

## Accounting for the distributional effects of non cash public benefits<sup>1</sup>

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### Abstract

International comparisons of inequality based on measures of disposable income may not be valid if the size and incidence of publicly-provided benefits differ across the countries considered. The benefits that are financed by taxation in one country may need to be purchased out of disposable income in another. We estimate the size and incidence of non cash benefits from public housing subsidies, education and health care for five European countries using comparable methods and data. Inequality in the augmented income measure is dramatically lower than in disposable income, with the effects of the three components varying in importance across countries. Adapting equivalence scales to take proper account of differences in needs for health care and education across population members reduces the scale of the effect, but does not eliminate it.

**Keywords** Inequality; In-kind transfers; Cross-national comparisons

### Introduction

A household's command over resources is determined not only by its spending power over commodities it can buy but also by resources available to the members of the household through the in-kind provisions of the welfare state as well as private non cash incomes. The omission of non cash incomes from the concept of resources used in distributional studies

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may call into question the validity of comparisons, both time-series within a particular country and cross-sectional comparisons across countries. For example, 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 about the relative degree of inequality and, perhaps, policy implications. Further, this omission can have important implications for the efficient targeting of resources aiming to reduce inequality or mitigate poverty.

Studies using national or cross-national information for developed countries employing a variety of techniques examining the distributional effects of in-kind public transfers, mainly in the fields of public education and public health care, suggest that in kind transfers are more equally distributed than disposable income and, thus, reduce aggregate inequality.<sup>2</sup> In quantitative terms, cross-country differences seem to be substantial, but it is not always clear whether such differences are genuine or can be attributed to methodological choices made by the researchers.

The aim of this paper is to extend previous analyses of the distributional effects of welfare state programs in rich countries and focus on three of the most important public transfers in-kind, namely, public education services, public health care services and public housing, and analyse their short-term distributional effects in a strictly comparable framework in five EU countries (Belgium, Germany, Greece, Italy and the UK).<sup>3</sup> Unlike other publicly provided services, such as those in the fields of national defence and public order, the benefits of health care and education are relatively easy to quantify and allocate to particular members of the population.

The methods of calculating the value of each of the three sources of in-kind benefits are described in the next section and ways of identifying beneficiaries are discussed. In order to

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<sup>2</sup> See, for example, O'Higgins and Ruggles (1981), James and Benjamin (1987), Lampman (1988), Smeeding et al. (1993), Evandrou et al. (1993), Whiteford and Kennedy (1995), Steckmest (1996), McLennan (1996), Huguenenq (1998), Tsakloglou and Antoninis (1999), Antoninis and Tsakloglou (2001), Sefton (2002), Caussat et al. (2005), Jones et al. (2008), Harding et al. (2006), Aaberge and Langørgen, (2006), Garfinkel et al. (2006), Marical et al. (2006) and Wolff and Zacharias (2006).

<sup>3</sup> These countries vary substantially in their standard of living as approximated by GDP per capita and represent three of the four welfare state regimes encountered in developed countries: "Liberal" (UK), "Continental" (Germany, Belgium) and "Southern" (Italy, Greece) (Esping-Andersen, 1990; Ferrera, 1996). National expertise was an essential input into the analysis reported here. The AIM-AP project did not include expertise on any country belonging to the "Social democratic" welfare state regime and hence no such example is included in our analysis.

carry out distributional analysis, their incidence is measured by allocating them to appropriate individuals or households within income surveys for each country, which are also described. This is followed by a presentation of the main results of the distributional analysis, showing the effects of the three non cash elements of income in terms of their relative importance in aggregate and across the cash income distribution. Their effects are compared with those of the cash benefits systems and their overall impact on measures of inequality and poverty are described. The following section discusses the welfare interpretation of the empirical findings and outlines an alternative approach using different sets of equivalent scales, providing some empirical illustrations. A final section concludes.

### **Methods and Data**

The main guiding principle that is adopted in calculating the monetary value of each of the three in-kind transfers, and in allocating them to households, is to do so in a manner that is comparable across the five countries considered. 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 (Table 1). These data were chosen because they also provide the input data for EUROMOD, the EU tax-benefit microsimulation model which is described in more detail at the end of this section. As well as allowing us to establish the distributional effects of the three non cash benefits, using our estimates within EUROMOD also enables the size and effects of the non cash benefits to be compared with those of cash benefits and direct taxes, as included in standard measures of disposable income. The income distributions augmented with non cash benefits can be used to evaluate the distributional effects of cash policy changes and, in specific circumstances the non cash elements can be manipulated to expand the scope of policy changes that can be examined by EUROMOD.

The estimates of inequality indices derived in the later sections of the paper rely on static incidence analysis under the assumption that 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 beneficiaries of the public transfers are exclusively the recipients of the transfers (and the members of their households). It is assumed that these services do not create any benefits (such as a healthy and educated workforce) or losses to the non-recipients. Of course, the presence of non cash benefits means that taxes are higher than they otherwise would be. Non cash benefits are typically financed from many sources, including

the direct taxes and social insurance contributions paid by both recipients and 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 (Jones et al., 2008; Marical et al., 2006; Smeeding et al., 1993).

The following three sub-sections describe how the estimates of non cash income were derived for each of the three components.

### Education

Information on spending per student in primary, secondary and tertiary education is derived from OECD (2006). Each student in a public education institution (or a heavily subsidized private education institution) identified in the income survey (see Table 1) is assigned a public education transfer equal to the average cost of producing these services in the corresponding level of education. Then, this benefit is assumed to be shared by all household members. In other words, it is 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 different types of secondary and tertiary education which may be important in some countries. Estimates of public spending per student in primary, secondary and tertiary public education institutions were derived using the information in OECD (2006) and they are shown in Table 2 (estimates in current euros).<sup>4</sup>

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<sup>4</sup> More specifically, figures from Table X2.5 (p. 434) (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

In all countries public spending per secondary education student is higher than the corresponding figure for primary education. However, in some countries such as Germany and Belgium the differences are quite large, while in others, such as Italy and Greece, the differences appear to be relatively small. Comparisons of spending per student in tertiary education depend on the treatment of public R&D expenditures. Because their main beneficiaries are not the students, estimates of public transfers to tertiary education students are calculated net of R&D public expenditures.

Tertiary education students living away from their parental homes pose the broader question of whether household income is a good approximation of their standard of living. Analysis which simply looks at all students, risks attributing an unwarranted benefit to students who appear to have low incomes simply because they moved temporarily away from high income parental homes for the period of their studies; while the literature on the returns to education indicates that their likely positions in the earnings distribution will be towards the top. Moreover, the living arrangements of tertiary education students differ substantially across countries, while their treatment in the national surveys is not always the same. For example, most of tertiary education students in Greece live with their parents whereas this is the case for relatively few students in the UK. In Belgium and Italy students living in student accommodation are treated as members of their parental households in the income surveys; in the UK they are not included at all. Therefore, the corresponding results should be treated with caution. It should be noted that in the UK there is a substantially more important role for private sources in funding tertiary education than in other countries, in the form of student fees.<sup>5</sup>

Figure 1 shows the position of the individual beneficiaries of public education subsidies in the distribution of equivalised household disposable income<sup>6</sup> for primary, secondary and tertiary education. Bars higher (lower) than 20 percent indicate that the quintile groups under consideration contain proportionally more (fewer) beneficiaries than their population shares. The top left graph depicts the situation regarding primary education. In Belgium and Germany, the beneficiaries of public primary education transfers appear to be fairly evenly

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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).

<sup>5</sup> For a detailed discussion see Callan et al. (2007).

<sup>6</sup> Following the practice of EUROSTAT, in the main body of the paper income is equivalised using the modified OECD equivalence scale - with weights of 1.0, 0.5 and 0.3 assigned to the household head, each other household member aged above 13 and each member aged below 14, respectively

distributed across the first four quintiles, while in the rest of the countries they seem to be disproportionately concentrated lower down the cash income distribution. In all countries, especially in Germany and the UK, they are substantially underrepresented in the top quintile. A similar picture emerges in the top right graph which shows that in all countries there is a negative relationship between the share of beneficiaries of public secondary education and the quintile of the income distribution. In the cases of Greece and the UK this can be partly attributed to the fact that the (relatively few) private education students are concentrated to the upper part of the cash income distribution (especially the top quintile). Such students cannot be identified in the income surveys of the remaining countries. Moreover, in all countries high earning individuals or couples without children are over-represented in the top quintiles.

The bottom left graph shows the location of public tertiary education beneficiaries in the income distribution. No clear cross-country pattern emerges, although with the exception of Greece there is a U-shaped pattern with more beneficiaries at the top and the bottom than in the middle. The higher shares of beneficiaries at the bottom, especially notable in Germany, can be attributed to a large number of single person (student only) households, naturally with low levels of current income. As explained above, cross-country differences in the living circumstances of tertiary-level students and the exclusion of students living in institutional accommodation may explain the observed effects. The bottom right chart combines all levels of education and shows how, in all countries, beneficiaries are under-represented in the top and, in most cases, the fourth quintile, while they are over-represented in the three lowest quintiles.

## Health

The most often-used method in the literature of the distributive evaluation of health care services accounts for the distributional impact of health care services by increasing household income by the sum of the corresponding public expenditures. Three approaches can be distinguished in this context: 1) the actual consumption approach; 2) the insurance value approach; and 3) using equivalence scales that incorporate health care needs.

The *actual consumption approach* uses detailed data on the effective use of health care services by individuals (see, for example, Evandrou et al. (1993) and Sefton (2002) for the UK). A fundamental critique of this approach states that it ignores the greater needs that are associated with being ill (Aaberge and Langørgen, 2006). It implies that, *ceteris paribus*, sick people are better off than healthy persons just because they receive more health care

services. In fact, it has been clearly demonstrated that poorer individuals tend to have lower health levels, and consequently greater needs for health care (see, for example, Hernandez-Quevedo et al. (2006) and Berlofffa et al. (2006)). Furthermore, since usually health care spending is concentrated heavily in the last year of an individual's life ("death related costs") adoption of this approach results in extensive re-rankings of elderly people in the income distribution and hence, misleading results.

Using the *insurance value approach*, the 'insurance value' of coverage for each person is imputed based on specific characteristics (such as age, sex, socio-economic status, etc). The insurance value is the amount that an insured person would have to pay in each category so that the third party provider (government, employer, other insurer) would have just enough revenue to cover all claims for such people (Smeeding, 1982). It is based on the notion that what the public health care services provide 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 (Marical et al., 2006). Nevertheless, a problem remains since the relative needs of individuals for health care are not the same as for commodities bought in the market. Different equivalence scales should be used in the two distributions (disposable income and disposable income plus the value of public health care services).

Therefore, a third approach, which has considerable informational requirements, is to use the insurance-based approach and *introduce an equivalence scale* that corrects for differences in health care needs between individuals. The problem with this approach, however, lies in the choice of the equivalence scale. No attempt to construct sets of equivalence scales covering differences in needs for the entire population exists, although a number of empirical studies focusing on particular population groups or specific situations can be found in the literature (Jones and O'Donnell, 1995; Klavus, 1999; Zaidi and Burchardt, 2005; Berlofffa et al., 2006). Nevertheless, the welfare foundations of these studies are not always straightforward (Radner, 1997). The problem of the appropriate equivalence scales and the welfare interpretation of the corresponding incidence analysis are discussed further below.

The present paper uses the risk-related insurance value approach. Following this approach, each individual is assumed to receive a public benefit determined by the average spending on his/her age group, irrespective of whether use of public health services was actually made. Then, this benefit is added to the resources of the household to which this individual

belongs. We calculate per capita expenditures for each age group using the OECD Social Expenditure database (SOCX), which provides data that are comparable across countries.<sup>7</sup>

The age pattern is the same as that used in Marical et al. (2006) and is shown in Figure 2. As expected, spending per capita is considerably higher for older people. The distributional impact of health care spending is, therefore, likely to be determined to a considerable extent by the location of the elderly in the income distribution. As shown in Table 3 which reports the relative mean per capita public health care expenditure by quintile of equivalised household disposable income, health care spending is higher (lower) than average for lower (higher) income households. The cross-country pattern by income is similar in all cases but less marked in Italy and Germany than in the other countries.

### Housing subsidies

Public support for housing costs can take many forms. Some of these are captured in the measurement of cash household disposable income. Housing benefits paid in cash and tax relief on mortgage interest are examples of common forms that are usually accounted for in cash income measures. However, cross-country (or inter-temporal) comparisons of the extent and incidence of public housing support are compromised if these forms of assistance are captured and direct subsidies are not. To redress this situation we estimate the extent to which tenants in the social rented sector are paying rent below the amount they would pay if they were renting the same accommodation in the private market. Actual rent paid (calculated gross of any cash housing benefit) by social sector tenants is recorded in the income survey datasets underlying our analysis. Market rents must be estimated. The method that is adopted is “borrowed” from the methods developed to estimate the value of imputed rents for owner occupiers (Frick and Grabka, 2003). The approach, known as the “rental equivalence” method, considers the opportunity cost of housing in non-subsidized rental markets. It is based on a hedonic regression approach, following a two-step procedure. First, a regression model is estimated for the population of tenants (or rented

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<sup>7</sup> 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. One drawback of the SOCX database arises from the fact that it does not distinguish differences in the use of for health care by men and women although there is evidence that spending patterns differ across sexes (Costello and Bains, 2001; Carone et al., 2005). Another issue is that R&D spending is included. It may be argued that this component is not relevant for current welfare but the SOCX database does not allow its deduction from the concept of public health care transfers (see Smeeding et al. (2008) for further discussion).

accommodations) in the private, non-subsidized market with rent as the dependent variable. Explanatory variables may include characteristics of the dwelling and the occupants.<sup>8</sup> The second stage applies the resulting coefficients to otherwise similar social tenants (see Frick et al. (2008) for further discussion). Table 4 shows that the proportion of households in the social rented sector varies considerably from almost none in Greece and very few in Italy to almost 20 percent in the UK. In all countries they are concentrated, but not located exclusively, in the lower income quintiles.

## EUROMOD

Our analysis makes use of EUROMOD, a unique tax-benefit microsimulation model that covers EU member states in a comparable way. It uses micro-data derived from representative national income surveys, as shown in Table 1 for this study. It simulates direct tax liabilities, social insurance contributions and benefit entitlements for the households and their members. It is a static model, appropriate for the analysis of short-term effects and designed to be used inform many types of analysis (Sutherland, 2007; Lietz and Mantovani, 2007).<sup>9</sup> In the context of the present paper, using EUROMOD allows us to decompose the components of disposable income in a comparable manner, and to compare the size and distributional effects of these components with non cash benefits.

The usual “outcome” measure from EUROMOD is disposable income, that is gross market income plus private transfers less income taxes and social insurance contributions (paid by employees and the self-employed), plus cash benefits. Disposable income measured at the household level and equivalised to account for differences in household size and composition is the income concept that makes up the usual measuring stick employed in studies of poverty and income distribution in Europe and most other developed countries. Since this concept of income includes only a selection of taxes and items of public spending, it provides only a partial picture of the effect of the public sector on household welfare. On the one hand the incidence of indirect and corporate taxes and employer social contributions

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<sup>8</sup> This straightforward approach can be further improved by correcting for potential selectivity into the owner status (e.g., by applying a Heckman selection correction) as well as by considering measurement error in the imputation process, i.e., by adding an error term to the imputed rental value, thus maintaining the variance in the final construct. The practical solution found for the five countries considered here varied both in terms of the precise method (the Heckman correction was not successfully employed for the UK and Italy) and the explanatory variables that were chosen. Each country used broadly the same approach, while using the available variables that were most applicable to national housing markets.

<sup>9</sup> Efforts are currently under way to extent its scope by including indirect taxation (see Decoster et al in this volume) and accounting for the imperfect targeting of benefits.

is omitted. On the other hand, public expenditure for health care, education and housing, together with spending in areas such as public order and national defense are also not incorporated.

In the analysis reported below we improve the comprehensiveness of the income measure by including non cash public transfers in the fields of education, health care and housing. As our analysis shows, countries rely to different extents on cash and non cash benefits and also on the taxes included in disposable income compared with those that are not. By adding non cash income we provide a more comprehensive measure of resources than that used in most distributional studies, and cross-country comparability is improved: but the analysis remains partial.<sup>10</sup>

### **Incidence of public non cash transfers**

In this section we consider the effects of the combination of the three public transfers across the income distribution. First we consider the size of each of the three components, measured relative to cash disposable income. Figure 3 shows that public rent subsidies make up a tiny proportion of the combined non cash transfers that we consider, even in the countries where they affect a significant number of households. Their largest effect is in the UK where they are equal to 1 percent to disposable income. Public spending on education and health each has a much bigger effect in all countries. Education transfers in kind are equal to nearly 10 percent of disposable income in Belgium, which has the highest spending relative to disposable income, while the lowest percentage is 6 percent, in Germany. Health makes a larger aggregate contribution than education in all five countries. It contributes most in Belgium and Germany (16 to 17 percent), followed by Italy (15 percent), UK (13 percent) and Greece with 12 percent. Added together the three non cash transfers that we consider represent the largest proportional addition to cash income in Belgium (27 percent) followed by Germany and Italy (23 to 24 percent), and the UK (21 percent), with the addition in Greece being the lowest (18 percent).

The scale of the transfer via non cash benefits, contrasted with that of cash benefits is illustrated in Figure 4. The left-hand chart shows the composition, across all households, of “augmented” income (cash disposable income plus non cash income), in terms of the average size of each income component as a percentage of augmented household income as a whole. As such it shows how much market income is necessary on average to achieve a

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<sup>10</sup> Taxes are not earmarked in the countries we consider and it would be misleading to allocate taxes to particular items of spending within a partial analysis.

given level of augmented income; how much is added as cash and non cash benefits and deducted as income taxes and social insurance contributions. Cash benefits are sub-divided in Figure 4 into (i) public pensions and (ii) other cash benefits. In all five countries cash benefits, taking the two types together, play a larger role in augmented income than non cash benefits, but the extent to which this is so varies. At one extreme, in the UK the proportions are similar with cash making up 19 percent and non cash 17 percent. At the other extreme (Greece and Italy) the contribution of non cash transfers considered here is much smaller than that of cash transfers, largely because of the importance of public pensions on the cash side. In Belgium and Germany both cash and non cash benefits are relatively large components of income but cash benefits including pensions make up the larger share.

The middle chart shown in Figure 4 illustrates the composition of augmented income in the bottom decile group, (using equivalised augmented income to rank households). Both cash and non cash benefits are more important at low levels of income. Cash benefits are more closely (but inversely) related to income than are non cash benefits – so the share of non cash in all benefits is lower in the bottom decile group than overall. In the top decile group, shown on the right of Figure 4, both cash and non cash benefits are clearly less important. In the case of the UK non cash benefits are larger than cash benefits. In all the other countries, mainly because of the role of public pensions, cash maintains the same relative role in benefits as a whole in the top income group as it does for all households. Figure 4 also shows the relative size of direct taxes and contributions paid by households. While the top decile group pays more in these taxes than it receives back in cash and non cash benefits, the reverse is strongly the case in the bottom decile group, with the contrast being particularly clear for Belgium.

The relative contributions of each source of non cash benefit in reducing inequality as we move from the distribution of disposable income to the distribution of augmented income are shown in Table 5 in terms of their effect on quintile shares. Non cash benefits as a whole have a rather similar and common absolute effect on quintile shares across the five countries considered, in each case increasing the share of the bottom two quintiles and reducing the share of the top quintile, while the effect on the third is slightly positive and on the fourth, slightly negative. The relative contributions of health and education are similar across countries although education seems to play a larger and more strongly redistributive role in Italy than in other countries, increasing the share of the bottom quintile group by 1.7

percentage points and reducing that of the top quintile group by 2.1 points. To a lesser extent, the same applies to health in Belgium, where the share of the bottom quintile group increased by 1.6 percentage points, compared with 1.4 to 1.5 points in all other countries. As expected from earlier results, the contribution of housing subsidies to changing quintile shares is small in all countries with the largest effects being an increase in the share of the bottom quintile group in the UK of 0.3 points (corresponding to a transfer equivalent to 5 percent to the income of the quintile).

Not surprisingly, the effect of adding non cash transfers to cash income is to reduce inequality. (We consider the welfare interpretation of such a measure in the next section.) As shown in Table 6, inequality using the augmented measure is lower in all countries than for cash income alone, for each of the three inequality indexes considered (the Gini coefficient, and Atkinson index with inequality aversion parameters set to 0.5 and 1.5). The proportional reduction in inequality is largest in Belgium and smallest in Greece, and is generally in line with the relative sizes of the non cash transfers and cash income (shown in Figure 3). In the case of the UK the inequality reduction is higher than the size of the transfers alone would indicate, implying that non cash transfers may be better targeted to the lower tail of the distribution. Table 6 also shows the effect on the three inequality indicators of each of the non cash components separately. In line with the results for quintile shares, public healthcare has a somewhat larger inequality-reducing effect in Belgium than in other countries with the same applying to education in Italy.

Finally, we consider the effect of the inclusion of public transfers in-kind in the concept of resources on the risk of poverty, as measured using the proportion of the population with equivalised income below 60 percent of the median. Figure 5 contrasts the effect of using the standard cash measure of disposable income with that using income augmented by non cash transfers. The approach adopted is explicitly relative and the poverty threshold is calculated using each income concept under analysis. It is worth noting that adding non cash income increases the median (and hence the threshold) by most in Belgium (31 percent), slightly less in Germany (30 percent), less in Italy and the UK (29 percent and 28 percent, respectively) and substantially less in Greece (22 percent). However, as clearly demonstrated in Figure 5, the proportion of people below the relevant threshold is much lower in all countries, when using the augmented income measure. The effect is particularly strong in the UK where the “poverty” rate is reduced by more than a half and least strong in Greece where it is, nevertheless, reduced by a third. In all countries the reduction in proportions of people in

households with income below the thresholds is larger for children and older people. This is not surprising since the incidence of public spending for education and health care, respectively, is particularly concentrated on these two groups. The proportions of children below the threshold using the augmented measure are just a little over one quarter of those using the cash measure in Belgium and the UK and only one third of the elderly below the cash income threshold remain below the augmented income threshold in Belgium, Germany and the UK.

However, it is doubtful whether these results should be interpreted as having bearing on the assessment of poverty or inequality from a welfare perspective. They are simply of interest because they show the scale of non cash incomes relative to cash incomes, without taking into account the needs of individuals for health care or education. The next section attempts to address this issue.

### **Welfare interpretation and equivalence scales**

The practice adopted in the analysis so far is in line with most studies found in the relevant empirical literature, in the sense that the same equivalence scales are used to construct the distribution of augmented income as well as for the distribution of disposable income. This may be problematic, particularly in the case of public education and public health care where needs are characterized by strong life-cycle patterns. The reason is that the equivalence scales used to measure inequality in disposable income are “conditional” on the existence of free public education and free public health care (Pollak and Wales, 1979; Blundell and Lewbel, 1991). By introducing the latter in the concept of resources in the augmented income distribution, we treat them like private commodities that households must pay for in order to obtain them. Therefore, the equivalence scales should be modified accordingly.

This is not an easy task. Both education and health care have some rather unique characteristics. Their consumption is absolutely necessary for the individuals involved and it does not involve any economies of scale at the household level. Needs for education and health care are likely to vary far more with individual characteristics such as age rather than with income. At the limit, we can 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 could 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 re-calculation of equivalence scales is straightforward.

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 in the same welfare level:

$$\frac{y}{e} = \frac{y+k}{e'} \quad (1)$$

and  $e'$  should be equal to

$$e' = \frac{e(y+k)}{y} \quad (2)$$

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 size 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 or short- versus long- term considerations. Therefore, there is room for sensitivity analysis, using alternative values of  $k$  for specific services (education, health care) and population (age) groups.

As an illustration of the implications of this approach, in Table 7 we exploit cross-country spending variations in EU15 and adjust  $k$  accordingly. In each country the value of  $k$  used in the equivalence scales is adjusted in order to be equal as a share of GDP per capita to the EU15 unweighted average public spending for the corresponding educational level (primary, secondary, tertiary) and health care spending per age group (18 age groups). Therefore, for each household with  $n$  members ( $i=1, \dots, n$ ) with different characteristics (such as age) the needs for education and health care are assumed to be:

$$k = \sum_{i=1}^n \left[ k_{ENi} \frac{S_{EEUi}}{S_{ENi}} + k_{HNi} \frac{S_{HEUi}}{S_{HNi}} \right] \quad (3)$$

where  $k_{ENi}$  and  $k_{EHi}$  are, respectively, national spending for public education and public health care for persons with characteristics  $i$ ,  $S_{ENi}$  and  $S_{HNi}$  are national spending figures for public education and public health care expressed as a share of the country's GDP per capita

(i.e. they are equal to  $k_{ENi}/GDP_{pcN}$  and  $k_{EHi}/GDP_{pcN}$ , respectively) and  $S_{EEUi}$  and  $S_{HEUi}$  are the corresponding (unweighted) averages for EU15.

Table 7 reports proportional changes in inequality indices when public education, health care and housing services are included in the concept of resources. Two alternative assumptions are used about which age groups have education needs. First (scenario 1), it is assumed that only people in age groups for whom education is compulsory 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), Table C1.2]. All people below these age thresholds and above the compulsory primary education enrolment age are considered to have educational needs (including those who do not receive any public transfers like dropouts and private education students), while the rest of the students in non-compulsory stages of the education system may receive public transfers but are assumed not to have the corresponding needs. Scenario 2 assumes 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.

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, health care and housing services using the modified OECD scales, as shown in Table 6. The impact of the transfers appears to be very large. In the next two lines, the distribution of equivalised income is derived using the equivalence scales in (2) and the proportional changes from the baseline distribution (distribution of equivalised disposable income using the modified OECD equivalence scales) are reported. This time the changes appear to be modest albeit inequality-reducing in most cases. In the first scenario the decline is due to the transfers to households with members in the non-compulsory stages of education (who are assumed to receive transfers in-kind without having corresponding needs), to the effects of public housing subsidies and to differences in the national levels of spending on health and education (included in income) and those at the EU average (providing our illustrative measure of needs). These factors are on balance inequality-reducing especially in the UK and Germany and when using inequality indices sensitive to changes close to the bottom of the distribution, such as Atkinson (1.5). In the second scenario all students and people of compulsory school age are considered to have education needs. In this case the net effect on inequality is negligible in most cases, with small reductions remaining in Germany, Belgium

and the UK. If alternative values of  $k$  are employed, for example by taking the EU minimum or maximum shares of spending for public education and health care as the yardstick with which to measure needs, then the net effects on inequality is scaled accordingly. Lower values attributed to needs result in larger net reductions in inequality than those shown in Table 7. Higher values result in smaller reductions or, indeed, increases in inequality.

We believe 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- or over- users of such services. For example, in countries with federal rather than national education 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 people who do not use public services and 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 under-use the public health care system or groups that make excessive use of public services (Le Grand and Winter, 1985). Likewise, we can also identify people with disabilities or chronic illness whose needs are likely to be higher than the rest of the population. Finally,  $k$  may be made to vary with  $y$ , albeit less slowly than the conventional equivalence scales assume.

## **Conclusions**

Standard microeconomic theory suggests that cash transfers are superior to non cash transfers, since using cash transfers individuals may be able to allocate their budgets to commodities freely, so as to maximize their welfare. However, there are many theoretical arguments in favour of transfers in kind (Nelson, 1987), in practice governments use them extensively and, as Knetsch (1995) points out, in many circumstances people seem to prefer non cash to cash transfers of equal value. Non cash benefits in the form of publicly provided education, health and housing subsidies together make up an important supplement to cash incomes in Europe, and in particular in the five countries that we consider. Nevertheless even in combination they are smaller in size, on average, than cash benefits.

Non cash benefits add a larger proportion to the resources available to households with low disposable incomes than they do to households with high income. Their absolute size also tends to be larger for households with low cash incomes. To the extent that the size and

incidence of these non cash incomes differ across countries it is important that they are accounted for – or considered in some way – in cross-national comparisons of income inequality and poverty. Among the countries we consider the differences in size and distributional effect are small, relative to those we would observe if we compared EU countries with the US or other developed countries outside Europe. However, there are important differences, which can be summarised as follows. Firstly, public housing subsidies, while relatively small in all cases and almost non-existent in some, nonetheless add 1 percent to incomes as a whole in the UK and somewhat less than this in Germany. The aggregate effect of public education ranges from 6 percent of disposable income in Greece and Germany to 10 percent in Belgium and for health the range is between 12 percent in Greece and 17 percent in Belgium and Germany. Given the differences in scale of spending, the distributional effect is quite similar in all five countries, but with education having a somewhat more pronounced effect on inequality measures in Italy than in other countries, and public health having a larger effect in Belgium.

Comparisons with the US would be very interesting. The evidence of Marical et al (2006) suggests that US public expenditure for non cash transfers as a share of GDP is lower than in all countries considered here, apart from Greece. Moreover, the ratio of non cash to cash public transfers is substantially higher in the US than in any of the countries included in our analysis, reflecting the relatively more limited role of public cash transfers in the US. At the same time, the share of private health expenditure is substantially higher in the US than in the EU and the role of social housing is quite limited. Nevertheless, both health care and social housing seem to be better targeted towards the poor in the US than in EU countries (this is particularly so in the case of the elderly; see Smeeding, 1986). Using simpler techniques than those employed in this paper, Marical et al (2006) conclude that even though non cash transfers reduce inequality more in the US than in Europe, their inclusion in the concept of resources still leaves the US at a level of inequality higher than that of almost all EU countries (see, also, Garfinkel et al, 2006).

Two further points remain. First, it is doubtful whether results derived using the standard approach in the field of static incidence analysis can have a straightforward welfare interpretation. 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 distributional effects of non cash

transfers appear to be far more modest and, under particular circumstances may even appear to increase inequality.

Secondly, the practical lessons from this comparative empirical exercise should not be forgotten. The results presented in this paper are as comparable as possible but there are nevertheless some factors that may apply in different ways across countries and these should not only be borne in mind but also provide the basis for future improvements in data and methods for the type of exercise we have carried out. Publicly provided education, health care and housing are organised differently across countries and common analytical choices – for example in the inclusion or otherwise of pre-primary education or tertiary students living on their own – have different implications across countries. Furthermore, the available comparable data on spending by sub-group (e.g. pupils by sub-level of education or healthcare by gender) may be insufficient to capture differential levels of spending that may be important in some countries but not in others. Micro-data from income surveys may not carry enough information about the use of private alternatives to public services (or co-payments) for the private components of spending to be captured properly. Again, the importance of these will vary with national context. While we believe that we have made a contribution to the comparative evidence on the distributional effects of non cash benefits, many challenges remain.

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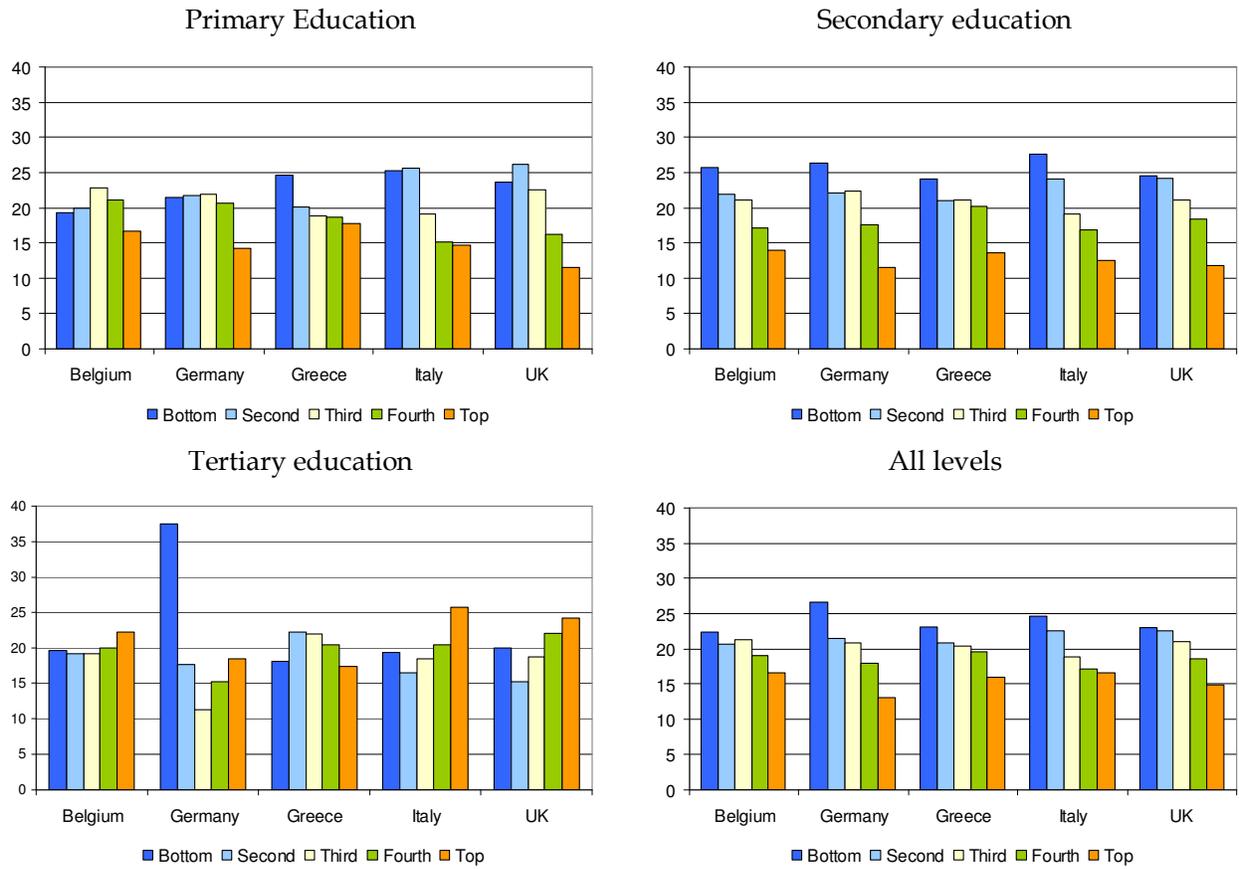
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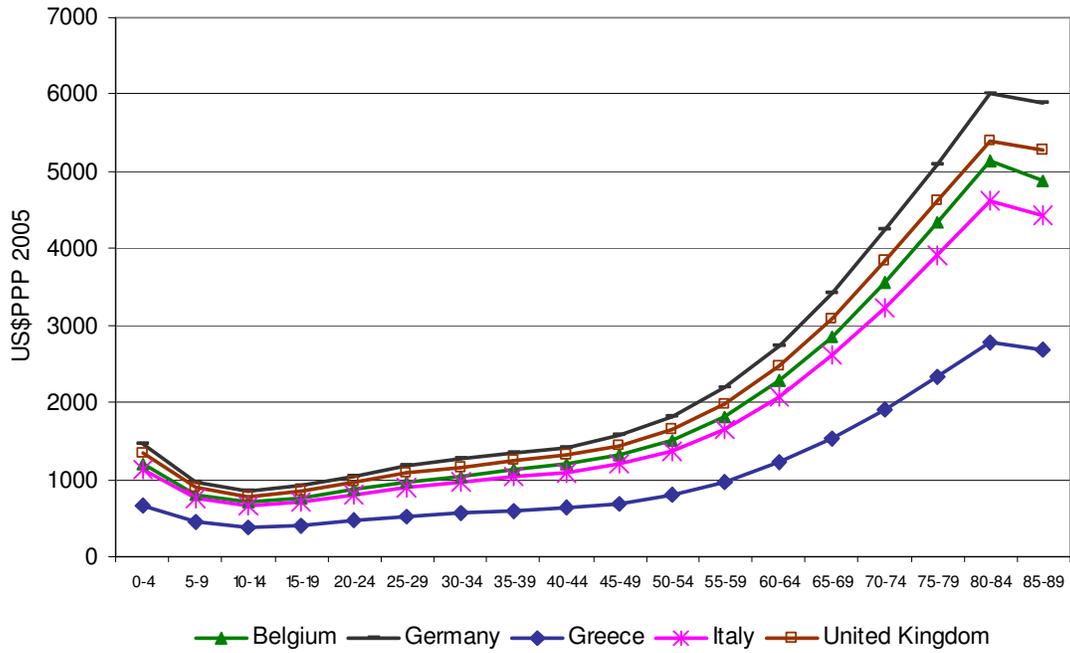
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**Figure 1 Distribution of public education beneficiaries by quintile of household disposable income and by level of education**



Source: EUROMOD

Figure 2. Public health care expenditures per capita for each age group



Source: Calculations based on OECD Social Expenditure database.

Figure 3 Non cash income components as a proportion of household disposable cash income

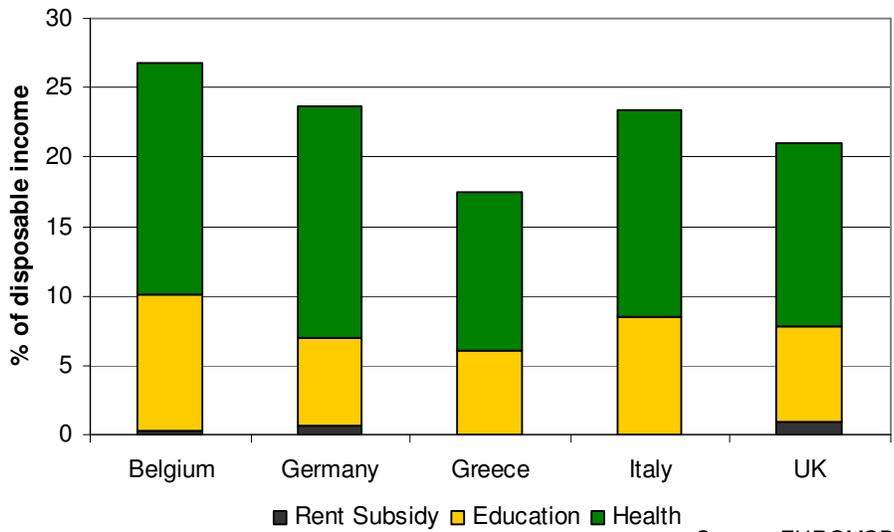
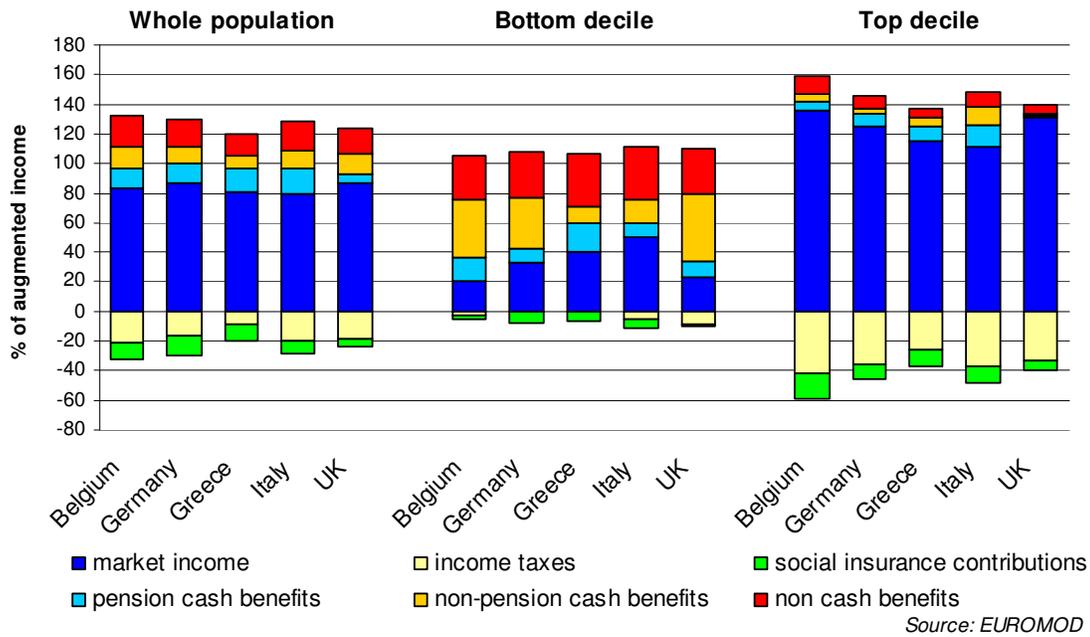
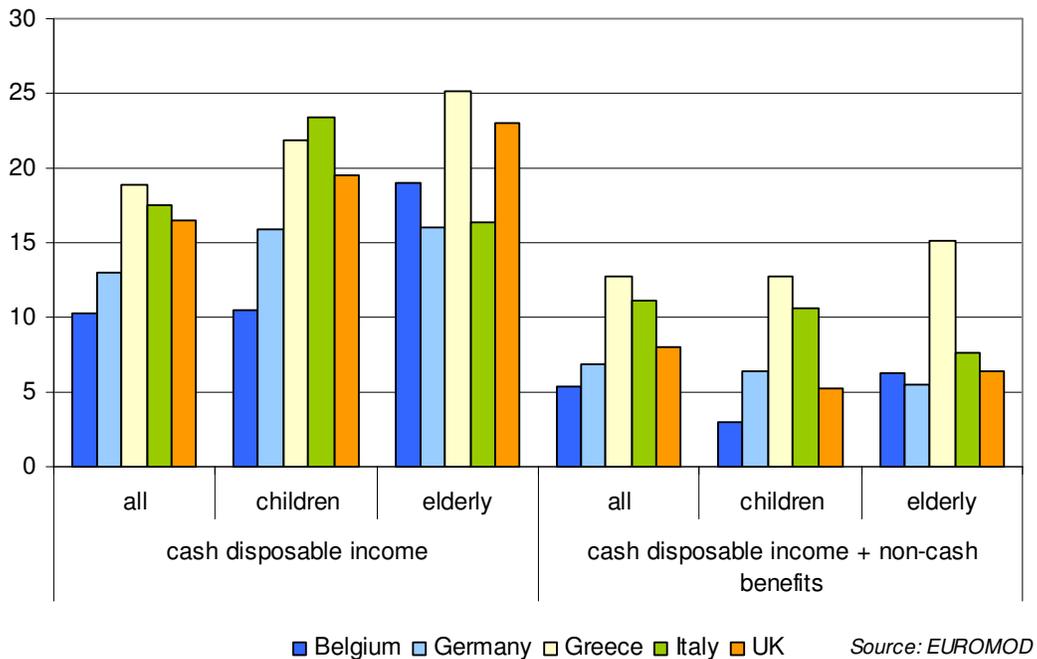


Figure 4 Composition of augmented household incomes, including non cash benefits (housing subsidies, education and health)



Note: decile groups are defined using household disposable income augmented with non cash benefits and equivalised using the modified OECD scale.

Figure 5 Percentage of population groups with cash disposable income and augmented (cash + non cash) income less than 60 percent of the median



Note: incomes are equivalised using the modified OECD scale

Table 1. Income data sets used in the analysis

Country	Dataset	Date of collection	Reference time period for incomes	Tax-benefit system
Belgium	EU-SILC	2004	2003	2003
Germany	German Socio-Economic Panel	2002	2001	2001
Greece	Household Budget Survey	2004/5	2004	2004
Italy	Italian version of EU-SILC	2004	2003	2003
UK	Family Resources Survey	2003/4	2003/4	2003

Acknowledgment: EUROMOD data sources are the EU Statistics on Incomes and Living Conditions (EU-SILC) made available by Eurostat (under contract EU-SILC/2007/03); the public use version of the German Socio Economic Panel Study (GSOEP) made available by the German Institute for Economic Research (DIW), Berlin; the Greek Household Budget Survey (HBS) made available by the National Statistical Service of Greece; the Italian version of the EU-SILC made available by ISTAT; and the Family Resources Survey (FRS), made available by the UK Department for Work and Pensions (DWP) through the Data Archive. Material from the FRS is Crown Copyright and is used by permission. None of the data providers bears any responsibility for the analysis or interpretation of the data reported here.

Table 2. Public spending per student in three educational levels (in current euros)

Country/year	Level of education		
	Primary	Secondary	Tertiary (without R&D)
Belgium 2003	4662	5814	5809
Germany 2001	3131	4857	5410
Greece 2004	2541	2984	2772
Italy 2003	5310	5723	3264
UK 2003	3989	4972	5207

Source: OECD (2006)

Table 3. Relative mean per capita public health care transfer per quintile of household cash disposable income

Quintile	Belgium	Germany	Greece	Italy	UK
1 (bottom)	1.17	1.05	1.11	0.98	1.10
2	1.17	1.06	1.11	1.03	1.10
3	0.95	0.99	1.00	1.04	1.02
4	0.87	0.95	0.90	0.99	0.92
5 (top)	0.84	0.96	0.88	0.96	0.85
All	1.00	1.00	1.00	1.00	1.00

Source: EUROMOD

Table 4. Social tenants (percent of all households) by quintile of household cash disposable income

Quintile	Belgium	Germany	Greece	Italy	UK
1 (bottom)	10.3	10.8	0.2	1.5	30.6
2	7.3	7.9	0.0	0.8	35.5
3	3.1	5.9	0.1	0.4	19.3
4	2.4	5.2	0.1	0.4	9.6
5 (top)	1.8	2.2	0.1	0.1	1.9
All	5.2	6.5	0.1	0.7	19.5

Source: EUROMOD

Table 5 Quintile shares (percent) for cash and augmented equivalised household income

	Quintiles	Household income				
		Cash only	+ in-kind rent subsidy	+ education	+ health	+ all 3 public non cash transfers
Belgium	1	10.3	10.3	11.5	11.9	12.9
	2	15.0	15.1	15.7	16.1	16.6
	3	18.8	18.7	19.1	18.9	19.1
	4	23.1	23.0	22.7	22.4	22.1
	5	32.9	32.8	31.1	30.7	29.3
Germany	1	9.3	9.5	10.4	10.8	11.9
	2	13.8	13.9	14.4	14.9	15.3
	3	17.6	17.6	17.9	18.0	18.2
	4	23.0	22.9	22.6	22.4	22.2
	5	36.3	36.1	34.7	33.9	32.5
Greece	1	7.3	7.3	8.3	8.7	9.6
	2	12.9	12.9	13.4	13.8	14.2
	3	17.3	17.3	17.5	17.6	17.8
	4	23.1	23.1	22.9	22.6	22.5
	5	39.4	39.4	37.9	37.2	36.0
Italy	1	7.7	7.7	9.3	9.2	10.5
	2	13.4	13.4	14.3	14.3	15.0
	3	17.8	17.8	17.9	18.2	18.2
	4	23.3	23.3	22.7	22.9	22.4
	5	37.8	37.8	35.8	35.5	33.8
UK	1	8.3	8.6	9.5	9.8	11.0
	2	12.3	12.5	13.2	13.4	14.3
	3	16.6	16.6	17.0	17.1	17.3
	4	22.7	22.5	22.3	22.2	21.8
	5	40.1	39.7	38.0	37.5	35.6

Source: EUROMOD

Note: Quintiles are fixed and based on equivalised cash household disposable income

Table 6 Inequality indicators for cash and augmented equivalised household income

		Household income				
		Cash only	+ in-kind rent subsidy	+ education	+ health	+ all 3 public non cash transfers
Belgium	Gini	0.2279	0.2267	0.2123	0.1932	0.1760
	Atkinson (0.5)	0.0452	0.0445	0.0395	0.0317	0.0266
	Atkinson (1.5)	0.2165	0.2076	0.1996	0.1019	0.0855
Germany	Gini	0.2697	0.2667	0.2498	0.2336	0.2124
	Atkinson (0.5)	0.0587	0.0574	0.0509	0.0442	0.0368
	Atkinson (1.5)	0.1681	0.1637	0.1478	0.1252	0.1042
Greece	Gini	0.3197	0.3197	0.3004	0.2849	0.2672
	Atkinson (0.5)	0.0879	0.0879	0.0763	0.0682	0.0595
	Atkinson (1.5)	0.2732	0.2732	0.2234	0.2037	0.1738
Italy	Gini	0.3020	0.3019	0.2742	0.2663	0.2408
	Atkinson (0.5)	0.0791	0.0791	0.0651	0.0606	0.0501
	Atkinson (1.5)	0.2419	0.2416	0.1973	0.1834	0.1514
UK	Gini	0.3178	0.3120	0.2927	0.2786	0.2510
	Atkinson (0.5)	0.0832	0.0806	0.0717	0.0649	0.0539
	Atkinson (1.5)	0.2414	0.2354	0.1985	0.1756	0.1437

Source: EUROMOD

Table 7. Proportional changes in inequality indices as a result of non cash public transfers in the fields of housing, education and health care using alternative equivalence 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	-22.8	-40.6	-62.9	-21.2	-37.2	-38.1	-16.5	-31.4	-39.6	-20.3	-35.6	-40.7	-21.0	-35.1	-40.7
Scenario 1	-0.9	-2.0	-3.2	-2.3	-4.6	-5.1	-1.6	-3.0	-2.8	-1.4	-2.8	-3.3	-1.0	-4.0	-7.5
Scenario 2	-0.3	-0.7	-1.4	-0.8	-1.5	-1.8	-0.1	-0.2	0.0	0.0	0.0	0.0	-1.1	-2.0	-1.6

Source: EUROMOD

Scenario 1: only people in compulsory education age groups have education needs

Scenario 2: all students have education needs