

Frick, Joachim R.; Grabka, Markus M.; Smeeding, Timothy M.; Tsakloglou, Panos

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Distributional Effects of Imputed Rents in Five European Countries

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Joachim R. Frick
DIW Berlin, Technical University Berlin and IZA Bonn

Markus M. Grabka
DIW Berlin and Technical University Berlin

Tim Smeeding
Luxembourg Income Study and University of Wisconsin-Madison

Panos Tsakloglou
Athens University of Economics and Business and IZA Bonn

Distributional effects of imputed rents in five European countries*

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Key words: home ownership; income in kind; imputed rent; income distribution

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Abstract

Most empirical distributional studies of well-being 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 value of private non-cash incomes. In developed market economies the most important private non-cash income component is imputed rent from owner-occupied or subsidized accommodation. Employing a wider definition of imputed rent that also allows the analyst to capture income advantages among tenants living in rent-subsidized accommodations of various sorts (including rent-free or reduced-rent households), the present paper examines the differential effects of including imputed rents in the concept of resources in five European countries (Belgium, Germany, Greece, Italy and the UK). The results suggest that in almost all cases, the inclusion of imputed rents in the concept of resources leads to a decline in measured levels of inequality and poverty. The main beneficiaries are outright homeowners and households living in rent-free (or heavily subsidised) accommodation — most often older persons. The inclusion of imputed rents in the concept of resources does not lead to substantial changes in the ranking of the countries according to their level of inequality, despite widespread differences in the rates of home ownership and subsidization across the countries studied here.

1. Introduction

Most empirical distributional studies in the majority of 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 (for example, publicly provided health and education services) and the use of private non-cash incomes (such as imputed rents for owner occupied accommodation and consumption of own production). Therefore, 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; Smeeding and Weinberg, 2001).

In developed market economies, the most important private non-cash income component is, undoubtedly, imputed rent for owner-occupied accommodation. Owner occupied housing offers a double benefit to investors: an asset they can sell in times of need (usually, though not always, at a monetary gain) and one that also provides a flow of services in terms of below market value housing flows (Fisher, et al. 2007; 2009) . Further, because ownership allows individuals to have full discretion in the design and use of a residence, it allows superior flows of housing consumption tailor made to fit the utility function of the owners including any psychologically relevant sentiments embedded in the fact of ownership. For these reasons home ownership yields value to the owner both as an asset and as a flow via imputed rent.

The exclusion of non-cash incomes in general and imputed rents in particular 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 differences across countries. For example, inter-temporal comparisons of inequality or poverty in a country ignoring imputed rents during a period of changing home ownership or home values are likely to lead to biased conclusions. Likewise, comparisons of inequality and poverty levels between groups of countries with dramatically different levels of home ownership may well lead to erroneous conclusions about their inequality rankings. For example home ownership rates differ widely just within

our small sample of nations, from less than 50 percent in Germany to about 75 percent in Greece.

The current recession and earlier housing price bubbles in many countries have depressed home values and increased foreclosures. While countries like the U.K. did experience some 'subprime lending', the practice of giving mortgages to less credit-worthy buyers never reached in Europe the proportions that it did in the United States. And while European countries did experience a building boom in the early 2000s, much of it was based on fundamentals such as income and population growth. The IMF (2008, figure 1.20, p. 27) has estimated how much of the rise in home prices could be explained by traditional economic drivers like income growth, population growth, the availability of credit and the wealth being created by rising stock prices. In many countries, home price gains went well beyond the levels predicted by those variables. In Ireland and the U.K., the gap between actual and predicted prices ranged from 20 to 30 percent in 2007. In France, Italy, the Netherlands and Spain the gap ran between 10 and 20 percent. Since 2007, home values in all those countries have begun to fall. But in the periods charted in this paper (2000-2004) home prices had not yet begun to appreciate beyond the predicted levels. Hence, we believe that the results presented in the following are not affected by the recession and the general findings are well applicable to current and future time periods

The paper builds on a series of national reports of the distributional effects of imputed rents that were carried out in the framework of the AIM-AP project targeted at enhancing cross-country comparability of micro-based inequality analyses.¹ Section 2 provides the motivation for the paper including a short review of the relevant literature. Section 3 provides an outline of the three main methods used in the literature in order to measure imputed rent. Section 4 contains the empirical results of the paper and Section 5 provides the conclusions.

2. Motivation

There are several reasons to consider non-cash advantages found in owned or subsidized housing in a measure of economic well-being: (a) home ownership almost always

¹ Verbist and Lefebure (2007), Frick, Grabka and Groh-Samberg (2007), Koutsambelas and Tsakloglou (2007), D'Ambrosio and Gigliarano (2007) and Mullan, Sutherland and Zantomio (2007).

saves on housing costs (and, therefore, produces a lower opportunity cost of housing) and (b) there is an implicit rate of return on private investment in real estate rather than in the financial market (the opportunity cost of capital). Over and above these advantages, housing that appreciates in value offers a possible return in the form of a capital gain, and owned housing presents an asset that can be borrowed against for non-housing consumption.² Above and beyond these arguments which focus on home-owners alone, there is an increasing awareness of also including a measure of imputed rent for any type of subsidized tenant including those paying no rent at all for whatever reason (e.g., housing provided by the employer or parents who passed on their property to their children)

Following this logic, imputed rent (IR) can be calculated using a variety of approaches. Moreover, according to empirical approaches taken in the literature to quantify IR, the choice of the technique and the (more or less) implicit normative assumptions those procedures entail, do have implications for both the impact of IR on economic inequality as well as for the cross-national comparability of results (Frick, Goebel and Grabka, 2007).

There is considerable empirical evidence in the literature of the impact of IR—in particular its impact on income inequality and poverty. In an early contribution, Lerman and Lerman (1986) employ the technique of inequality decomposition by factor components on US data and conclude that imputed rents are more equally distributed than monetary income. Hence, the inclusion of IR in the concept of resources reduces aggregate inequality. International findings by Smeeding et al. (1993) show a leveling effect on inequality in Germany, Sweden, Canada and the Netherlands. Likewise, Meulemans and Cantillon (1993) report declining income inequality in Belgium. Yates (1994) finds slightly declining income inequality in Australia. Buckley and Gurenko (1997) study the income distribution of Soviet Russia and find that the progressive impact of housing income provided a cushion against the consequences of transition, where the ‘state’ walked away from collective housing and the tenants were left to govern (see also Bailey, Smeeding and Torrey, 1999). Eurostat (1998, 2005), demonstrates the poverty reducing effects of IR in a number of selected EU countries. Frick and Grabka (2003) show declining poverty and inequality in Germany, USA, and the UK. Gasparini and Escudero (2004) report that measured inequality in Argentina declined after the inclusion of imputed rents, due to an income elasticity of spending in housing less

² One should note that the incentive structure to take up such additional mortgages for consumption purposes differs considerably across countries, e.g. for tax reasons (see the case of The Netherlands).

than one. Again for Australia, Saunders and Siminski (2005) report that imputed rental income has an unambiguously equalizing effect on income distribution. Frick, Goebel and Grabka (2007) find poverty (and inequality) reductions for Finland, Denmark and France based on EU-SILC data for 2004. In a slightly different context, using administrative data, Onrubia, Rodado and Ayala (2009) conclude that the inclusion of imputed rents evaluated at market prices rather than cadastral values would result in an increase in gross income inequality among taxpayers in Spain. Finally, Garner and Short (2009) compare micro and macro estimates of imputed rents for the US economy using alternative valuation methods. Their results seem to be quite sensitive to the choice of the estimation method. Regarding the distributional effects of IR, they conclude that their inclusion in the concept of resources improves substantially the relative income position of elderly households but, unlike the results of earlier US studies, they report that the impact of IR on aggregate inequality is only marginal and, in many cases, inequality-increasing.

These studies use a variety of data sources and methods to evaluate IR, in many cases they do not include non-homeowners (rent-free or reduced rent tenants) among the potential IR beneficiaries and further, may use gross or net IR values in their analyses. These deviations leave open the question whether cross-country differences identified in them reflect true variations or whether they merely reflect the result of the different methodologies employed by the authors. Up to now, very few studies have explicitly considered the differences in results coming from *both* the choice of method *and* the empirical implementation of the various implicit assumptions extant in the literature. This consideration is the major hallmark of this paper and its contribution to the literature.

The paper covers five European countries that differ substantially regarding their levels of GDP per capita, housing market arrangements and welfare state regime (Belgium, Germany, Greece, Italy and the UK). In the national reports underlying this comparative paper, we find clear evidence that the substantive results for both inequality and poverty are sensitive to the choice of method and the definition of the potential beneficiary population. For the sake of cross-national comparability, which is at the very heart of this paper, we have harmonized the applied techniques and the definition of beneficiaries across countries to the largest extent possible, given restrictions in the five underlying national data sources. The next section describes principles of alternative methods to derive measures of imputed rent followed by a short overview of the techniques actually applied in the country data at hand.

3. Measuring non-cash income advantages from housing in micro data: Imputed Rent (IR)

The concept of imputed rent (IR) has been a part of economics for decades. Musgrave (1964) was one of its first proponents, writing from the tax point of view. Many others followed. Below we summarize the approaches taken in the literature.³

3.1 Principles of alternative approaches to measure imputed rent

When dealing with income advantages derived from housing, the EU Commission defines imputed rent as equivalent market rent that would be paid for a similar dwelling as that occupied, less any costs actually paid and subsidies received and excluding operational costs and charges.⁴ According to this definition, potential beneficiaries of imputed rent include owner-occupiers, rent-free tenants, and tenants with below-market rent, including those who live in public or social housing as well as those who have been granted a rent reduction by their respective landlord (e.g., by relatives or employers). The approaches discussed in the following section have been used to empirically capture imputed rent in various micro-datasets such as the first wave of EU-SILC (Frick et al., 2007), the German SOEP (Frick and Grabka, 2001), the United States PSID (Lillard, 2001), and the U.K. BHPS (Henley, 2000).

³ For an excellent formal treatment of the issues involved in calculating imputing rents of owner occupied dwellings see Diewert (2003).

⁴ The complete definition reads 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.”* (Regulation (EC) No 1980/2003 of 21 October 2003 implementing Regulation (EC) No 1177/2003 of the European Parliament and of the Council concerning Community statistics on income and living conditions (EU-SILC) as regards definitions and updated definitions).

3.1.1 The “rental equivalence method” or “opportunity cost” approach

The “rental equivalence” method focuses on the opportunity costs of housing in non-subsidized rental markets. It is often based on a hedonic regression approach (Rosen 1974), following in principle a two-step procedure (“regression rental equivalence”):

a) Run a regression model with rent (per housing unit or better, per square meter) as dependent variable based on the population of tenants in the private, non-subsidized market. Right hand side variables may include a wide range of ‘hedonic’ characteristics of the dwelling, occupancy, location, quality, and so on.

b) Apply the resulting coefficients to otherwise similar owner-occupiers in order to predict a fictitious market rent.

This straightforward procedure may be extended to tenants paying below-market rent as well. And the 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 (by adding an error term to the predicted imputed rental value, thus maintaining the proper variance of the final construct). A major advantage of this method is that it allows the definition and homogeneous implementation of a measure of imputed rent for all potential beneficiaries including tenants paying below-market or zero rent.⁵

An alternative way to derive the gross imputed rental value is to use a stratification of data on rent paid by “true” tenants, either within the same dataset or as given in external rental statistics (“stratified rental equivalence”). Stratification variables may include information on size of the housing unit or dwelling, year of construction, quality of the building, regional information and the like. Depending on the size of the underlying data and the distribution across the various stratification variables, all available households are assigned to one of the strata in which—as a consequence—identical rental data is found. As such, this approach might suffer from insufficient variation across individual households, depending on the size of the underlying sample and the independent variables available for the construction of relevant strata. This approach has, for example, been applied to the Finnish contribution to EU-SILC 2004, based on rent statistics from Statistics Finland, yielding a total of 128 strata (Frick, Goebel and Grabka, 2007).

⁵ See Juntto and Reijo (2010) for an application of this approach to selected countries in EU-SILC 2007.

After defining *gross* imputed rent, either by means of regression or stratification, all relevant costs need to be deducted in order to obtain the required *net* measure of IR. This includes specific costs such as operating and maintenance (excluding heating) for both tenants with below-market rent and owners. Above and beyond these, owner-specific costs also need to be considered: interest payments from the purchase of the home, property taxes, depreciation (i.e., consumption of fixed capital), etc. It is particularly the deduction of interest payments within this *net* calculation that reduces the income advantage derived from owner-occupied housing, e.g., while repayment of a mortgage (amortization) is usually defined as adding to savings, the payment of mortgage interest should be considered purely as consumption.⁶ Interest and mortgage payments are especially important over the course of an entire lifetime, because, with time, amortization represents a higher percentage of total repayments and as such, the level of actual ownership increases. As a result, longer term (older) homeowners tend to benefit more from the income advantages of owner-occupied housing, other things being equal (see e.g. Frick and Grabka, 2003), despite the fact that, naturally, imputed rent is not as liquid as cash income.⁷

3.1.2 The “user cost method” or “capital market” approach

The user cost approach has its starting point in the alternative or opportunity use of capital on the capital market. A household's decision to move into homeownership represents a trade-off by foregoing the opportunity to invest in financial assets that would create real income flows through interest or dividends. The user cost can be derived from optimizing models of consumer behavior with durable goods (Dougherty and Van Order, 1982). Taking a capital market approach, Saunders et al. (1992) described their empirical calculation of imputed interest from homeowner capital tied up in housing as follows: "Hence the implicit rate of return on housing equity will equal a safe private market rate of return [...] on an equal value of investment. The annual rate of return used in this case is

⁶ Following the terminology used in most similar empirical papers, we use the term “net imputed rent” throughout the paper. However, as one referee pointed out, the term “net imputed rental income” might be more accurate in the paper’s context.

⁷ It should be noted that if typical owner properties are better in unmeasured quality attributes than typical rented properties, hedonic rent estimates of the rents on the owned units are likely to be downward-biased. However, no systematic direct or indirect evidence of quality differences between rented and owned dwellings could be traced in the surveys used in the paper.

approximated by a two per cent real return (two per cent above the change in overall consumer prices for a country in the year studied). Inflation plus two per cent was thus multiplied by home equity to estimate imputed rent." (Saunders et al., 1992, p. 11).

In many micro data sets (e.g., the US PSID), the capital market approach is calculated based on the current market value of owner-occupied housing, V , as estimated by the homeowner, deducting any outstanding mortgages, M . Information on the market value of the home may also be obtained from external statistics: in the British Household Panel Study (BHPS), for example, regional and county-level housing prices are used to construct estimates of current home value (Henley, 2000). By combining this information with details provided by respondents on their home purchases and mortgages, a value for current outstanding mortgage debt and, therefore, net housing wealth or home equity can be generated. In any case, if the resulting value of net home equity, $V - M$, is positive, imputed rent is calculated on the basis of this value and a nominal interest rate, i ; otherwise, imputed rent is assigned a value of zero. This approach has the advantage of allowing for negative values of imputed rents in cases where housing prices fall after the collapse of a housing bubble (for the case of Britain in the early 1990s, see Gentle et al., 1994).⁸

A problem with the capital market approach as measured in various datasets (including the US PSID) is that it is based on the homeowner's own estimation of the current market value, which may be subjectively distorted due to the homeowner's personal affinity to his or her property. This is especially true for long-time homeowners, who may base their estimations on the original purchase price and not on the value that the property would actually have on the market today.⁹ In addition to this potential bias, the failure to consider depreciation as the building ages may be an additional inherent problem of this approach. Last but not least, it has been argued that the inter-temporal volatility of house values, especially in case of house price bubbles, may cause a problem in this context (Garner and Short, 2009; Garner and Verbrugge, 2009). Thus, while investments in owner-occupied housing may be seen as a hedge against fluctuations in housing costs, such investments may

⁸ Applying a nominal interest rate, i , to home equity, thus calculating IR as $i(V-M)$, may confound the effect of inflation on returns. Alternatively, one may apply the real interest rate, r , to the dwelling's current market value, V , and the nominal interest rate, i , to the outstanding mortgage. Thus $(rV) - (iM)$, by definition yields smaller estimates for IR (see Frick & Grabka, 2003 for an illustration using PSID data).

⁹ Kiel and Zabel (1999) report that self-reported estimates by homeowners in the US overestimate actual house prices by approximately 5 percent. While recent buyers report house values 8.4 percent higher than the stated sales prices, duration of occupancy significantly reduces owners' estimates.

bear some asset price risk themselves (Sinai and Souleles, 2005).¹⁰ Most important, this approach can be used only for owner-occupiers due to the general unavailability of prices for rental housing. Finally, a valid *net* measure of imputed rent would require deduction of all relevant owner-specific costs.¹¹

3.1.3 The “self-assessment” approach

This approach is based on rather simple questions addressed to either owners or tenants. Owner-occupiers, for example, are asked to provide a fictitious market rent – that is, to estimate how much they would pay if they were renting their home. Given the affinity of homeowners to their property (including the lot of land, the type of bathroom garments and the like), we cannot rule out a certain risk for homeowners to over-estimate the true rental value of their home compared to rented homes with similar characteristics. Similar in vein, one can assume the probability for item-non-response on such questions tends to be increasing with respect to years of occupancy suggesting the need for careful imputation of value when the individual is generally lacking in knowledge of the rental market (e.g., long time homeowners). In any case, a valid *net* measure of imputed rent for owners would require deduction of all relevant owner-specific costs (see above).

Subsidized tenants would be asked for an assessment of what their “normal rent” (market rent) would be if their rent payments were not subsidized. In this case, imputed rent could be derived on the basis of the difference between actual rent paid and self-assessed market rent. Such subjective data has been used in the EU-SILC data for Denmark in 2004 (Frick, Goebel and Grabka, 2007) and for Hungary, Spain, Romania, Czech Republic and Portugal in 2007 (Juntto and Reijo, 2010).¹²

¹⁰ One way to deal with such volatility in the empirical application could be the use of long moving average house prices instead of time-specific ones (Verbrugge, 2008).

¹¹ Using a micro simulation framework, Díaz and Luengo-Prado (2008) show that when imputed rent is not taxed and mortgage interest payments are tax deductible, the rental equivalence method is likely to produce higher estimates of IR than the user cost method.

¹² From a broader point of view and irrespective of the estimation method used, renters face rent risks while homeowners face house price risks. Housing costs are usually negatively correlated with unemployment and positively correlated with income. Therefore, in bad times the renters benefit since rents fall, while the homeowners lose because house prices fall and vice versa. Hence, rents can act as consumption stabilizers to renting households whereas imputed rents have a destabilizing effect over the business cycle for the homeowners. As a result, it may be argued that homeownership is

3.2 Implementation of Imputed Rent measures in the national datasets

Table 1 gives basic information on the data sources used for the countries considered in this paper together with the preferred as well as alternatively employed methods of defining a measure of *net* IR. In all five countries (Belgium, Germany, Greece, Italy, UK) we can put into practice the regression-based opportunity cost approach. This approach can be implemented using a (functionally equivalent or sufficiently comparable) set of standard variables available in the underlying population surveys; it also can easily be applied to tenants with below-market rent (including rent-free tenants) which is especially interesting for longitudinal research on income mobility in case of changing tenure status. A limitation of the implementation of this approach is given for countries with small private rental markets such as the UK, where a stratification-based equivalence approach can also be implemented. Due to the rather small population of private renters in Italy and the UK and the correspondingly small sample size, the Heckman selection correction was not applied for these two countries.¹³

4. Empirical results

We first report housing tenure in the five countries. In each case the sample is divided into persons living in owner-occupied accommodation (owner-occupiers) and persons living in various types of rented accommodation (Table 2). The cross-country variation is

associated with risk-taking and the true (risk-adjusted) gain to homeowners might be lower than that indicated by the estimated net imputed rent.

¹³ This section only provides a brief overview of the implementation carried out in the underlying surveys. It is obvious that the empirical implementation of any approach described above will have to accept potential caveats arising from data deficiencies and, following from this, interpretation of the substantive results will have to be appropriately cautious. At the same time, any differential treatment of any of those issues appears to be even more relevant in case of cross-nationally comparative analyses which are at the focus of the present paper (see also Appendix A1). The actual regressions used to make these imputations can be found in the papers cited in footnote 1. They are available at <http://www.iser.essex.ac.uk/research/euromod/research-and-policy-analysis-using-euromod/aim-ap/deliverables-publications>. Besides the five countries analysed here, Ireland and the Netherlands were also participating in the AIM-AP project. However, data restrictions forced the capital market approach as the only approach in these countries (Callan, 2007; de Vos, 2007). Unfortunately, this implied that there are no imputed rent estimates for (subsidized) tenants in these countries. Because this restriction clearly reduces cross-country comparability, we have not included them in the current analysis.

enormous. Rates of home ownership between 70% and 75% are observed in Greece, Belgium, Italy and the UK, whereas the corresponding percentage in Germany is below 48%.¹⁴ Apparently, in light of this variation in housing tenure any ignorance of imputed rents is likely to have consequences for measured cross-country inequality differences.

We further subdivide the population of owner occupiers and renters into finer groups. Owner occupiers are split between those with outright ownership and those with outstanding mortgages, while (depending on the information available in the national data set) renters are subdivided into private market non-subsidized renters, private market subsidized renters, renters subsidized due to living in social housing, renters subsidized by their landlords (employers, family, etc) and persons living in rent-free accommodation. Cross-country differences are, again, very substantial. 62.4% of the population in Greece are outright owners, while the corresponding proportion in Germany is only 23.2%. High rates of outright home ownership are also observed in Italy (55.7%). Regarding tenants, in four countries the majority live in private market housing (Germany, Greece, Belgium, Italy), while in the UK most of them live in social housing. Further, very considerable cross-country differences are observed with respect to rent-free housing, with the corresponding proportion being close to 12% in Italy, 5.5% in Greece but less than 3% in the rest of the countries under examination.

Next we report the shares of the population in each country enjoying a positive imputed rent according to the simulation procedures described above (Table 3). It should be reminded at this point that in this paper “imputed rent” denotes “*net* imputed rent” that is, imputed rent net of the costs associated with the ownership of the dwelling such as maintenance costs and mortgage interest payments. Therefore, net imputed rent may be non-positive. In such cases, imputed rent was set to zero. Close to 100% of outright owners enjoy positive imputed rents in Greece, Germany and the UK and between 90% and 95% in Belgium and Italy. However, in the case of households with outstanding mortgages, cross-country differences are quite substantial. Only around half such households seem to enjoy

¹⁴ The relatively low share of owner occupiers in Germany can be attributed, first, to the fact that in Germany homeowners tend to benefit less from subsidization programs compared to other European countries and, second, to the fact that German house prices remained rather stable over a long period thus investments in real estate rather than in the capital market was less lucrative (Voigtlander, 2009).

positive imputed rents in Germany, while in Belgium the figure is close to 73%.¹⁵ In Greece and the UK the figure is between 80% and 90% and in Italy the corresponding figure is over 95%. Combining the two groups, we conclude that in all countries the great majority of owner-occupiers enjoy positive imputed rents, although cross-country differences are not negligible. For example, in Germany over a quarter of owner-occupier households do not enjoy positive imputed rents, while in Greece and Italy this figure is below 5%.

The picture is even more complicated in the case of tenant households where differences among the remaining countries are very large, reflecting the balance between subsidized and non-subsidized renters reported in Table 2. In the UK and Italy between 50% and 60% of all tenant households seem to enjoy a positive imputed rent due to the above average share of tenants in social housing and rent-free accommodation, respectively, whereas in the remaining countries only between 17% and 22% do so.

All in all, at the national level in all countries except Germany the majority of the population lives in households enjoying the benefits of imputed rents. About 80 % of the population in Greece, Italy and the UK live in households enjoying positive imputed rents. The corresponding figure in Belgium is 63%, but only 45% benefit from IR in Germany. These differences seem to suggest that the inclusion of imputed rent in the concept of resources is likely to influence cross-country differences in measured levels of inequality.

We next shed some light on the location of the beneficiaries of imputed rents in the income distribution (Table 4). For the purpose of this table, the members of the population are ranked according to their equivalized disposable income¹⁶ from the poorest to the richest and split into five groups of equal size (quintiles). Once again, notable cross-country differences are evident. In Greece those enjoying imputed rents are distributed fairly evenly across income quintiles, while in the UK they are mildly disproportionately concentrated close to the bottom of the distribution, which seems to be primarily the result a of

¹⁵ The finding for Germany is somewhat surprising, given that the typical lending limit is set to 60% of the value of the property. Thus one would expect that the liability only slightly reduces the gross value of IR.

¹⁶ The income measure employed is annual post-tax, post-transfer monetary income from all sources received by all household members. The equivalence scales used are the “modified OECD equivalence scales” that are also used by Eurostat (Hagenaars et al, 1995). They assign weights of 1.00 to the household head, 0.50 to each of the remaining adults in the household and 0.30 to each child (person aged below 14) in the household.

pronounced incidence of tenants in social housing. In the remaining countries, those enjoying imputed rents are more likely to be found in quintiles close to the top than the bottom of the income distribution (especially the lowest one).

The proportional changes in income moving from the distribution of disposable monetary income to an augmented distribution containing both monetary income and imputed rent are shown in Table 5. Starting from the last line of the table, it can be noticed that imputed rents as a proportion of disposable income vary considerably across countries. Greece with the highest share of outright owner-occupiers also shows the highest returns from imputed rent with about 11% increase in income. Italy which is ranked fourth with respect to the share of owner occupiers (but second with respect to the share of outright homeowners), shows the second strongest increase with about 10,6%, the UK follows with an increase of about 8.7% and, finally, Germany with about 7,2% and Belgium with 6%. The somewhat small increase in Belgium might be the result of a relatively inexpensive housing stock compared to other Western European countries.¹⁷

The top panel of the table shows imputed rents as a proportion of the disposable income of income quintiles. In all countries this proportion declines as we move from the bottom to the top of the income distribution, reflecting the fact that a given amount of IR, other things being equal, is of decreasing relevance among (monetary) richer households. However, once again, cross-country differences are striking. In the UK with its large social housing sector the proportional increase in the income of the bottom quintile (23.9%) is almost four and a half times larger than that of the income of the top quintile (5.2%), whereas in Belgium the corresponding difference is small (8.7% vs 4.9%).

In the second panel, each country's population is grouped according to tenure status and the proportional increase in disposable income after the inclusion of imputed rents in the concept of resources is calculated. Naturally, in all countries the outright homeowners enjoy the largest increase in their incomes, followed by the homeowners with outstanding mortgages and the tenants (with the exceptions of the UK and Germany). In all countries but Italy the differences between the three groups are very considerable. The Italian finding is in particular motivated by two main characteristics of tenant households: while there is only a small proportion of non-subsidized renters, the share of rent-free tenants is by far the highest

¹⁷ For a comparison of residential square meter prices across Europe see: <http://www.globalpropertyguide.com/Europe/Belgium/square-meter-prices>.

among all countries considered (12%). While this induces a high share of beneficiaries of IR among all Italian tenants, rent-free tenants are also living on rather low cash incomes, yielding a high IR to income ratio.

In the last panel, the sample is split according to the age of the population member. In all countries, the incomes of the elderly (aged 65 and over) appear to rise the most due to the inclusion of imputed rents in the concept of resources, while the young (those aged below 25) gain the least. These results are considerably influenced by the age-profile underlying the repayment scheme of mortgages, as well as cross-country differences regarding the living arrangements of young adults.¹⁸ Once again, the differences in the proportional income increases between the three groups are not large in Italy and, to a lesser extent, Belgium but very substantial in the rest of the countries included in our analysis.¹⁹

Next, we analyze the relative income position (national mean equivalized income: 100) of population members grouped according to tenure status and age before and after the inclusion of imputed rents in the concept of resources (Table 6). In all countries, members of renting households enjoy the lowest average equivalized cash income and their relative position deteriorates even further after the inclusion of imputed rents in the concept of resources. This relative loss among tenants is smallest in Italy and the UK where we find the highest share of beneficiaries of IR due to living in rent-free and social housing, respectively. In all countries the group with the highest equivalized income is the group of homeowners with outstanding mortgages. However, across the board, their relative income position somewhat deteriorates when moving from the monetary to the augmented income distribution and, in fact, in Germany the outright owners appear to be in a better position than the mortgagors in the augmented income distribution.

The relative position of the elderly improves – sometimes quite substantially as in the case of the UK (plus 7%-points) and Germany (plus 5%-points) – and, in most countries the relative position of young persons declines marginally after the inclusion of imputed rents in the concept of resources. In all countries, the group of persons aged 25-64 is the one with the

¹⁸ In Southern Europe young adults tend to leave the parental home substantially later than in Northern European countries (Allen et al, 2004).

¹⁹ Additionally, differences in the age composition across countries might influence these results. As a country's population is ageing, the share of outright owners may increase yielding higher values of IR – however, at the same time, this process may reduce the demand for housing with a consequential reduction in price levels.

highest mean monetary income and they retain their relative position when we move to the augmented income distribution.

Next we assess the impact of imputed rents on the level and the structure of inequality in the five countries under consideration (Table 7). The top panel reports the proportional change in three widely used inequality indices after the inclusion of imputed rents in the concept of resources. The indices used are: The Gini index, the Mean Log Deviation (also known as the “second Theil index”) and the Half Squared Coefficient of variation. These indices satisfy the desirable properties for an inequality index (anonymity, mean independence, population independence and transfer sensitivity). Moreover, the Mean Log Deviation (MLD) is a strictly additively decomposable index of inequality; that is, when the population is partitioned in exhaustive and non-overlapping groups, aggregate inequality can be attributed to differences “within groups” and differences “between groups” (Cowell, 2000; Lambert, 2001).

There is a robust picture across all countries, namely that inequality declines after the inclusion of imputed rents in the concept of resources regardless of the measure of inequality employed. This result is in line with the results of the studies mentioned earlier in Section 2. The recorded declines are more pronounced in the cases of the Mean Log Deviation and the Half Squared Coefficient of Variation that are, respectively, relatively more sensitive to changes close to the bottom and the top of the income distribution, rather than the Gini index that is relatively more sensitive to changes close to the middle of the distribution. Cross-country differences are again substantial. According to the two most sensitive indices, after the inclusion of imputed rents, measured inequality declines by more than 10% in Greece and the UK, while in Belgium and Germany the reduction is never above 6.5%. This result should be attributed to the combined effect of the factors examined in Tables 2 to 6 (the share of imputed rent “beneficiaries” in the total population, their location in the income distribution, their relative income change, etc.).

The next two panels report the results of decomposition analysis when the population is partitioned according to tenure status of the household (second panel) and age of the population member (third panel). Despite the fact that the share of aggregate inequality due to differences “between tenure groups” varies very considerably across countries, in all countries it rises when we move from the distribution of monetary income to the “augmented income distribution”. Further, according to this partition of the population, in

all countries inequality appears to decline within tenure groups (outright homeowners, homeowners with outstanding mortgages, tenants) after the inclusion of imputed rents in the concept of resources. The decline is strongest among outright homeowners varying between 9% and 20% of the respective baseline inequality index.

A slightly different picture emerges in the last panel of the table, where the population is partitioned according the age of the population member. After the inclusion of imputed rents in the concept of resources, inequality declines within all age groups – most pronouncedly among the elderly. Because inequality between age groups declines quite substantially after the inclusion of imputed rents, the already small contribution of “between-age-groups” inequality to aggregate inequality declines even further in all countries (apart from Italy, where it rises marginally).

In general, there is clear empirical evidence that imputed rents change the national picture of level and structure of economic inequality in all five countries considered. Our findings reconfirm previous research (see Section 2) with respect to the improved position of the elderly, pointing to the importance of (outright) ownership as a means of old-age provision across countries. Given the evident cross-national variation in the degree to which these findings hold in the various countries, however, the question arises whether the inclusion of imputed rents in the concept of resources also changes substantially the relative ranking of the various countries under consideration with respect to their level of inequality. Table 8 provides an answer using the three inequality indices used in Table 7 (Gini, Mean Log Deviation and Half Squared Coefficient of Variation). The answer to the question is largely negative. Due to Lorenz curves’ intersections, the ranking of the countries according to these indices is not unanimous, apart from the lowest inequality rank occupied by Belgium. No clear ranking emerges regarding the rest of the countries. Nevertheless, when we move from the baseline distribution (distribution of monetary income) to the “augmented distribution” (distribution of monetary income and imputed rent), no re-ranking takes place when using the top-sensitive Half Squared Coefficient of Variation, while only one re-ranking is recorded in each of the Gini and the Mean Log Deviation, in both cases involving countries with relatively high levels of inequality (UK, Italy and Greece).

Finally, we consider the effect of IR on income poverty in Table 9. We apply the standard EU-definition of relative poverty using a threshold of 60% of the national median income – these thresholds are defined dynamically, thus being recalculated when adding

imputed rent to the underlying measure of resources (see also Zaidi et. al., 2006). In order to better control for inequality effects within the poor population we calculate the family of poverty measures described by Foster, Greer and Thorbecke (1984). By and large, poverty effects are in line with those shown for income inequality. For all countries considered here, the inclusion of IR reduces the value of the poverty rate (in Belgium by just more than 1%; Germany and Italy hold a middle position with 5% and in Greece and UK the reduction is as much as 14% and 17%, respectively). Again, in all countries the poverty reduction effect is more pronounced when using higher values for the poverty aversion parameter alpha: the respective reduction in FGT2 ranges from 6% (Belgium) to more than 30% in Greece and the UK. Results from poverty decomposition by tenure status reveal that IR reduces the risk of poverty among owners on average by 6% (UK) to 28% (Germany). Among those, outright owners clearly profit much more than those with outstanding mortgages. The latter, in the case of Germany, even show slightly increased poverty risks following from the recalculation of the underlying poverty threshold once adding IR. It is only in the UK where the inclusion of IR in the welfare measure also significantly reduces poverty among tenants, an effect mostly related to the high relevance of social housing.²⁰ In all other countries this effect is either near nil (Italy and Germany) or even strongly positive as in Belgium and Greece where poverty among tenants rises by 9% and 12%, respectively. Given the strong relationship of mortgage repayment status and the life course, decomposition by age re-confirms the relevance of homeownership as a means of old age provision.²¹ The value of the headcount ratio in all countries is reduced for the elderly (above 64 years of age); between almost 9% in Belgium and more than 50% in the UK. At the same time, the young are least advantaged in this respect and in Belgium and Germany even slightly more exposed to the risk of relative poverty once IR is considered in the augmented income measure. Again, by and large, all those results are more pronounced when using the FGT2 measure.

5. Conclusions

²⁰ See Paulus et al. (2010) for a detailed analysis of the distributional effects of public housing policies in the five countries considered in this paper.

²¹ Thus, investments in real estate for the purpose of saving housing costs in the long run may be seen as a hedge against poverty as well as against volatile returns on alternative financial investments which the elderly appear to be less capable to recuperate from.

The evidence presented above suggests that the inclusion of a consistently defined measure of imputed rent in the concept of resources used in distributional studies is both desirable and feasible. The informational requirements for the estimation of imputed rents are not extreme. However, it also seems most desirable to ensure strict cross-country comparability by using a common method of estimation across countries (something that is not always possible due to the lack of a sufficiently large rental market in a number of countries; see the Appendix). Nevertheless, even under these circumstances, the inclusion of imputed rent in the concept of resources is of paramount importance for sensible cross-country and cross-group comparisons of economic well being.

The empirical results suggest that the structure of housing tenure differs substantially across the five countries examined in the paper, with home ownership and, especially, outright home ownership being more prevalent in South European countries (Italy and Greece). After the inclusion of imputed rents in the concept of resources the relative income position of outright homeowners, persons living in rent-free accommodation and older persons improves substantially vis-à-vis the rest of the population, while measured inequality declines (sometimes substantially) irrespective of the index of inequality used. Nevertheless, the effect of the change in the concept of resources on the relative ranking of the countries regarding their levels of inequality is quite small.

This paper focuses primarily on methodological rather than policy issues. However, important policy implications can be derived from the paper's results. In all countries under consideration the mean equivalized income per capita of members of households headed by homeowners with outstanding mortgages are substantially higher than the mean income of the population. Therefore, policies using the tax system in order to provide benefits such as mortgage interest payment tax relief (especially uncapped schemes) to this population group are likely to be regressive and lead to increased levels of inequality²² (see, also, Matsaganis and Flevotomou, 2007). On the contrary, looking at housing policies targeted at low income renters, the economic position of those being subsidized via means-tested cash transfers will be captured accurately by a monetary measure, whereas the implicit income advantage of the in-kind subsidization via public housing tenants can only be adequately approximated

²² Information on the treatment of mortgage interest payments, housing costs and imputed rents in the tax systems of several European countries can be found in Onrubia et al. (2009) and <http://www.iser.essex.ac.uk/research/euromod/documentation/country-reports>

by using an imputed rent approach as employed in this paper. Again, a cross-country comparative evaluation of the inequality and poverty reducing effect of different housing policies requires a more complete measure of economic resources.

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Table 1. Data sources and methods used to derive Imputed Rent (IR) by country

	Belgium	Germany	Greece	Italy	UK
Opportunity cost approach (rental equivalence) - Regression (incl. Heckman selection model) - Stratification	1 (yes)	1 (yes)	1 (yes)	1 (no)	1 (no)
Capital Market approach (i =x%)		2 (2, 3, 4)			2
Self assessment approach	2	3	2	2	
Dataset (Year)	Statistics on Income and Living Conditions (SILC) 2004	Socio- Economic Panel (SOEP) 2002	Household Budget Survey (HBS) 2004/05	Statistics on Income and Living Conditions (SILC) 2004	Family Resources Survey (FRS) 2003/04
n (individuals) =	12,930	28,925	17,386	61,107	67,122
n (households) =	5,248	12,193	6,555	24,048	28,859
N (individuals in millions) =	10.4	81.6	10.9	57.6	58.5
N (households in millions) =	4.4	38.7	4.0	23.1	25.2

(1=preferred method) (2=alternative method) (3=second alternative method).

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 2. Housing tenure in five European countries

Tenure status	Belgium	Germany	Greece	Italy	UK
Owner occupiers	72.3	47.4	75.2	69.9	72.5
thereof					
(a) outright owners	33.9	23.2	62.4	55.7	25.4
(b) with outstanding mortgage	38.4	24.2	12.7	14.2	47.1
Tenants	27.7	52.6	24.8	30.1	27.5
thereof					
(a) in private market (non-subsidized)	21.6	38.7	18.9	12.7	6.0
(b) rent-subsidized by direct public transfers in cash		3.9	0.3		1.9
(c) rent-subsidized due to living in social housing	4.5	4.0		5.5	17.8
(d) rent-subsidized by landlord (eg. family, employer)		3.4	0.1		0.7
(e) rent-free	1.6	2.7	5.5	11.9	1.1

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 3. Housing tenure and Income advantages from IR by tenure status in five European countries:
% Share of beneficiaries (i.e., IR > 0) using regression based opportunity cost approach

Tenure status	Belgium	Germany	Greece	Italy	UK
Owner occupiers	81.2	74.7	98.0	95.8	87.6
thereof					
(a) outright owners	90.9	99.9	100.0	94.7	99.9
(b) with outstanding mortgage	72.7	50.5	87.0	99.8	81.0
Tenants	16.8	19.1	22.0	54.3	59.3
thereof					
(a) in private market (non-subsidized)	0.0	0.0	0.0	0.0	1.2
(b) rent-subsidized by direct public transfers in cash		0.0	0.0		0.0
(c) rent-subsidized due to living in social housing	68.2	100.0		80.0	82.5
(d) rent-subsidized by landlord (eg. family, employer)		99.6	0.0		60.3
(e) rent-free	100.0	100.0	100.0	100.0	100.0
All	63.4	45.4	79.0	83.3	79.9

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 4. Income advantages from IR by income quintile in five European countries:
% Share of beneficiaries (i.e., IR > 0) using regression based opportunity cost approach

Income Quintile	Belgium	Germany	Greece	Italy	UK
bottom quintile	49.1	40.8	80.0	74.6	85.5
2	64.7	42.2	74.1	82.0	80.3
3	64.4	46.7	78.8	84.2	81.0
4	69.2	47.3	81.1	86.7	78.5
top quintile	69.4	50.3	81.7	88.8	74.1
All	63.4	45.4	79.0	83.3	79.9

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 5. Income effects from IR by income quintile, tenure status and age of population member in five European countries:
% Change in Equivalent Post Gov't Income due to IR using regression based opportunity cost approach

	Belgium	Germany	Greece	Italy	UK
Income Quintile					
bottom quintile	8.7	13.9	24.6	18.7	23.9
2 nd	7.5	8.2	14.7	13.3	12.1
3 rd	6.2	7.7	12.1	11.6	9.5
4 th	5.5	6.5	9.8	10.7	7.4
top quintile	4.9	5.5	7.5	7.7	5.2
Tenure status					
Owner occupiers, all	7.2	9.8	13.2	11.0	9.4
(a) outright owners	9.3	16.1	14.5	11.3	17.8
(b) with outstanding mortgage	5.6	4.0	7.6	9.8	5.6
Tenants, all	2.2	4.1	3.7	9.4	5.9
Age					
< 25 years	5.3	5.7	9.6	10.3	6.6
25 - 64 years	5.8	6.1	9.9	10.3	7.7
> 64 years	8.2	13.6	16.6	11.8	18.6
All	6.0	7.2	11.0	10.6	8.7

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 6. The impact of IR on relative income position by housing tenure status and age in five European countries

Relative Income Position	Belgium		Germany		Greece		Italy		UK	
	A	B	A	B	A	B	A	B	A	B
Tenure status										
Owner occupiers, all	106	107	115	117	102	104	107	107	109	110
(a) outright owners	98	101	112	121	99	102	105	105	98	106
(b) with outstanding mortgage	113	113	117	114	116	113	117	116	115	112
Tenants, all	84	81	87	84	94	88	84	83	75	73
Age of population member										
< 25 years	94	94	88	87	94	93	89	89	90	88
25 - 64 years	108	108	109	108	110	109	106	106	112	111
> 64 years	83	84	89	94	83	87	96	97	79	86
All	100	100	100	100	100	100	100	100	100	100

A: Baseline distribution (disposable income)

B: Baseline distribution + Imputed Rents

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 7. The impact of IR on income inequality by housing tenure status and age in five European countries

	Belgium		Germany		Greece		Italy		UK	
	A	B	A	B	A	B	A	B	A	B
Inequality										
Half Squared Coff. Variation (HSCV)	.145	-3.3	.269	-6.2	.225	-10.3	.293	-10.0	.366	-11.3
Gini Coefficient	.265	-1.3	.295	-1.9	.326	-5.0	.325	-2.6	.328	-5.8
Mean Log Deviation (MLD)	.134	-5.7	.160	-6.5	.182	-13.5	.193	-7.1	.186	-12.0
Inequality Decomposition (MLD)										
Tenure status										
Owner occupiers, all	.116	-10.4	.153	-12.7	.184	-17.9	.179	-8.3	.186	-14.7
(a) outright owners	.134	-15.0	.184	-19.3	.193	-18.1	.183	-9.0	.207	-20.0
(b) with outstanding mortgage	.095	-3.1	.123	-3.4	.127	-9.1	.159	-4.6	.170	-9.3
Tenants, all	.161	-2.7	.147	-6.8	.176	-4.0	.205	-6.7	.138	-11.8
Contribution to aggregate inequality										
% within-groups	94.3	92.8	90.1	87.0	98.9	97.7	96.4	95.2	87.1	86.0
% between-groups	5.7	7.2	9.9	13.0	1.1	2.3	3.6	4.8	12.9	14.0
Age of population member										
< 25 years	.127	-2.3	.162	-5.7	.172	-8.7	.216	-7.8	.162	-10.5
25 - 64 years	.135	-5.3	.157	-5.0	.177	-11.4	.196	-6.8	.200	-10.4
> 64 years	.108	-13.2	.132	-11.4	.178	-20.4	.140	-7.7	.126	-16.9
Contribution to aggregate inequality										
% within-groups	96.2	96.4	96.7	97.1	96.4	97.0	98.6	98.5	94.9	95.8
% between-groups	3.8	3.6	3.3	2.9	3.6	3.0	1.4	1.5	5.1	4.2

A: Results for baseline distribution (disposable income)

B: Proportional change due to adding Imputed Rents to the concept of resources.

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 8. Inequality Rankings according to Gini, MLD and Half SCV

	Gini		MLD		Half SCV	
	Baseline	Baseline + IR	Baseline	Baseline + IR	Baseline	Baseline + IR
Belgium	0.265	0.262	0.134	0.126	0.145	0.140
Germany	0.295	0.289	0.160	0.149	0.269	0.252
Greece	0.326	0.310	0.182	0.161	0.225	0.202
Italy	0.325	0.317	0.193	0.179	0.293	0.264
UK	0.328	0.309	0.200	0.164	0.366	0.325

	Gini		MLD		Half SCV	
	Baseline	Baseline + IR	Baseline	Baseline + IR	Baseline	Baseline + IR
Belgium	1	1	1	1	1	1
Germany	2	2	2	2	3	3
Greece	4	4	3	3	2	2
Italy	3	5	4	5	4	4
UK	5	3	5	4	5	5

1, .., 5 = lowest to highest level of inequality

shaded areas indicate rank changes

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Table 9. The impact of IR on income relative poverty indices by housing tenure status and age in five European countries

Poverty	Belgium		Germany		Greece		Italy		UK	
	A	B	A	B	A	B	A	B	A	B
FGT0 (poverty rate)	15.4	-1.1	15.1	-4.9	19.7	-14.0	18.6	-4.5	17.4	-16.7
Tenure status										
Owner occupiers, all	11.0	-10.7	8.2	-28.0	19.3	-23.8	14.5	-7.8	14.1	-6.3
(a) outright owners	14.7	-14.5	11.7	-41.2	21.6	-22.4	16.1	-7.9	21.8	-7.9
(b) with outstanding mortgage	7.7	-4.0	4.8	3.0	8.3	-9.1	8.2	-6.5	9.9	-2.8
Tenants, all	27.0	9.2	21.4	3.1	20.9	12.4	28.2	-0.5	26.2	-9.9
Age of population member										
< 25 years	18.1	0.8	20.5	1.1	21.0	-4.0	25.1	-1.5	19.6	-0.9
25 - 64 years	12.5	1.1	12.1	-2.5	14.9	-8.5	16.7	-3.7	14.3	-11.1
> 64 years	20.2	-8.5	16.8	-21.1	30.4	-23.4	16.1	-12.8	23.8	-54.7
FGT2	1.9	-6.4	2.1	-14.8	2.3	-31.7	2.7	-11.8	2.2	-32.9
Tenure status										
Owner occupiers, all	1.3	-18.7	1.3	-37.8	2.3	-46.5	1.8	-16.5	2.1	-22.5
(a) outright owners	1.8	-26.0	1.8	-55.0	2.6	-46.3	2.0	-17.6	2.3	-11.9
(b) with outstanding mortgage	1.0	-6.2	0.8	-1.9	0.8	-10.2	0.9	-7.3	2.0	-8.8
Tenants, all	3.4	6.1	2.8	-5.0	2.2	11.8	4.8	-7.7	2.2	-7.3
Age of population member										
< 25 years	2.4	1.7	3.4	-7.4	2.6	-13.1	4.2	-10.1	2.0	-20.8
25 - 64 years	1.7	-7.2	1.6	-12.1	1.7	-27.9	2.6	-12.1	2.5	-33.2
> 64 years	1.8	-21.4	1.7	-44.6	3.2	-50.1	1.1	-18.2	1.2	-72.9

A: Results for baseline distribution (disposable income)

B: Proportional change due to adding Imputed Rents to the concept of resources.

Source: EU-SILC 2004 for Belgium and Italy, SOEP 2002 for Germany, HBS 2004/05 for Greece, FRS 2003/04 for UK.

Appendix 1. A comparison of the distributional effects of imputed rent estimates derived using alternative approaches

The upper panel of Table A1 gives basic results (inequality, share of beneficiaries, imputed rent as a percent of income) obtained using a regression-based opportunity cost approach in each of the five countries. The lower panel shows results obtained using the very same approach conditional on owner-occupiers as potential beneficiaries only. For this restricted population, basic results are also provided using alternative techniques (capital market, self-assessment). The most remarkable difference results from the change in the definition of potential beneficiaries, thus the consideration of imputed rent for tenants with below-market rent (including those with zero rent). The inequality reduction effect of imputed rent is significantly larger if one considers both tenants and owner-occupiers rather than owner-occupiers alone, thus confirming that a well-balanced approach should include imputed rent for *all* potential beneficiaries. Secondly, there is evidence for some conflicting results across the various methods e.g., in Belgium a much higher income share is reported using the self-assessment approach.

Excluding tenants from the population of beneficiaries, however still applying the very same (opportunity cost) approach for constructing IR, clearly lowers the poverty reduction effect shown in the top of the table. In Belgium, Germany and Italy the overall poverty reduction is even completely effaced due to the implicit increase in poverty among tenants (not shown separately in Table A1). Applying the capital market approach (only applicable for Germany) using an implicit interest rate of 3% exerts an even stronger increase in inequality and poverty risk rate than is found in the opportunity cost approach. Similarly for all applicable countries, the self-assessment approach yields smallish increases in poverty rate in Belgium, Germany and Italy, whereas the poverty reduction effect in Greece is also the smallest compared to the other approaches.

Table A1: Imputed Rent by different approaches and for varying populations

	Belgium	Germany	Greece	Italy	UK
	Population: ALL potential beneficiaries				
Opportunity cost approach ¹⁾					
○ Population share of benef. (%)	63.4	45.4	81.0	83.3	79.9
○ IR as a % of income	6.0	7.2	11.0	10.6	9.3
○ % Change in Gini	-1.3	-1.9	-5.7	-2.6	-5.8
○ % Change in Poverty rate	-1.1	-4.9	-14.0	-4.5	-16.7
	Population: only homeowners as potential beneficiaries				
Opportunity cost approach ¹⁾					
○ Population share of benef. (%)	58.7	35.4	75.3	66.9	63.6
○ IR as a % of income	5.5	5.3	10.1	8.2	8.0
○ % Change in Gini	-0.6	0.4	-5.0	-0.6	-3.6
○ % Change in Poverty rate	0.6	0.1	-11.9	-0.1	-6.3
Capital Market approach ²⁾					
○ Population share of benef. (%)	n.a.	38.0	n.a.	n.a.	n.a.
○ IR as a % of income	n.a.	4.8	n.a.	n.a.	n.a.
○ % Change in Gini	n.a.	1.2	n.a.	n.a.	n.a.
○ % Change in Poverty rate	n.a.	1.9	n.a.	n.a.	n.a.
Self assessment approach					
○ Population share of benef. (%)	67.3	37.5	75.3	68.7	n.a.
○ IR as a % of income	12.8	6.5	10.2	13.3	n.a.
○ % Change in Gini	-2.4	0.2	-4.2	-1.1	n.a.
○ % Change in Poverty rate	0.4	2.3	-9.1	0.9	n.a.

1) Regression-based rental equivalence. 2) using an interest rate of $i=3\%$

Source: EU-SILC 2004, SOEP 2002, HBS 2004/05, FRS 2003/04.