in particular sets of countries [Titmus (1958), Esping-Andersen (1990), Ferrera (1996)] and emphasize the importance of welfare state transfers, particularly for those segments of the population located close to the bottom of the income distribution. Scandinavian and Nordic countries are big spenders and reduce inequality the most; the English speaking countries spend relatively little and reduce inequality the least; and the continental European countries spend a lot, but achieve less equality than the Scandinavians. Southern European nations spend the least and have the highest inequality and poverty [Atkinson et al (1995), Gustafsson and Johansson (1999), Heady, Mitrakos and Tsakloglou (2001), Alderson and Nielsen (2002), Dennis and Guio (2003), Moller et al (2003), Kenworthy (2004), Förster and Mira d'Ercole (2004), Hacker et al (2005)].

Nevertheless, in the developed countries, about half of welfare state transfers consist of in kind benefits such as education, health insurance, child care, elderly care and other services. In kind as well as cash transfers reduce inequalities in standards of living as documented in research within selected countries but only occasionally cross nationally and never for a large set of rich countries [for notable exceptions, see Smeeding et al (1993) and Marical et al (2006)]. The theoretical and empirical importance of valuing in kind benefits has been understood for a long time [Smeeding (1977, 1982)]. Conceptually it is clear that these benefits are worth some nontrivial amount to beneficiaries. Therefore, from a theoretical point of view, a measure that counts in kind transfers is superior to the conventional measure of cash disposable income as a measure of a household's standard of living [Atkinson and Bourguignon (2000), Atkinson et al (2002), Canberra Group (2001)].

Besides publicly provided in-kind transfers, there are also substantial private non-cash incomes. The most well known is, probably, imputed rent for owner occupied accommodation. Of lesser importance for developed market economies but of great significance in many developing countries, particularly those with large agricultural sectors, are commodities produced for own consumption or barter without the

intervention of the market mechanism. Finally, for an evaluation of the full concept of resources available to the household, one should also take into account home produced and consumed services.

The omission of non-cash incomes from the concept of resources used in distributional studies may call into question the validity of several comparisons of distributional outcomes of these studies - both time-series within a particular country and cross-sectional across countries. For example, inter-temporal comparisons of inequality or poverty in a particular country ignoring publicly provided services in general are likely to lead to misleading conclusions at times of considerable expansion or contraction of the role of the welfare state. Likewise, comparisons of inequality and poverty levels between groups of countries with dramatically different welfare state arrangements regarding the provision of particular services may well lead to erroneous conclusions. For instance, comparing the income distributions of two countries, one where health services are primarily covered by private out-of-pocket payments and another where such services are provided free of charge by the state to the citizens is likely to lead to invalid conclusions and, perhaps, policy implications.

Existing empirical studies of the distributional effects of both publicly provided and private non-cash incomes using a variety of imputation methods and national or cross-country data sets covering developed countries tend to confirm that non-cash incomes are more equally distributed than monetary incomes.<sup>1</sup> The aim of the present paper is to analyse in detail the aggregate combined distributional effects of imputed rent, public education services and public health care services using common methodologies in roughly similar data sets of seven European countries (Belgium, Germany, Greece, Ireland, Italy, the Netherlands and the United Kingdom). Some indications of the likely distributional effects of home production and fringe benefits are given in an appendix. It relies on the four corresponding

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<sup>1</sup> See, for example, O'Higgins and Ruggles (1981), Bryant and Zick (1985), James and Benjamin (1987), Lampman (1988), Smeeding et al (1993), Evandrou et al (1993), Meulemans and Cantillon (1993), Yates (1994), Whiteford and Kennedy (1995), McLennan (1996), Steckmest (1996), Jenkins and O'Leary (1996), Huguenenq (1998), Tsakloglou and Antoninis (1999), Harris (1999), Antoninis and Tsakloglou (2001), Pierce (2001), Sefton (2002), Frick and Grabka (2003), Chung (2003), Saunders and Siminski (2004), Lakin (2004), Caussat et al. (2005), Aaberge et al. (2006), Harding, Lloyd and Warren (2006), Garfinkel et al (2006), Marical et al (2006), Wolff and Zacharias (2006), Frazis and Stewart (2009)

comparative reports of AIM-AP,<sup>2</sup> which, in turn, rely on national reports for each of the corresponding non-cash components.

The remainder of the paper is structured as follows. Section 2 presents the data and the methodologies used. Section 3 reports the main empirical findings. Section 4 discusses issues related to the welfare interpretation of the results. Section 5 provides the conclusions. Finally, the Appendix reports evidence for a few countries on the distributional effects of home production and fringe benefits.

## 2. Data and Methods

The main guiding principle that is adopted in calculating the monetary value of each of the in-kind transfers and in allocating them to households is to do so in a manner that is comparable across the seven countries considered (although this was not always possible). As far as possible, the micro-data used to provide information on household characteristics and cash income is taken from survey sources that are broadly comparable in terms of methods used to collect them, period in time and content. The national databases used in the analysis and the corresponding reference years are shown in Table 1.

Table 1. Income data sets used in the analysis

Country	Dataset	Reference year
Belgium (BE)	EU-SILC	2004
Germany (DE)	German Socio-Economic Panel	2002
Greece (EL)	Household Budget Survey	2004
Ireland (IR)	Living in Ireland Survey	2000
Italy (IT)	Italian version of EU-SILC	2004
Netherlands (NL)	Socio-Economic Panel Survey	2001
United Kingdom (UK)	Family Resources Survey	2003

The estimates of inequality and poverty indices derived in the later sections of the paper rely on static incidence analysis under the assumption that non-cash incomes

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<sup>2</sup> Frick et al (2007), Callan et al (2007), Smeeding et al (2008) and Tsakloglou (2009).

(and, in particular, public transfers in-kind) do not create externalities. No dynamic effects are considered in the present analysis. In other words, it is assumed that the recipients of these incomes and the members of their households are the sole beneficiaries and that these non-cash income components do not create any benefits or losses to the non-recipients. Moreover, in the cases of public education and public health care it is assumed that the value of the transfer to the beneficiary is equal to the average cost of producing the corresponding services. Similar assumptions are standard practice in the analysis of the distributional impact of publicly provided services [Smeeding et al (1993), Marical et al (2006)]. The following paragraphs describe briefly how the estimates of non-cash income were derived for each of the three components (imputed rent, public education and public health care).

Following the EU Commission regulation (EC) No. 1980/2003 imputed rent is defined as follows: *“The imputed rent refers to the value that shall be imputed for all households that do not report paying full rent, either because they are owner-occupiers or they live in accommodation rented at a lower price than the market price, or because the accommodation is provided rent-free. The imputed rent shall be estimated only for those dwellings (and any associated buildings such a garage) used as a main residence by the households. The value to impute shall be the equivalent market rent that would be paid for a similar dwelling as that occupied, less any rent actually paid (in the case where the accommodation is rented at a lower price than the market price), less any subsidies received from the government or from a non-profit institution (if owner-occupied or the accommodation is rented at a lower price than the market price), less any minor repairs or refurbishment expenditure which the owner-occupier households make on the property of the type that would normally be carried out by landlords. The market rent is the rent due for the right to use an unfurnished dwelling on the private market, excluding charges for heating, water, electricity, etc.”*

Due to data limitations, it was not possible to apply the same methodology to all seven countries involved in the project. In five of them (Belgium, Germany, Greece, Italy and UK) the “rental equivalence” (or, “opportunity cost”) method was applied. There are three stages in its implementation. First, a regression model is estimated with rent (per square meter) as dependent variable based on the population of tenants in the private, non-subsidized market, while the explanatory variables include a wide range of characteristics of the dwelling, occupancy, and so on. Then, the resulting coefficients are applied to otherwise similar owner-occupiers and

tenants paying below-market rent. The estimates thus derived refer to the gross imputed rent. Finally, in order to derive estimates of the net imputed rent that can be used for cross-country comparisons, mortgage interest payments (in the case of owner occupiers and actual rent paid (in the case of tenants paying below market rent) and operating and maintenance costs (for both groups) are subtracted from the gross imputed rent estimate.

In the datasets used in the cases of Ireland and the Netherlands, insufficient information on (market) rents of tenant households was available and, hence, the above method could not be applied. However, in both data sets self-reported information was available on the market value of the accommodation as well as mortgage interest payments and maintenance costs. Therefore, estimates of imputed rent were derived using an alternative method, the “capital market approach”. More specifically, estimates of the gross imputed rent were derived by applying a country-specific interest rate to the market value of the accommodation and the corresponding housing specific costs were subtracted in order to derive estimates of the net imputed rent. Unfortunately, this implies that there is no imputed rent measure for (subsidized) tenants in those two countries which clearly reduces cross-country comparability of the distributional effects of imputed rent.

Regarding education, information on spending per student in primary, secondary and tertiary education is derived from OECD’s “Education at a glance 2006”. Each student in a public education institution (or a heavily subsidized private education institution) identified in the income survey was assigned a public education transfer equal to the average cost of producing these services in the corresponding level of education. Then, this benefit was assumed to be shared by all household members. In other words, it was implicitly assumed that in the absence of public transfers the students and their families would have to undertake the expenditures themselves. Because of limitations on the information available on education in some of the income surveys we focus on three levels of education (primary, secondary and tertiary), thus leaving aside other levels such as pre-primary and non-tertiary post-secondary education and suppressing distinctions, such as those between general and technical secondary education, as well as Type A and Type B tertiary education which may be important in some countries. R&D expenditures are not included in

the benefit received by tertiary education students, since it is assumed that the students are not the primary beneficiaries of this type of public spending.

Estimates of public spending per student in primary, secondary and tertiary public education institutions were derived as follows. Figures from Table X2.5 (p. 434) of OECD's "Education at a glance 2006" (*Annual expenditure on educational institutions per student for all services (2003) in equivalent euros converted using PPP, by level of education based on full-time equivalents*) were multiplied by the estimates of the share of public expenditures in total educational expenditures (separately for tertiary and non-tertiary education) reported in Table B2.1b (p. 206) (*Expenditure on educational institutions as a percentage of GDP by level of education (1995, 2000, 2003) from public and private sources by source of funds and year*) and euro PPP conversion rates as reported in Table X2.2 (p. 431) (*Basic reference statistics (reference period: calendar year 2003, 2003 current prices)*). Then, in order to derive the corresponding estimates for years other than 2003, these estimates were inflated or deflated using country specific nominal GDP per capita conversion factors derived from the data of the on-line OECD database (using real GDP growth rates, GDP deflators and population growth rates).

With respect to public health care services, the risk-related "insurance value approach" was adopted. More specifically, the 'insurance value' is the amount that an insured person would have to pay in each category (in our case, narrowly defined age group) so that the third party provider (government, employer, other insurer) would have just enough revenue to cover all claims for such persons. It is based on the notion that what the public health care services provided is equivalent to funding an insurance policy where the value of the premium is the same for everybody sharing the same characteristics, such as age. Then, this value is added to the resources of each individual belonging to a particular group with the predefined characteristic(s) and, correspondingly to his/her household.

We calculated per capita expenditures for each age group using the OECD Social Expenditure database (SOCX), which provides data that are comparable across countries. The health care expenditures are taken from the OECD Health Data and include all public expenditure on health care, including among other things, expenditure on in-patient care, ambulatory medical services, pharmaceutical goods and prevention. They do not include non-reimbursed individual health expenditures or cash benefits related to sickness [OECD (2007)]. One restriction of the SOCX

database arises from the fact that existing differences in the use of for health care between men and women are not considered and there is evidence that spending patterns differ across sexes [Costello and Bains (2001), Carone et al (2005)]. Another restriction is that “research and development” (R&D) spending is included, since it may be argued that this component is not relevant for current welfare. The SOCX database does not allow the deduction of this component.

For the purposes of the empirical analysis, the non-cash income components are added to the concept of resources of the baseline distribution (distribution of disposable monetary income) and comparisons are made. In order to take into account household economies of scale and differences in needs between adults and children, in both cases, the total household resources are divided by the household equivalence scale and the resulting figure is assigned to all household members. Following EUROSTAT, in the next section the equivalence scales used assign weight of 1.00, 0.50 and 0.30 to the household head, each of the remaining adults and each child in the household, respectively.

Table 2. Non-cash income components as a proportion of total disposable income

Country	Imputed Rent	Public Education	Public Health Care	All
Belgium (BE)	6.0	13.2	16.3	35.5
Germany (DE)	7.2	7.2	16.5	30.9
Greece (EL)	11.1	7.2	10.3	28.6
Ireland (IR)	9.3	11.9	12.2	33.4
Italy (IT)	10.6	9.5	13.7	33.8
Netherlands (NL)	6.1	10.6	11.2	27.9
United Kingdom (UK)	7.9	10.2	12.7	30.8

### 3. Empirical results

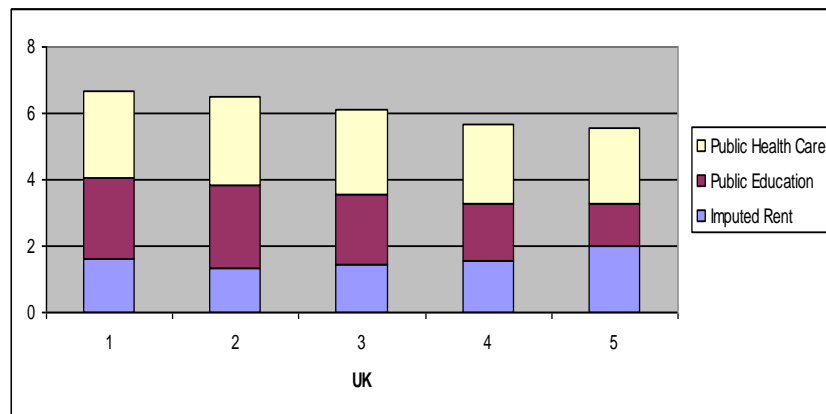
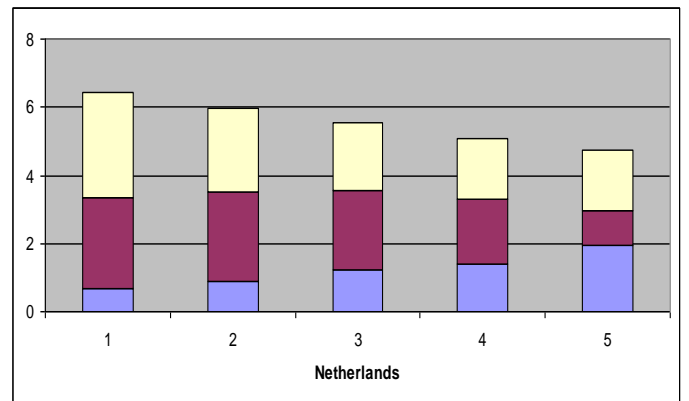
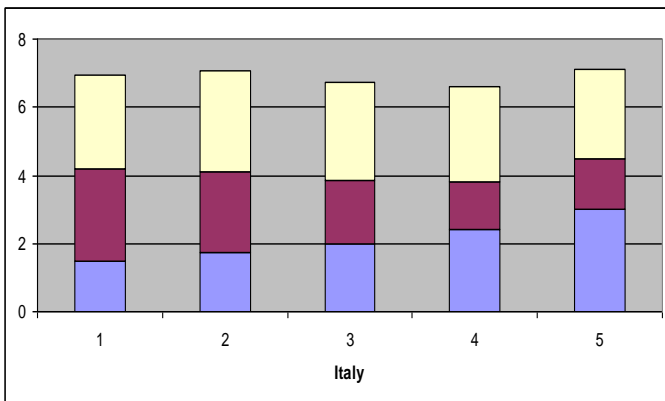
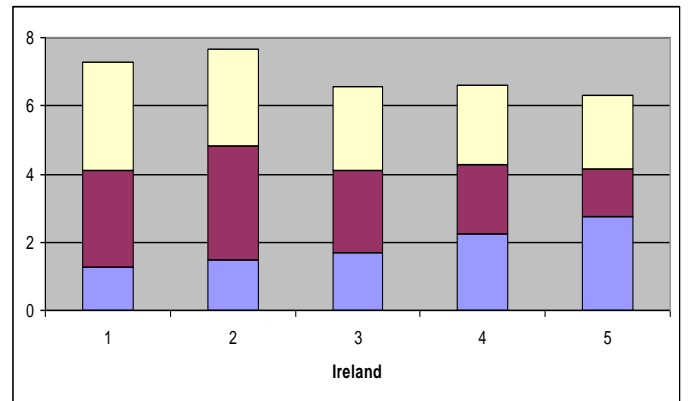
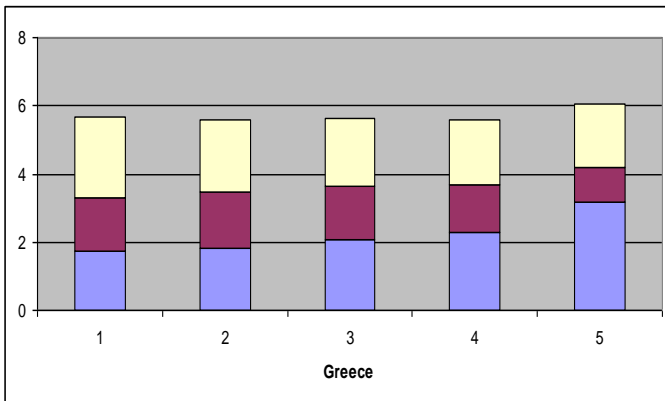
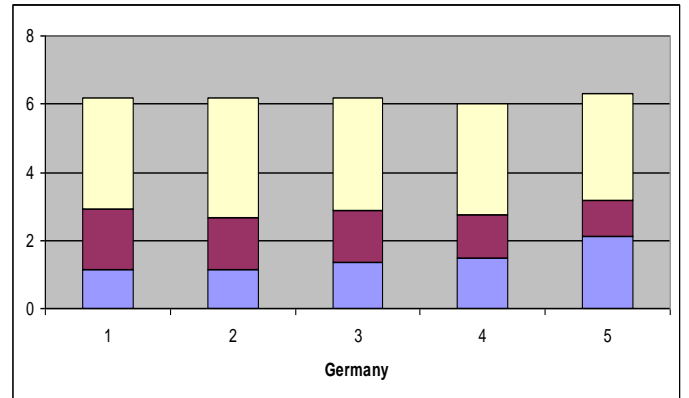
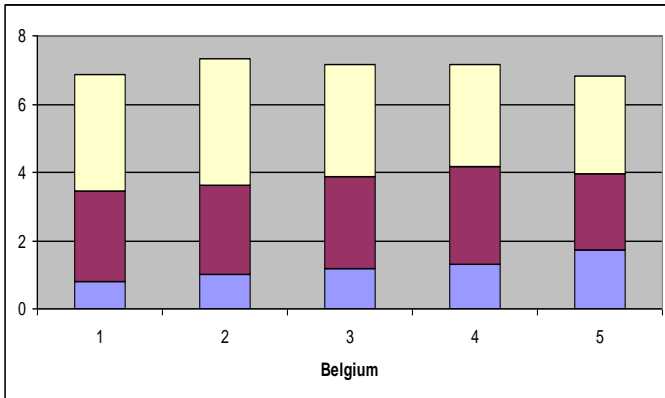
Table 2 reports the monetary value of the three non-cash income components as a proportion of the total disposable income of the population in the seven countries

under consideration. As noted above, the estimates of imputed rent for Ireland and the Netherlands are not strictly comparable with those of the other countries and, hence, are reported in italics. The figures for these countries underestimate the true value of imputed rent and, hence, its share as a proportion of disposable monetary income. Looking at the individual non-cash incomes, cross-country differences are substantial. They can be attributed to a variety of reasons. In the case of imputed rent, it seems that the main determinant is likely to be the extent of homeownership and, particularly, outright home ownership. In the cases of public education and public health care, the demographic structure of the population is likely to be an important determinant; *ceteris paribus*, countries with younger/older populations are likely to spend more in education/health. Moreover, in these cases, cross-country differences in the importance of private out-of-pocket payments for obtaining education and health services can account for a considerable proportion of cross-country differences.

In the countries under consideration imputed rent is equivalent to between 6.0% and 11.1% of disposable income. The corresponding ranges for public education and public health care are 7.2%-13.2% and 10.3%-16.5%. When the three non-cash incomes are put together, cross country differences are still relatively large, but not very substantial. In Greece and the Netherlands they add up to around 28% of disposable income, in Germany and the UK a little below 31%, in Ireland and Italy a little above 33% and in Belgium 35.5%.

For the purposes of our analysis, what is equally, if not even more, important is the distribution of the non-cash incomes across the distribution of income. Graph 1 provides a picture of the distribution of non-cash income components across quintiles, when the members of the population are grouped according to their equivalised disposable income. The pattern is relatively similar across countries. Non-cash incomes appear to be fairly evenly distributed across quintiles, at least in four of the countries examined here (Belgium, Germany, Greece and Italy). In the Netherlands and, to a lesser extent, in the UK and Ireland non-cash incomes accrue

Graph 1. Distribution of non-cash income components across quintiles  
 (as % of total monetary income)



more to the poorer rather than the richer quintiles.<sup>3</sup>

Looking at the three individual non-cash income components it can be observed that in absolute terms in all countries the share of imputed rent is higher in the richer rather than the poorer deciles. The opposite is true for public education and public health care services. Since the main beneficiaries of these policies are households with children and the elderly that in most European countries have above average poverty rates, this finding is not unexpected.

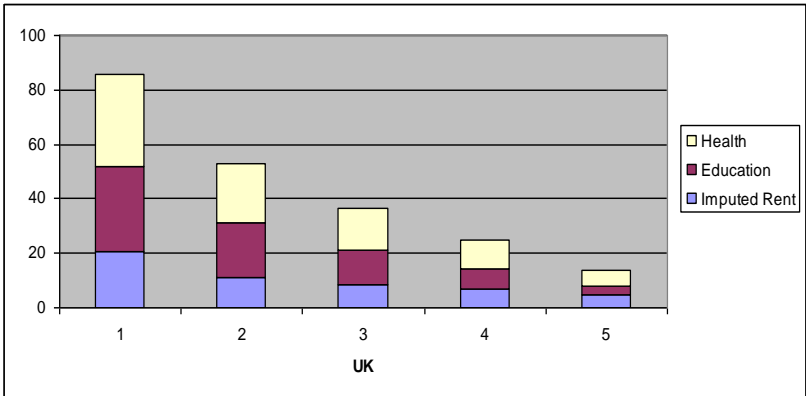
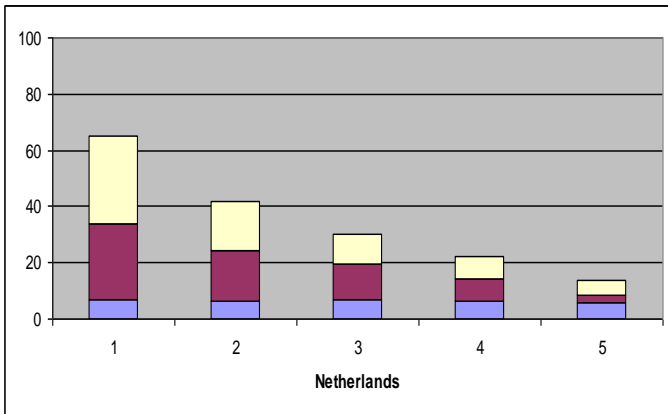
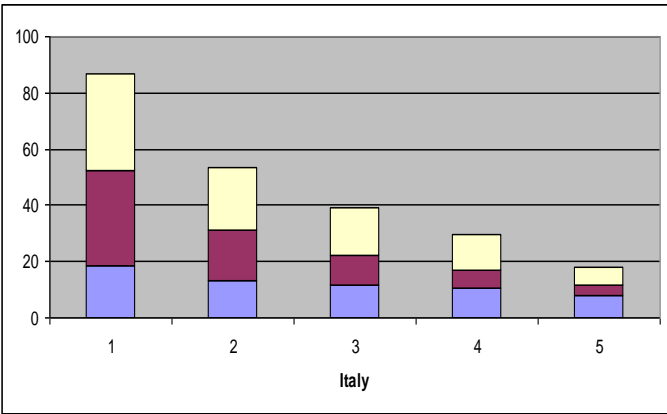
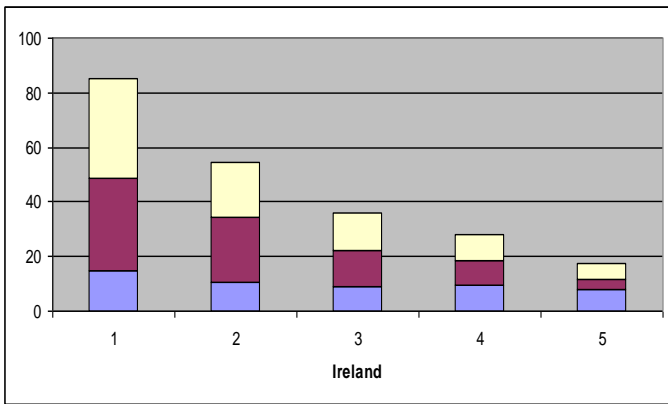
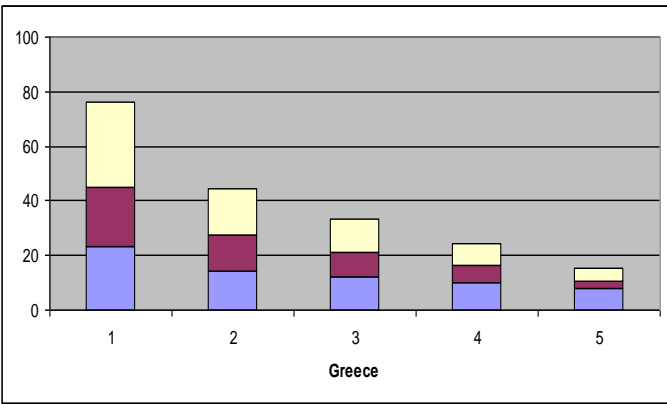
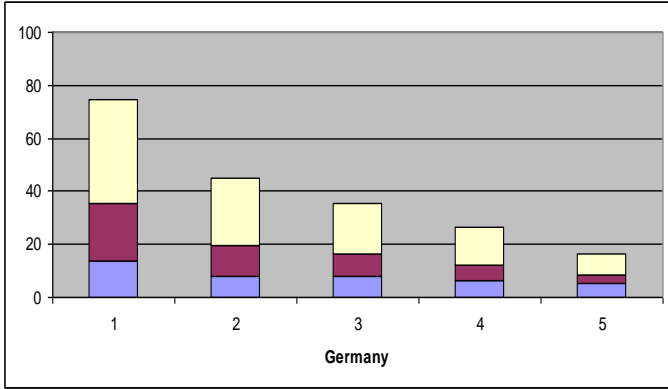
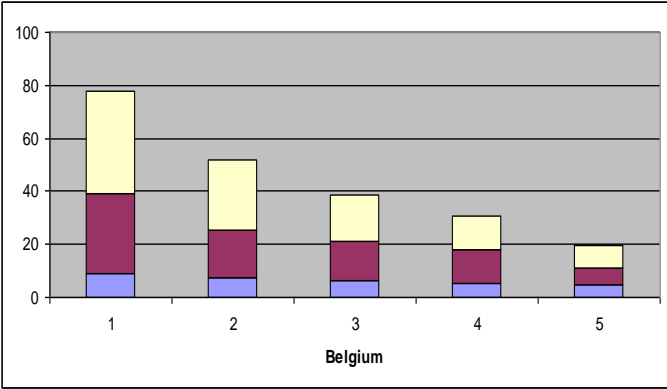
Graph 2 shows non-cash incomes in relative rather than absolute terms. More specifically, it reports non-cash incomes as a proportion of the quintile disposable income. The evidence of Graph 1 shows that, the figures used as numerators for the derivations of the estimates reported in Graph 2 (non-cash incomes as a proportion of total disposable income) are roughly equal across quintiles, while the figures in the denominators (quintile income shares) are likely to differ very considerably across quintiles. As a consequence, non-cash incomes cause a substantially larger proportional increase in the share of the poorer rather than the richer quintiles. Moreover, *ceteris paribus*, for the same reason proportional differences across quintiles are likely to be larger in countries with more (UK, Greece, Italy, Ireland) rather than less (Netherlands, Belgium, Germany) unequal distributions of disposable income. This is, indeed, confirmed in Graph 2.

Taking into account the evidence of Graph 1, it is not surprising to observe that in most countries the proportional increases in the disposable income of the various quintiles due to the inclusion of imputed rent in the concept of resources are not dramatically different. By contrast, the inclusion of public education and, particularly, public health care transfers in the concept of resources increases substantially more the income share of the poorer rather than the richer quintiles. The monetary value of the three non-cash income components taken together as a share of the poorest quintile's disposable income varies between 65% (the Netherlands) and 87% (Italy). The corresponding figures for the top quintile are 13.7% (UK) and 19.5% (Belgium).

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<sup>3</sup> Under the reasonable assumption that the beneficiaries of below market rents in the Netherlands and Ireland can be found disproportionately among the poor rather than the rich, accurate accounting for imputed rent could have resulted in an even more pro-poor pattern of allocation of non-cash incomes in these countries.

Graph 2. Non-cash income components  
as a proportion of the disposable income of quintiles

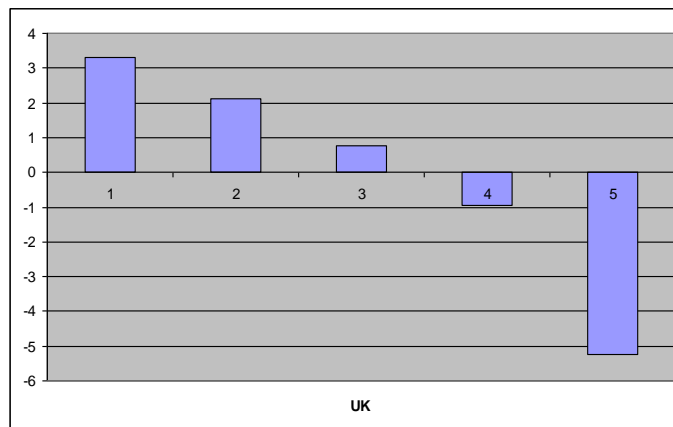
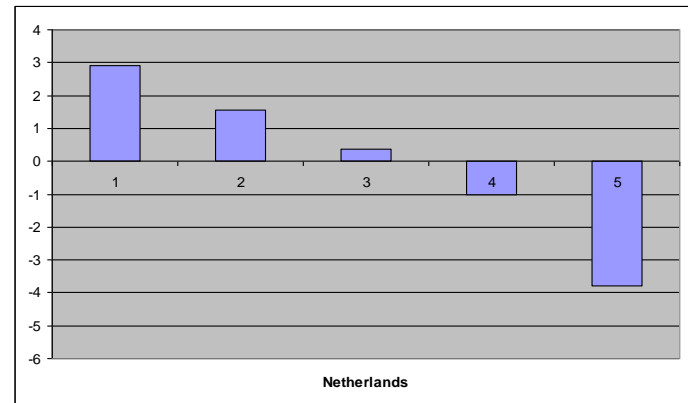
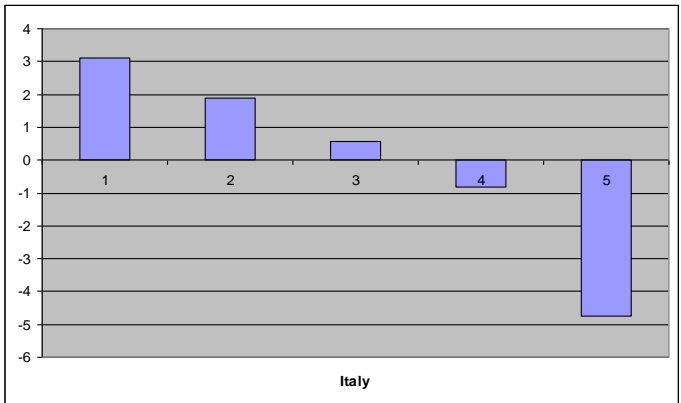
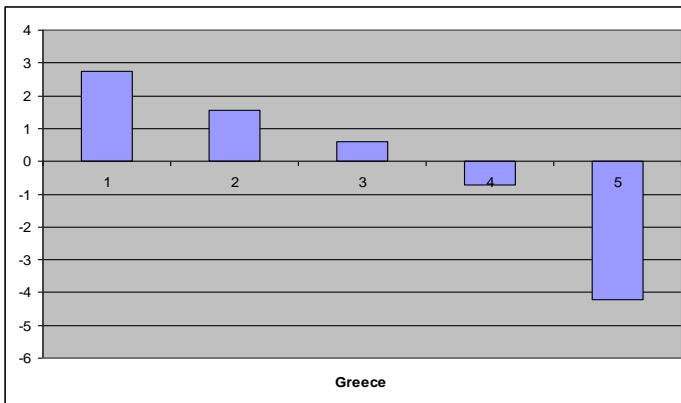
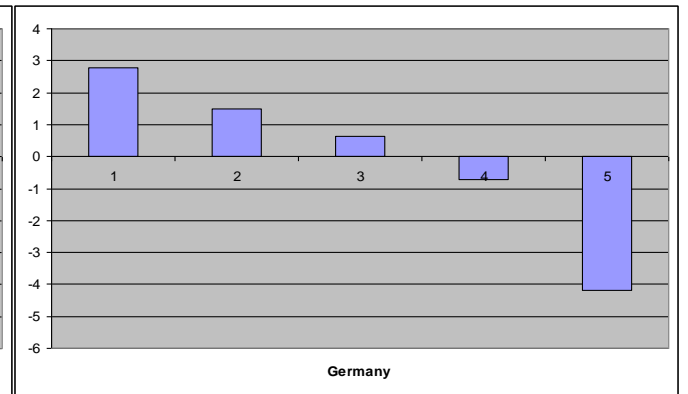
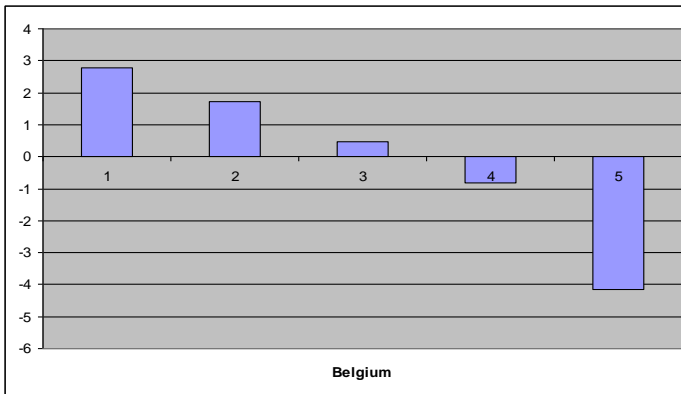


Graph 3 goes a step further and compares the quintile shares of two distributions. The first is the distribution of disposable monetary income and the second the augmented income distribution that includes monetary incomes as well as the monetary value of the three non-cash income components. In other words, unlike Graphs 1 and 2, in Graph 3 there is also re-ranking of the households after the inclusion of non-cash incomes. More specifically, Graph 3 reports the differences in quintile shares before and after the inclusion of the non-cash income components.

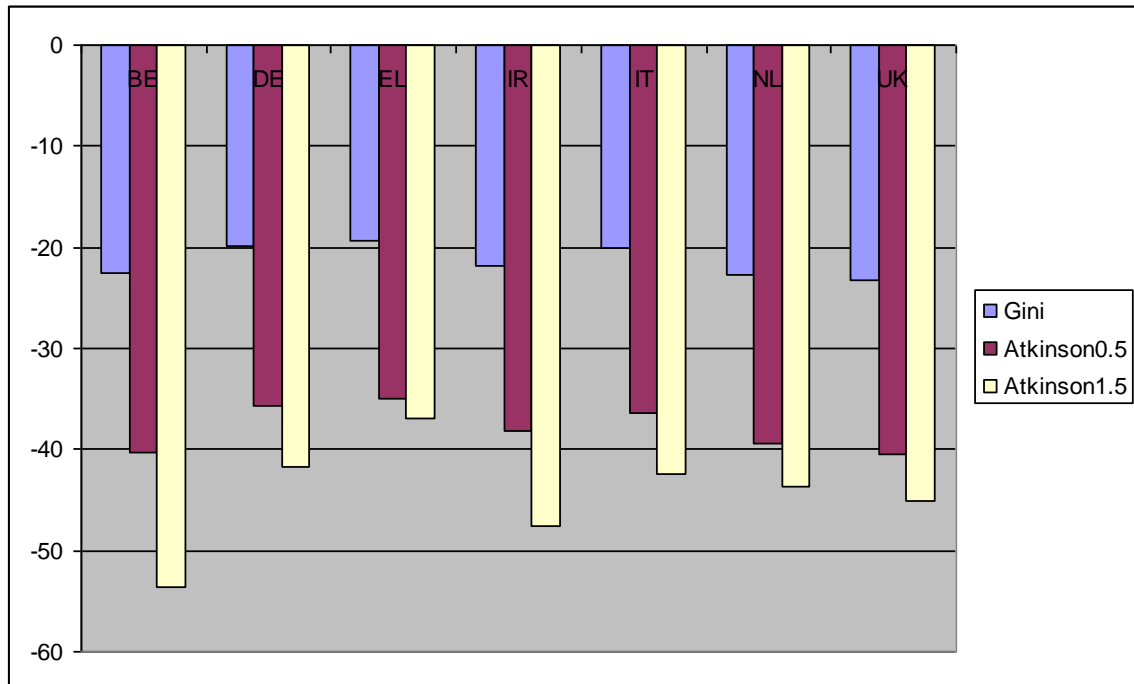
Once again, the cross-country similarities are obvious. In all countries, after the inclusion of non-cash incomes in the concept of resources the shares of the three bottom quintiles increase, while that of the top quintile declines. The changes are most spectacular in the bottom (positive) and top (negative) quintiles. In all countries, the share of the poorest quintile in the augmented income distribution is around three percentage points higher than in the distribution of disposable income (between 2.8%, in Greece, and 3.2%, in the UK). Quite substantial is also the increase in the share of the second quintile (between 1.5%, in the Netherlands, and 2.1%, in the UK). In almost all cases, the changes in the shares of the next two quintiles are less than 1% in absolute terms (positive in the case of the third, negative in the case of the fourth quintile). In all countries the change in the share of the top quintile as we move from the distribution of disposable income to the distribution of augmented income is very substantial, ranging from -3.8% (Netherlands) to -5.2% (UK).

Graph 4 reports the proportional change in aggregate inequality associated with the inclusion of the three non-cash incomes in the concept of resources. As inequality indices we use the widely used Gini index and two members of the parametric family of Atkinson indices. The value of the inequality aversion parameter in the latter is set at  $e=0.5$  and  $e=1.5$ . Both indices satisfy the desirable properties for an inequality index (anonymity, mean independence, population independence, transfer sensitivity). Higher values of  $e$  make the Atkinson index relatively more sensitive to changes closer to the bottom of the distribution while, in practice, the Gini index is relatively more sensitive to changes around the median of the distribution [Cowell (2000), Lambert (2001)].

Graph 3. Differences in quintile income shares between monetary and augmented income distributions



Graph 4. Proportional changes in inequality after the inclusion of non-cash income components in the concept of resources

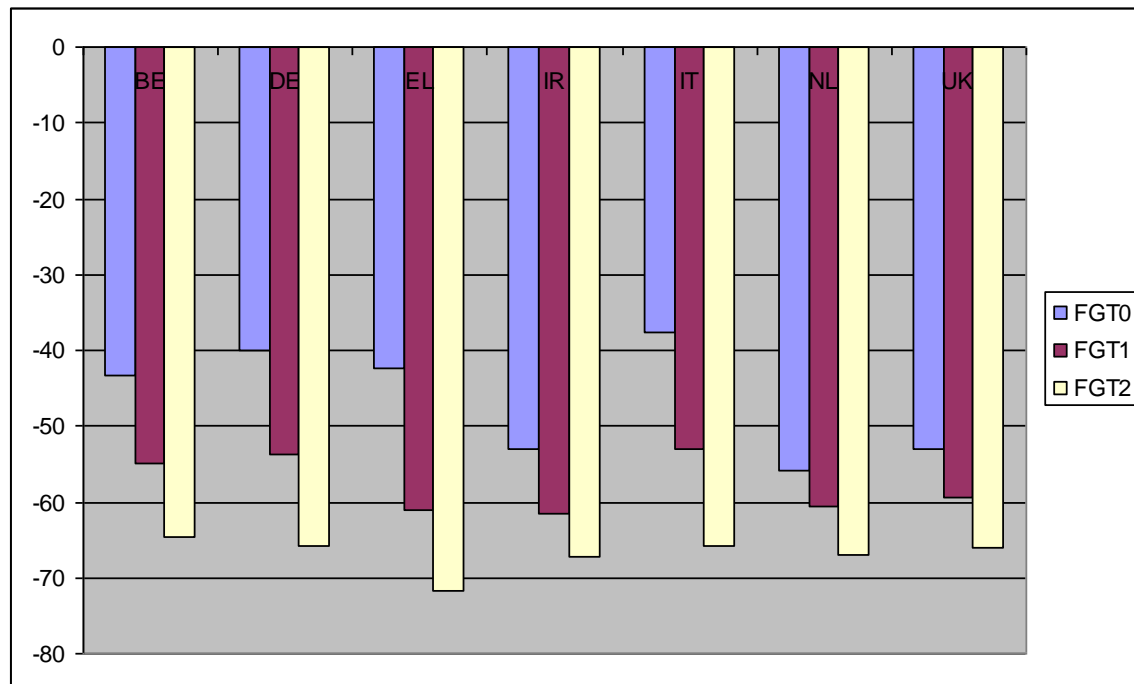


The evidence of Graph 4 illustrates very clearly that in all countries under examination, the inclusion of non-cash incomes in the concept of resources reduces the values of the indices very substantially. In all cases the recorded effects are larger when the Atkinson index is used, particularly for higher values of the inequality aversion parameter. The proportional changes are relatively larger in Belgium, UK, Netherlands and Ireland. The value of the Gini index declines between -19.3% (Greece) and -23.3% (UK), while the corresponding proportional decline in the value of A0.5 is between -35.0% (Greece) and -40.5% (UK) and in the value of A1.5 between -37.0% (Greece) and -53.6% (Belgium).

Graph 5 is the counterpart of Graph 4 for changes in relative poverty after the inclusion of non-cash incomes in the concept of resources. Following EUROSTAT, the poverty line is drawn at the level of 60% of the median of the corresponding distribution. The poverty indices used belong to the parametric family of Foster et al (1984) (FGT). When the value of the poverty aversion parameter is set at  $a=0$ , the index becomes the widely used "head count" poverty rate, that is the share of the population falling below the poverty line. When  $a=1$ , the index becomes the normalized income gap ratio, while when  $a=2$  the index satisfies the axioms proposed by Sen (1976) (anonymity, focus, monotonicity and transfer sensitivity) and

is sensitive not only to the population share of the poor and their average poverty gap, but also to the inequality in the distribution of resources among the poor.

Graph 5. Proportional changes in poverty after the inclusion of non-cash income components in the concept of resources



The proportional changes reported in Graph 5 are even larger than those reported in Graph 4 and, in all cases, the larger the value of the poverty aversion parameter the larger the recorded decline in relative poverty. The poverty rate (FGT0) declines between -37.7% (Italy) and -55.9% (Netherlands), the normalised income gap ration (FGT1) between -53.1% (Italy) and -61.6% (Ireland), while FGT2 declines between -64.5% (Belgium) and -71.8% (Greece).

Do the changes reported in Graphs 4 and 5 lead to a re-ranking of the countries regarding their levels of inequality and poverty? An attempt to answer this question is provided in Table 3. Starting from the upper half of the table, it can be noted that no re-ranking is taking place regarding the two countries with the lowest level of inequality (Belgium and the Netherlands). Re-ranking is observed among countries with medium or high levels of inequality. However, even in this case the re-ranking is not very substantial, with countries moving only one rank up or down in the distribution of augmented income vis-à-vis their rank in the distribution of

disposable monetary income. There are only two exceptions to this rule: the UK in the case of the Gini index and Ireland in the case of A1.5.

Table 3. Inequality and poverty re-rankings after the inclusion of non-cash incomes in the concept of resources

Index of inequality or poverty	BE		DE		EL		IR		IT		NL		UK	
	M	A	M	A	M	A	M	A	M	A	M	A	M	A
Gini	2	2	3	4	6	7	4	3	5	6	1	1	7	5
Atkinson0.5	2	2	3	4	5	5	4	3	6	7	1	1	7	6
Atkinson1.5	2	2	3	4	4	5	5	3	7	7	1	1	6	6
FGT0	2	2	3	4	6	6	7	5	5	7	1	1	4	3
FGT1	2	2	3	4	6	6	5	5	7	7	1	1	4	3
FGT2	2	2	4	5	6	4	3	3	7	7	1	1	5	6

M: Distribution of Disposable Monetary Income  
A: Distribution of Augmented Income  
1: Lowest; 7: Highest

Likewise, the evidence reported in the bottom half of Table 3 reveals a limited re-ranking of countries in terms of their poverty levels after the addition of non-cash incomes in the concept of resources. Irrespective of the poverty index used, the Netherlands and Belgium remain the countries with the lowest and second lowest levels of poverty, respectively. Below them, there is limited re-ranking, but in most cases by a single rank only. Only the ranks of Ireland in the case of FGT0 and Greece in the case of FGT2 change by two places when we move from the distribution of disposable income to the distribution of augmented income.

#### 4. Welfare interpretation and equivalence scales

The practice adopted in the analysis so far is in line with the analysis of most studies found in the relevant empirical literature, in the sense that the same equivalence

scales – in our case the modified OECD scales used by EUROSTAT- are used for the distribution of disposable income and for the distribution of augmented income. This may be problematic, particularly in the case of the two largest universal non-cash public transfers (public education and public health care) that are also characterized by strong life-cycle patterns. The reason is that these scales are “conditional” on existing external arrangements [Pollak and Wales (1979), Blundell and Lewbel (1991), Radner (1997)]. In other words, they are conditional on the existence of free public education and free public health care. By introducing the latter in the concept of resources in the “augmented” income distribution, we treat them like private commodities to which the households need to devote resources in order to obtain them. Therefore, the equivalence scales should be modified accordingly. This argument does not apply in the case of imputed rent (as well as home production and fringe benefits).

The appropriate modification of the household equivalence scales used in the analysis is not an easy task. Both education and health care have some rather unique characteristics. Their consumption is absolutely necessary for the individuals involved (arguably, more so for health) and their consumption does not involve any economies of scale at the household level. Therefore, we should adopt a “fixed cost” approach, assuming that the needs of the recipients of these services are equal to a specific sum of money. For example, we can assume that the per capita amounts spent by the state for age-specific population groups on public education and public health care depict accurately the corresponding needs of these groups. Then, the recalculation of equivalence scales is easy, albeit in this case the effects of these public transfers in kind on measured levels of inequality and poverty should be zero almost by definition.

In general, assuming that  $y$  is household disposable income,  $k$  is the amount of extra needs of the household members for health and education (or each of them separately),  $e$  the OECD scale and  $e'$  the new scale, the following should be valid for the household to remain at the same welfare level:

$$y/e = (y+k)/e'$$

and  $e'$  should be equal to

$$e' = e(y+k)/y$$

Table 4a. Proportional changes in inequality indices as a result of public education transfers in-kind under alternative concepts of equiv. scales (under the assumption that only persons in compulsory education have education needs)

	Belgium			Germany			Greece			Italy			UK		
	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5
Baseline	-6.9	-12.7	-7.8	-7.4	-13.3	-12.1	-6.3	-13.4	-19.4	-9.2	-17.2	-19.0	-7.9	-13.8	-17.8
National	-0.8	-2.2	-2.9	-1.8	-3.6	-3.8	-1.9	-3.8	-4.0	-1.8	-3.6	-4.7	-1.0	-2.3	-9.6
EU15 min	-2.9	-5.9	-4.7	-3.2	-6.1	-6.2	-3.0	-6.0	-7.8	-4.7	-9.2	-10.8	-2.8	-5.4	-12.1
EU15 average	-0.7	-1.9	-2.7	-1.4	-2.7	-2.9	-1.7	-3.4	-3.6	-2.9	-5.8	-7.1	-0.6	-1.6	-9.0
EU15 max	2.0	2.9	-0.3	0.5	0.9	0.6	-0.5	-0.8	0.4	-1.2	-2.5	-3.4	1.5	2.3	-5.7

Table 4b. Proportional changes in inequality indices as a result of public education transfers in-kind under alternative concepts of equiv. scales (under the assumption that all students have education needs)

	Belgium			Germany			Greece			Italy			UK		
	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5
Baseline	-6.9	-12.7	-7.8	-7.4	-13.3	-12.1	-6.3	-13.4	-19.4	-9.2	-17.2	-19.0	-7.9	-13.8	-17.8
National	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.2	0.0	0.0	0.0	0.2	0.4	0.3
EU15 min	-2.5	-4.4	-2.6	-1.9	-3.6	-3.5	-1.3	-2.8	-3.9	-3.3	-6.3	-7.1	-2.0	-3.6	-4.8
EU15 average	0.1	0.3	0.2	0.5	0.9	0.9	0.5	1.1	1.6	-1.0	-1.9	-2.1	0.5	0.8	0.0
EU15 max	3.5	6.6	3.9	3.0	6.1	6.4	2.7	5.7	7.8	1.5	3.3	3.9	3.1	5.9	6.6

Table 5. Proportional changes in inequality indices as a result of public health care transfers in-kind under alternative concepts of equiv. scales

	Belgium			Germany			Greece			Italy			UK		
	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5	G	A0.5	A1.5
Baseline	-15.2	-28.9	-55.5	-13.4	-24.7	-25.6	-10.9	-21.4	-29.2	-11.8	-22.1	-28.2	-12.3	-22.0	-27.7
EU15 min	-5.0	-9.3	-13.1	-6.3	-12.2	-12.6	-1.5	-3.0	-4.0	-4.0	-7.9	-9.6	-4.5	-8.4	-9.0
EU15 average	0.5	0.9	1.2	-2.3	-4.4	-4.5	3.1	6.3	7.6	0.3	0.5	0.6	-0.3	-0.5	-0.5
EU15 max	5.3	10.3	11.7	1.3	2.5	2.6	6.9	14.4	16.7	3.8	7.7	8.5	3.3	6.5	7.0

Naturally, there will be no single equivalence scale for households with identical composition - the scale will be higher (smaller economies of scale) in poorer households and lower (larger economies of scale) in better-off households. This is an old postulate of equivalence scales theory that was long abandoned in favour of simplicity and transparency (for comparative and policy purposes).

In democratic societies  $k$  and the level of the corresponding public provision is determined through various forms of negotiation at several levels. It is not cast in stone and may be affected by numerous factors such as the demographic composition of the population, short- versus long-term considerations, etc. Therefore, there is room for sensitivity analysis, using alternative values of  $k$  for specific services (education, health care) and population groups (age specific cohorts).

Then, there is the question of who has the corresponding needs. In the case of health care the answer is clear: everybody has health care needs. Not so in the case of education. Undoubtedly, students in compulsory levels of education have such needs. Not necessarily so for students in non-compulsory levels that could have participated in the labour market but opted to stay in the education system instead. The implications of this alternative approach are explored in the following paragraphs, exploiting cross-country variations in the level of provision of public education and health care services as a share of GDP.

Table 4a - as well as the following two tables - is taken from Sutherland and Tsakloglou (2009) and reports proportional changes in the three inequality indices used in the paper (Gini, Atkinson(0.5) and Atkinson(1.5)) when public education services are included in the concept of resources, using alternative equivalence scales, in five of the countries included in the rest of the paper's analysis (all, apart from Ireland and the Netherlands). For the purposes of this table it is assumed that only students in ages corresponding to compulsory education have educational needs. School leaving age varies in the five countries under consideration: 14.5 in Greece, 15 in Italy, 16 in the UK, 18 in Belgium and Germany (OECD (2006) *Education at a Glance*, Table C1.2). All persons below these age thresholds and above the compulsory primary education enrolment age are considered to have educational needs (including dropouts and private education students who do not receive any public transfers), while the rest of the students in non-compulsory stages of the

education system may receive public transfers but are not assumed to have the corresponding needs.

The first line of the table (“Baseline”) reports the proportional changes of the inequality indices between the estimates derived from the distribution of disposable income and the same distribution augmented by the value of in-kind public education services using the modified OECD scales.<sup>4</sup> The second line of the table (“National”) reports estimates using different sets of equivalence scales for the two distributions. More specifically, in this line it is assumed that in the case of the augmented income distribution  $k$  is equal to the value provided by the state to students in compulsory levels of education.

In the last three lines we exploit cross-country spending variations in EU15 and adjust  $k$  accordingly. In these lines the value of  $k$  used in the second line is adjusted in order to be equal as a share of GDP per capita to the minimum, (unweighted) average and maximum of EU15 in the corresponding educational level using the information of OECD (2006) *Education at a Glance 2006*, Table B1.4, p. 192 (“Annual expenditure on educational institutions per student for all services relative to GDP per capita”). The choice of EU15 is not accidental. All five countries considered here are EU member-states and despite cross-country difference, in comparison with the rest of the world, EU15 countries are pretty homogenous, fully-fledged democracies, with relatively similar demographic structures and welfare state arrangements and differences in their standards of living that are not enormous. Therefore, use of EU15 figures (as a share of GDP) can provide reasonable upper and lower bounds as well as an average yardstick for our calculations. In this respect, cross-country variation is considerable in EU15. The corresponding rates vary between 14-28%/19-35%/18-46% of GDP per capita in the cases of primary/secondary/tertiary education, while on average these percentages are 21%, 27% and 27%, for the three educational levels. In most cases, spending per student as a share of GDP in the five countries under consideration are close to the EU15 average, with the exception of Greece where the corresponding figures are lower (especially regarding spending per student in tertiary education).

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<sup>4</sup> These estimates are not strictly comparable to those used in the rest of the paper, since they have been derived using the disposable income distribution obtained from the simulation of the tax-benefit microsimulation model EUROMOD, rather than the income distributions of the datasets included in Table 1. The differences are very small, though.

As anticipated, in all countries the recorded proportional decline in inequality between the distribution of cash disposable income and the augmented income distribution is sharply reduced as we move from the first to the second line of the table. Nevertheless, in all countries the aggregate result of these transfers remains inequality-reducing. This should be attributed primarily to the transfers to households with members in the non-compulsory stages of education (that are assumed to receive transfers in-kind without having corresponding needs). In the last three lines of the table recorded proportional reductions in inequality decline as we move from the minimum to the maximum adjustment of needs for educational services. In fact, when it is assumed that only students in compulsory education have educational needs but the corresponding needs as a share of GDP per capita are equal to the highest such figure in the EU15, the transition from the distribution of cash disposable income to the augmented income distribution is associated with an increase rather than a decline in inequality in most of the countries under examination.

Table 4b is similar to Table 4a, but this time we assume that all students have needs for education services, irrespective of their educational level, as do dropouts below the official school leaving age of the country under consideration. Naturally, the first line of the table is the same in both tables, while the second line records no changes in recorded inequality in the three countries with limited information on students below the official school leaving age (in other words, it is assumed that the persons currently in education are compensated justly for their extra needs, which are assumed to be equal to the corresponding state transfers per educational level). In Greece and the UK, where detailed information is available for the type of school attended by the student (public or private) as well as for his/her status as early school leaver, the corresponding estimates are close to but not exactly zero. The two forces are likely to operate in opposite directions. Since most private education students are located close to the top of the distribution, the fact that they do not receive a subsidy is likely to reduce recorded inequality. On the contrary, since most dropouts are usually located close to the bottom of the distribution, the corresponding lack of state transfers to them, despite their needs, is likely to lead to increases in recorded inequality. The pattern in the last three lines of the table is similar to the corresponding pattern of Table 4a but the differences across lines are larger. More specifically, when it is assumed that the real needs of a student in a

particular educational level as a share of GDP per capita is equal to the minimum of EU15 at this level (third line), educational transfers appear to reduce recorded inequality - in other words, the households of the students are over-compensated and since they are disproportionately located close to the bottom of the distribution, these transfers appear to reduce inequality. Exactly the opposite is observed in the last line of the table, where it is implicitly assumed that the students are undercompensated for their extra educational needs. In the fourth line of the table, where the corresponding needs are assumed to be equal to the EU15 average as a share of GDP per capita, the recorded changes are small but regressive in all countries apart from Italy. The result for Italy can be attributed to the fact that according to this approach and the evidence reported in the aforementioned OECD publication, Italy appears to overcompensate primary and, to a lesser extent, secondary education students that are disproportionately represented in lower income quintiles, while it undercompensates tertiary education students who are, in most countries, more likely to be found in top quintiles.

Table 5 applies the same methodology to public health care transfers. No “National” line appears in this table, since if it is assumed that all population members are justly compensated for their extra health care needs, the result is distributionally neutral by definition. If no adjustment is made to the equivalence scale, the reduction in the recorded inequality is enormous and appears to be larger when inequality indices sensitive to changes close to the bottom of the distribution are employed (such as Atkinson (1.5)). However, this approach implicitly assumes that population members with ill health are as equally well off as healthy population members with similar levels of disposable income. In other words, this approach ignores that health care needs are likely to be larger at particular life-stages. This inconsistency is ameliorated in the last three lines of the table, where it is assumed that health care needs vary according to the age of the population member. Taking as yardsticks the lowest, average and highest health care spending per age group as a share of GDP, the recorded changes in inequality are substantially lower. In fact, as anticipated, in the last line the recorded changes in inequality are positive, and in some cases such as Greece and Belgium quite substantial, while in the second line these transfers appear to have a progressive impact only in the cases of Germany and (marginally) the UK.

It is likely that the approach outlined above can contribute to a better understanding of the distributional effects of non-cash public transfers. At this stage it may still be relatively crude but can be improved in several ways. The two most promising avenues are likely to be in the direction of uncovering variations in the quality of services directed to particular segments of the population and the identification of systematic under/over users of such services. For example, in countries with federal rather than national education and/or health systems it may be possible to identify regions with higher spending per capita (provided there is evidence that the higher spending is translated in higher quality of services). In the case of education we can identify persons who do not use public services such as private education students, early school leavers, etc and, further we can bring pre-primary education into the picture. In the case of health care we can differentiate between males and females, identify private health insurance holders who may systematically underutilise the public health care system or socioeconomic groups that, *ceteris paribus*, make excessive use of the public services [Le Grand and Winter (1985)]. Likewise, we can also identify persons with severe disabilities whose needs are likely to be higher than the rest of the population (although they may also receive more expensive public health care services).

## **5. Conclusions**

The aim of the paper was to provide estimates of the distributional effects of three large non-cash income components (imputed rent, public education and public health care services) in seven European countries. In the countries under examination – Belgium, Germany, Greece, Ireland, Italy, the Netherlands and the UK – the total monetary value of these non-cash incomes is around one third of the aggregate disposable income of the population. Using static incidence analysis, under the assumption that incomes in-kind do not create externalities, it was shown that non-cash incomes are far more equally distributed than cash incomes and, as a result, their inclusion in the concept of resources leads to considerable reductions in the measured levels of inequality and relative poverty. However, the relative ranking of countries in terms of inequality and/or poverty indicators is affected only marginally as we move from the distribution of disposable monetary income to the augmented income distribution that includes cash as well as non-cash incomes.

Nevertheless, it was also pointed out that it is doubtful whether results derived using the standard approach in the fields of public education and public health care can have a straightforward welfare interpretation. The reason is that using this approach we incorporate the value of the public services in the concept of household resources but ignore the problem of extra needs of public services recipients. Once these needs are taken into account with appropriate changes in the household equivalence scales used in the analysis, the results regarding these non-cash income components appear to be far more modest and, under particular circumstances may even appear to be inequality-increasing.

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## APPENDIX

### Home production and fringe benefits

Among the aims of AIM-AP was the analysis of the distributional effects of home production and fringe benefits. This aim was only partially achieved, for the reasons outlined below.

The items under this general heading of “home production and fringe benefits” can be grouped into four categories: Consumption of own production of commodities, consumption of own production of services, company cars and other fringe benefits. Different methodologies are usually employed for collecting information on these items.

Regarding consumption of own production of commodities as well as consumption of commodities obtained through barter with other economic units without the intervention of the market mechanism, typically such information is collected through Household Budget Surveys. Households are asked detailed questions about quantities consumed and the Statistical Services carrying out the survey apply the relevant prices. The important question is what is the most “relevant price” for such imputations. Usually, the price applied is the price prevailing in the local market, but this approach may become problematic if there is no local market for such commodities or the existing market is very “thin”.

Information on consumption of own production of services is typically collected through the use of time use surveys. Household members are asked detailed questions about their use of time in a typical period (usually, a week) and then, for the activities for which a market exists the corresponding time used is evaluated in monetary terms. Two important issues arise in this case. First, it is the question of “where you draw the line”. In other words, there are several activities that are difficult to classify as productive or leisure activities. A related issue is that of the maximum number of hours (per day or, better, week) that can be considered as devoted to productive activities. Further, there is the treatment of leisure. Standard microeconomic theory suggests that leisure increases welfare and that the shadow price of leisure is the wage rate. However, this may apply only to voluntary leisure. It is hard to argue that the leisure time of an involuntarily unemployed worker gives

him the same utility as the consumption of commodities that would be obtained if he was working. Even after providing a solution to these problems, a very important question is related to the shadow wage assigned to the non-market productive activities. It can be plausibly argued that the corresponding shadow wage should be the typical wage of workers involved in such activities (cleaning, cooking, etc). However, there is also an alternative view arguing that the shadow wage of a worker involved in paid or non-paid activities should be the wage rate that he would have obtained in the labour market (in other words, his opportunity cost). Despite some theoretical appeal, this valuation method implies that household chores are more valuable when performed by a highly qualified worker than by his/her less qualified partner.

In the case of company cars information is usually collected in the framework of Household Budget Surveys or Income Surveys. Users of company cars are asked detailed questions both about the specific characteristics of the car (make, year, etc) and about the use of the car for private rather than work purposes. Then, using elaborate techniques, members of the Statistical Services carrying out the survey impute a value for the use of the car corresponding to the specific period of information collection, so that it is comparable to the figure reported for the monetary compensation of the employee.

Likewise, in the case of fringe benefits other than company cars, information is usually collected through Household Budget Surveys or Income Surveys and is self-reported. However, in this case the imputation methodology corresponds more to the methodology applied in the case of consumption of household production of commodities.

It is highly unlikely that a single survey will contain information on all the above items (consumption of own production of commodities, consumption of own production of services, company cars and other fringe benefits). Therefore, researchers interested in estimating the combined distributional effects of the inclusion of these items in the concept of resources, have to rely on statistical matching techniques of varying sophistications and accuracy. To our knowledge, no such attempt can be found so far in the literature.

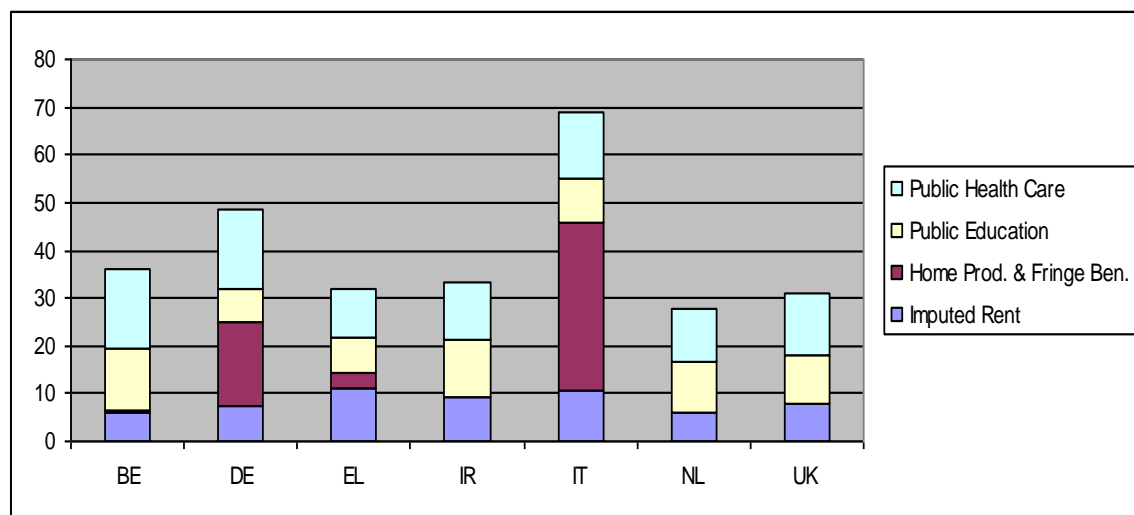
The information availability regarding these items in the data sets used in the framework of AIM-AP is shown in Table A1. It is immediately evident that the

information available is not comparable across countries. In two of the national data sets used (Ireland and the Netherlands) there is no such information at all, in one case information is available but could not be used in the framework of this project (UK), in one case there is only information about company cars (Belgium). Only in the Greek data set there is information about consumption of own production of commodities, while only in the Italian and German data sets there is information about time use (and, hence, consumption of own production of services). Therefore, no comparative analysis was possible.

Table A1. Information availability on consumption of own production and fringe benefits in AIM-AP surveys

	Auto-consumption (commodities)	Auto-consumption (services)	Company car	Other fringe benefits
Belgium			+	
Germany		+	+	+
Greece	+		+	+
Ireland				
Italy		+	+	+
Netherlands				
UK			(+)	

Graph A1. Non-cash income components as a proportion of total disposable income (including home production and fringe benefits)



Graph A1 provides the picture that emerges regarding the size of total non-cash incomes vis-à-vis the total disposable income in the seven countries. Clearly, in the two countries where the value of home production of services can be estimated (Germany and, particularly, Italy), this component is the largest of all non-cash income components, thus making cross-country comparisons hard to interpret.

Moreover, Graph A2 reports the monetary value of non-cash components as a proportion of quintile disposable income for the four countries where information on some home production and/or fringe benefits items is available. Home production – that is far larger than fringe benefits – is far more important for poor rather than rich households. Naturally, the latter has obvious consequences for changes in inequality and poverty indices when these components are included in the concept of resources along with the other non-cash income components, thus making cross-country comparisons extremely hard to interpret.

Graph A2. Non-cash income components  
as a proportion of disposable income of quintiles

