LIS
Working Paper Series

No. 857

The Impact of Imputed Rent on Old-Aged Poverty: The Evidence for the Luxembourg Income Study

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April 2023

Luxembourg Income Study (LIS), asbl

The impact of imputed rent on old-age poverty: the evidence from the Luxembourg Income Study

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Abstract

Our study contributes to the discussion on the impact of imputed rent on poverty. In this paper, we address the issue of the relevance of imputed rent specifically in regard to the welfare of older people. Our aim is to assess how imputed rental income relates to monetary income for both homeowners and subsidized tenants, to draw more comprehensive picture of poverty among retirees, who are considered to be an economically vulnerable group. We employ the Luxembourg Income Study database (wave X) to compare the situation of elderly households in seventeen countries in this respect. The results obtained demonstrate that although imputed rental income is quite universal among the older population, there is a lot of a cross-country variation in this respect, which partly can be attributed to the methodological constraints. Nonetheless, we can conclude that imputed rental income contributes to poverty reduction. This also entails some policy implications in the long run, especially in the face of housing market shifts, rising wealth inequalities and the expected reduction in the generosity of public pensions.

Keywords: imputed rent, housing, poverty, elderly households

Introduction

Ageing populations, retiring baby boomers and a shrinking labour force have affected whole economies, including labour markets and pension systems. Although benefits paid from public funds remain relatively adequate in income terms and still reflect the idea of a generous welfare state towards the elderly, forecasts do not raise any doubts that replacement rates will decline. This is necessary to keep pension systems sustainable as well as developed economies competitive and still able to generate growth. Pension reforms undertaken by many developed countries aim to relieve the public sector form its obligations towards older people and to promote private pensions and individual providence to ensure adequate income replacement in the retirement period. Government actions undertaken to stimulate homeownership, although not directly related to private pensions, support the idea of the retrenchment of the public welfare state towards older people as they reduce the cost of living through the elimination of expenditures on renting a residential property. The idea of the nexus between homeownership and the welfare state is not new. Over 40 years ago, Kemeny (1980, 1981) formulated the thesis about the substitution of homeownership and public pension system generosity at a macro level. He also delivered some empirical evidence that homeownership rates are higher in countries with reduced welfare systems. Castles (1998) positively verified Kemeny's view in regard to public pension provisions paid for the elderly naming this phenomenon 'The Really Big Trade-Off'. Later, many authors addressed the issue of homeownership-pension generosity substitution in their research (Bengtsson 2001; Fahey and Norris 2011; Hoekstra 2003; Malpass 2003; Torgersen 1987; Tranøy et al. 2020). With reference to the microscale, Sherraden (1991) proposed the theoretical concept of 'Asset-Based Welfare' (ABW) emphasizing an important role of wealth accumulation over the life cycle. As his theory did not address the main role of housing in a household's asset portfolio,

Prabhakar (2019) developed the concept of Housing Asset-Based Welfare (HABW), in which housing itself can serve as a pension. As last few decades have shown decreasing public pension system adequacy and increasing homeownership rates across developed countries, the above-mentioned concepts are gaining popularity and are very relevant today.

An residential property that is owned can act in two ways as an additional source of income. First, it can be treated as an investment with a potential return as the real estate market grows. To realize this return, the house must be sold. However, on the other hand, such an asset can generate a permanent income without equity release, which is an income in kind. Namely, homeownership allows one to not pay the cost of renting a home. This 'saving' associated with a hypothetical income stream is termed imputed rent. This applies also to a specific type of non-homeowners, i.e. tenants who occupy their homes rent-free, or pay rent below market price (e.g. as a result of state subsidy). Thus, imputed rent can be defined as a 'value representing the benefit accruing to the household due to not paying full rent' (Törmälehto and Sauli 2013).

An important problem addressed in the literature is that a great majority of empirical research on poverty, income inequality or living standard refers only to monetary aggregates like disposable income and neglect non-monetary incomes or benefits, an example of which is imputed rent. This calls into question the validity of such comparisons conducted across countries, over time or across generations (age groups). Two households with similar monetary income but different housing status are in different economic situations. Thus, this omission distorts the picture to some extent.

Our study contributes to the discussion on the impact of imputed rent on poverty. In this paper, we address the issue of the relevance of imputed rent specifically in regard to the welfare of older people. Our aim is to assess how imputed rental income relates to monetary income for both homeowners and subsidized tenants, to draw a more comprehensive picture of poverty among retirees, who are considered an economically vulnerable group. We employ the Luxembourg Income Study database (wave X) to compare the situation of the households of older people in seventeen countries in this respect.

The paper is organized as follows. In the next section, it discusses the relevant prior literature dedicated to the topic of imputed rent. Next, it elaborates on the data used in our empirical study and methodological issues associated with imputed rent measurement. In the subsequent section it presents the empirical results. The paper ends with synthetic conclusions.

Literature review

Imputed rent is addressed in the literature in three main contexts: methodological aspects of the imputed rent estimation, taxation of imputed rent, and the impact of imputed rent on poverty reduction and welfare inequality. There is general agreement among scholars that any studies on income inequality or living standards making use only of a monetary disposable income suffer from a very serious methodological limitation, as people may receive other non-monetary or in-kind incomes that substantially improve their material situation. That is why non-monetary incomes are necessary to ensure appropriate validity for such research (Balcázar et al. 2017; Kravis 1962; Smeeding and Weinberg 2001). Imputed rent is one kind of such income (Frick et al. 2010; Lerman and Lerman 1986; Onrubia et al. 2009). However, there are some controversies of whether imputed rent as an in-kind income should not be taxed similarly to other monetary incomes. Obviously, imputed rent is only one example among other non-monetary incomes; nevertheless, the tax debate has focused especially on non-monetary real estate income of those living in their own homes (Bourassa and Hendershott 1994; Cho and Francis 2011; Figari et al. 2017; Haffner 2002; Onrubia et al. 2009). However, from the

perspective of this paper, the most important literature vein is the one addressing the relationship between imputed rent and poverty reduction, as well as income inequality. The benefit received from the ownership of a home is relevant and constitutes between 14% and 25% of the total adjusted household income in developing and developed countries (Balcázar et al. 2017). Simultaneously, housing tenure distributions vary substantially across countries, which naturally affects the distribution of imputed rent at the macro level. According to OECD data, while in 2020 outright owners constituted 95% of the population in Romania, in Switzerland it was only 4.5%. The proportion between private (at market rate) and subsidized renters varied as well. In Switzerland, this was 55.5% to 5.7%, while in the United Kingdom 11.1% to 20.0%. The ratio of owners with mortgages in Romania was 0.9% and in Norway 50.8%. These statistics show that any cross-country comparisons of poverty or income inequality disregarding imputed rent as an important non-monetary income are clearly not fully comprehensive.

On theoretical grounds, the mechanism how imputed rent affects income distribution is as follows. Assume that in a base scenario imputed rent is not included in the welfare of households. Then, if a rent is of a fixed amount and is added to the welfare of each household, the distribution of welfare will shift to the right and inequality will decline. In a scenario in which the rent is a fixed proportion of the individual base welfare, the distribution will move to the right, but the inequality will not change. Another scenario assumes that imputed rent is a proportion, different for each household, of its base welfare. Then the distribution will shift to the right as in previous scenarios; however, the effect on inequality is unpredictable a priori as it is unknown for which income deciles this proportion is greater and for which it is lower (Ceriani et al. 2019). The estimates of this impact differ. In regard to inequality, several studies have demonstrated that imputed rent included in the welfare aggregate used to measure the living standard reduces income inequality (Buckley and Gurenko 1997; Frick et al. 2010; Frick and Grabka 2003; Gasparini and Escudero 2003; Guénard and Mesplé-Somps 2010; Yates 1994), but to a differing extent. The impact of the inclusion of imputed rent in the welfare aggregate for poverty assessment is obvious in the case of the absolute poverty line. Then, poverty is expected to decline. However, when the poverty line is changed due to imputed rent inclusion, which is justified by the change in the welfare distribution, the effect is unpredictable (Ceriani et al. 2019). Similarly to inequality, many studies deliver empirical arguments supporting the thesis that imputed rent as a component of household welfare reduces poverty (Frick et al. 2010; Frick and Grabka 2003; Guénard and Mesplé-Somps 2010). As Ceriani et al. (2019) argue, empirical evidence demonstrates that the distributional effect of the imputed income of homeowners or subsidized tenants is 'context and method specific'. Nevertheless, Balcázar et al. (2017), on the basis of their review of empirical studies on the topic, summarize that the impact of imputed rent included in the welfare aggregate is difficult to predict on theoretical grounds; however, the literature seems to deliver conclusive results confirming a reduction effect on both poverty and inequality.

As widely recognized, homeownership rates increase with age and disposable income (Andrews and Caldera Sánchez 2011; OECD 2013). This is in line with the life cycle hypothesis (Ando and Modigliani 1963; Modigliani and Brumberg 1954), as empirical data show the linkage between homeownership status and the stage in the life cycle (Artle and Varaiya 1978; Törmälehto and Sauli 2013). An agent needs to accumulate savings for the down payment toward the purchase of a home. Simultaneously, preferences change with age. That is why young people rent houses and adults at their prime working age, when their income reaches its maximum, decide to buy a house becoming first, owners with mortgage and, then, outright owners. This explains why older people own their homes outright more frequently than other age groups. As a consequence, older people are the main beneficiaries of non-monetary income resulting from owning a home, i.e. imputed rent (Frick et al. 2010). Frick and Grabka (2003) for the United Kingdom, West Germany and the United States, and Törmälehto and Sauli (2013) for EU countries show a reduction effect of imputed rent on poverty among older people. Törmälehto

and Sauli (2013) additionally compare the welfare distributions by age with and without an imputed rent and demonstrate that older people, especially those aged 70 and above, exit poverty when imputed rent is included in their income. Those aged 40 and under are the ones who enter poverty then. Munnel and Soto (2005) argue that imputed rent should be included in the calculation of the replacement rate both in the nominator and in the denominator as it constitutes a non-monetary income not only after retirement but also before. They show that for the United States, the incorporation of imputed rent increases the replacement rate from 55.2% to 63.1% for couples and from 59.1% to 70.0% for singles including the rent in both, the numerator and denominator. Similarly for Canada, the main beneficiaries of implicit income from owner-occupied houses are older people. In their case, imputed rent increases income by 13% in average terms (Brown and Lafrance 2010).

To summarize the empirical research review, studies support the view based on theoretical grounds that homeownership provides an additional source of implicit income that increases the replacement rate in old age and decreases the risk of poverty. This supports such concepts as 'asset-based welfare' proposed by Sherraden (1991), developed later by Prabhakar (2019) as 'housing asset-based welfare'. In line with them, residential property as a source of income in kind and in cash in old age has the potential to supplement public transfers and reduce demand for generous old-age pension benefits. The views and results of empirical research referring to the microscale translate into the macroscale as well, as the possible consequence of increasing homeownership rates in developed countries can be a further reduction in the generosity of the welfare state towards the elderly, which finds support in Kemeny's thesis (Kemeny 1980, 1981) and 'The Really Big Trade-off' hypothesis (Castles 1998) that homeownership rates are negatively correlated with public pension systems generosity.

Data and methods

The aim the empirical study is to explore, in a cross-country perspective, the contribution of imputed rent to the elderly welfare. It draws from the Luxembourg Income Study database (LIS 2022), which comprises harmonized microdata on household and personal labour income, pension benefits, other public social benefits, private transfers, consumption expenditure, as well as socio-demographic characteristics and labour market activity. This study employs the X wave data that covers the years 2016-2017. Our analyses comprise datasets for 17 developed countries, which have been selected based on the availability of the information on imputed rent, i.e. Australia, Austria, Belgium, Czechia, Denmark, Estonia, Finland, Germany, Greece, Ireland, Italy, the Netherlands, Slovakia, Slovenia, Spain, Switzerland, and the United States. The detailed information on particular datasets used in this study is presented in Table A1 in the Appendix.

Our study employs household-level statistical information. All the analyses are conducted using weighted data. Normalised household weights delivered by data producers are applied. They ensure the representativeness of country samples, and additionally equalize sample sizes to 10,000 households. This matters especially in analyses where a joint sample is used, because it prevents the overrepresentation of households from countries for which the samples are considerably larger.

Our empirical investigation concerns exclusively older households. For the purpose of this study, we identify these as households in which all members are aged 65 or above. This way the analysis refers solely to individuals at an age equal to or over the statutory pensionable age in most of the countries under study (Eurostat 2020a), and excludes e.g. multigenerational families, where the older generation shares the same principal residence with the younger one.

The key variable under investigation in our study is imputed rent. According to Luxembourg Income Study methodology, it embraces 'full imputed rent at market value for respondents who are owners

or rent-free tenants, and the amount of market rent paid by an outside source for respondents with subsidized housing.' In the original LIS dataset, it is expressed in monetary value and given in national currency. In line with the previous literature, three main types of methods of imputed rent estimation can be distinguished: 1) the 'rental equivalence method' (or 'opportunity cost' approach), 2) the 'user cost method' (or 'capital market' approach), the 'self-assessment' approach (see e.g. Frick et al. 2014; Törmälehto and Sauli 2013). The first method aims to find the market rent value for an equivalent dwelling with similar characteristics. To calculate the equivalence rent, various stratification or regression methods usually can be used. The 'user cost method' is based on the concept of the investment of financial assets on the capital market as an alternative to moving into homeownership. The imputed rent estimates are related to hypothetical interest and dividends earned. The third method of imputed rent estimation, i.e. the 'self-assessment' method, is the most subjective one. Households are simply asked about their assessment of the amount of rent they would pay if the dwelling they occupy was rented at market price. According to Eurostat and OECD guidelines, the method of first choice, as the most reliable, should be the rental equivalence method, whereby the estimates are obtained with the use of a stratification procedure(Eurostat 2012). In contrast, Balcázar et al. (2017) value regression above stratification and state that 'using stratification is at best a shot in the dark because there is no theoretical prior that can tell which variables should make up the strata'. They also identify advantages and disadvantages of particular estimation methods (hedonic and non-hedonic) to conclude that application of these is conditioned by specific market circumstances and data quality. For instance, the application of the 'opportunity cost' approach requires the existence of well-developed rental sector which provides market information of sufficient quality and reliability. If this condition is not met, then the second-choice method is the 'user cost' method (Eurostat 2012). Nonetheless, due to differences in housing market arrangements, in cross-country studies with broad coverage, the requirement of a unified methodology that ensures comparable, reliable and robust results is unlikely to be met. An attempt to apply such a unified method was made in a very recent study by List (2022). It employs Household Finance and Consumption Survey (HFCS) microdata for 20 European countries to estimate imputed rents using the 'capital market' approach, which is less sensitive to the rental market structure, and therefore, seems to be better suited for cross-country studies that require comparability. However, such consistent methodology does not guarantee robust, unbiased results, as it is based on the subjective assessment of the real estate value, and thus, highly susceptible to a household's misjudgement in this respect. Moreover, housing price volatility, which is country-specific, also affects the results.

In this study, we employ the estimates of imputed rent delivered by country data producers. However, as elaborated above, this also constitutes the main methodological constraint of this comparative study, which is that for particular countries imputed rent is estimated independently, i.e. without a common methodological framework. As reported in the Appendix, for the great majority of countries, rent estimates are calculated using the 'rent equivalence method', albeit with various specific solutions regarding stratification and regression techniques. For Czechia, Estonia, and Slovakia the 'user cost' method is applied, whereas for Italy imputed rental values are obtained using the self-assessment method. This naturally entails some comparability problems. Thus, some caution is required in regard to the country comparisons made.

Results

Imputed rent is relevant to homeowners who occupy their dwellings, but also to tenants who enjoy rent-free housing or pay rent at reduced price. It does not apply to renters at a market price. Figure 1 reports the share of eligible elderly households that are potential beneficiaries of imputed rent. Older people are typically more often homeowners than the working-age population, and as shown in this study, the share of older owner-occupiers in most of the countries under investigation exceeds 70%. For five countries where housing systems are commonly recognized as more 'rental', i.e. Germany,

Austria, Switzerland, the Netherlands and Denmark, it ranges between approximately 30 and 50%. A separate group eligible for imputed rent are 'other non-homeowners' which include rent-free tenants or those paying reduced rent. The share of households belonging to this category varies substantially between countries. It is the greatest (over 25%) for Denmark, Austria, and Finland, and the lowest (i.e. below 10%) for Slovakia, Spain, Greece, Ireland and the United States. For the Netherlands, this share equals 0. The differences between countries with this respect naturally results from various housing arrangements that determine the size of subsidized rental sector, but to some extent they may be also biased by different approaches to tenure status operationalisation. As indicated by Juntto and Reijo (2010), a possible measurement error is associated with the adopted definition of tenure status, especially in regard to the distinction of borderline cases between owners and tenants, and subsidized tenants in the rental sector.

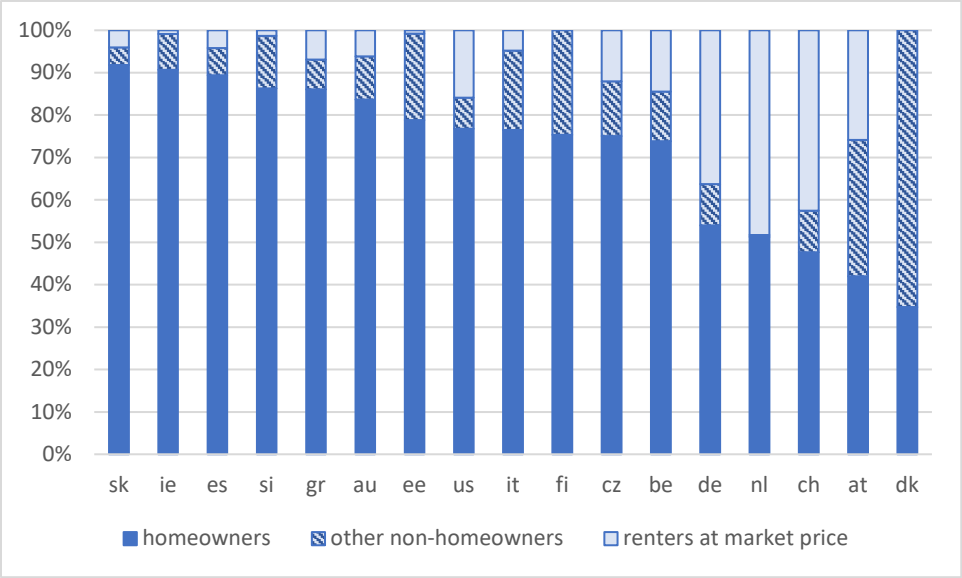


Figure 1. Structure of elderly households in terms of tenure status.

Source: Authors' own calculations based on LIS weighted data

As shown above, it is justified to state that the great majority of older households enjoy additional income in the form of imputed rent. Thus, what matters more for the assessment of its impact on poverty, and their financial situation in general, is the value of imputed rent. Table 1 reports the average values of this kind of non-cash income calculated for particular countries. It presents mean and median imputed rent calculated separately for older homeowners and other non-homeowners, i.e. tenants with subsidized or free rent. Additionally, in the column *Total* the average levels are displayed for all the tenures, including renters at market price whose imputed rent equals 0. Thus, such statistics reflect a conceptually different measure than those in conjunction with particular tenure type. Namely, they also account for the size of the unsubsidized private rental sector – a greater share of renters at market price diminishes the average imputed rent at the country level. Imputed rent is reported in both, absolute (in PPPs) and relative terms. The latter presents the amount of imputed rent as a share of the median income in the whole population (net of imputed rent).

Table 1. Imputed rent country statistics for elderly households

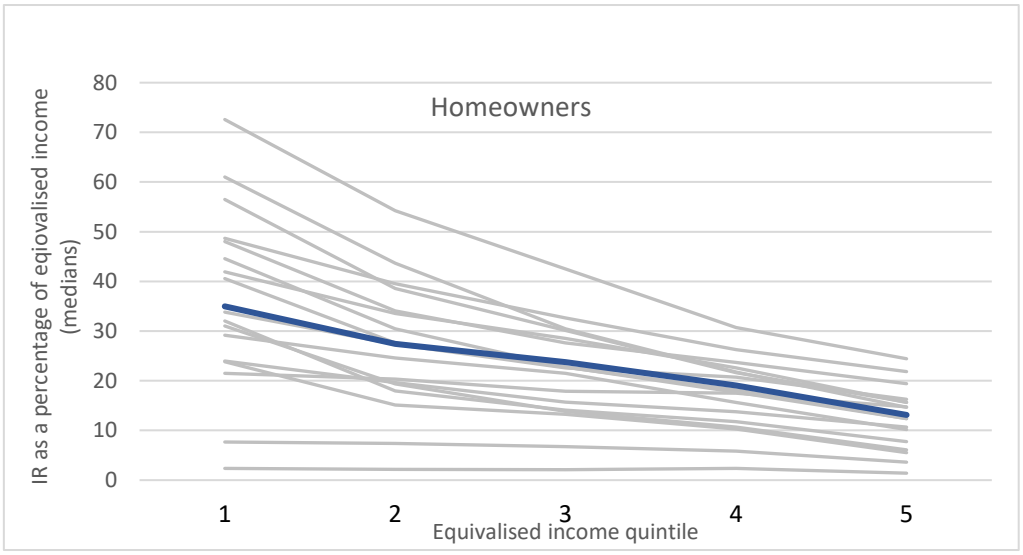
	Imputed rent in absolute value (in thous.PPP)						Imputed rent relative to median income					
	Homeowners		Other non-homeowners		Total		Homeowners		Other non-homeowners		Total	
Country	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*	*Mean*	*Median*
Austria	5.88	5.76	4.77	5.00	4.00	4.60	0.15	0.14	0.12	0.13	0.10	0.12
Australia	14.62	11.86	6.52	5.86	12.89	10.92	0.42	0.34	0.19	0.17	0.37	0.32
Belgium	8.71	8.50	6.76	6.66	7.22	7.81	0.25	0.24	0.19	0.19	0.20	0.22
Switzerland	6.18	6.40	5.31	3.80	3.47	0.90	0.12	0.12	0.10	0.07	0.07	0.02
Czechia	0.37	0.28	0.30	0.25	0.32	0.26	0.02	0.01	0.02	0.01	0.02	0.01
Germany	6.01	5.42	4.98	5.20	3.73	3.26	0.17	0.15	0.14	0.15	0.10	0.09
Denmark	8.27	6.51	2.53	0.00	4.52	3.01	0.21	0.17	0.06	0.00	0.11	0.08
Estonia	0.98	0.79	0.86	0.66	0.95	0.75	0.06	0.05	0.05	0.04	0.05	0.04
Spain	7.45	7.15	6.52	6.27	7.08	7.03	0.31	0.29	0.27	0.26	0.29	0.29
Finland	7.85	7.17	1.25	0.00	6.23	5.85	0.24	0.22	0.04	0.00	0.19	0.18
Greece	5.29	4.93	4.94	4.71	4.90	4.74	0.29	0.27	0.27	0.26	0.27	0.26
Ireland	9.84	8.60	5.71	5.03	9.41	8.50	0.33	0.28	0.19	0.17	0.31	0.28
Italy	9.57	7.72	3.65	3.86	8.03	6.17	0.41	0.33	0.16	0.16	0.34	0.26
Netherlands	8.94	8.46	2.44	0.00	4.59	6.02	0.24	0.22	0.06	0.00	0.12	0.16
Slovenia	4.59	4.67	3.74	3.89	4.43	4.67	0.24	0.24	0.19	0.20	0.23	0.24
Slovakia	3.19	2.79	0.85	0.84	2.96	2.62	0.19	0.17	0.05	0.05	0.18	0.16
United States	6.70	5.52	0.00	0.00	5.15	3.68	0.16	0.13	0.00	0.00	0.12	0.09

Notes: 2017 USD PPP deflators are used to calculate absolute values. The *Total* column refers to all tenures, including renters at market price who have 0 imputed rental income.

Source: Authors' own calculations based on LIS weighted data

The statistics on average imputed rent values presented in Table 1 indicate great variation in the results, which of course to some extent can be attributed to the methodological inconsistency at the stage of imputed rent estimation, but also are associated with cross-country differences in housing consumption and pricing. Nonetheless, some common patterns can be distinguished. Firstly, homeowners naturally enjoy greater imputed rent in average terms than tenants (free or at reduced price), but the gap between these two groups vary substantially when countries are compared. The greatest disparity in this respect can be indicated for Australia, Ireland, Italy, Slovakia. Likewise, it is also significant for Denmark, Finland, the Netherlands and the United States. However, for these countries, median values equal to 0 reported for other non-homeowners imply that in this group at least half of the households have been identified by data producers as not eligible for imputed rental income. Secondly, the amount of average imputed rent expressed as a percentage of median income also demonstrates large cross-country variation. In terms of the mean value for all older households it ranges between 2% (Czechia) and 37% (Australia). The greater amount of imputed rent indicates greater importance of this type of income in kind for the household financial situation. Among the countries where imputed rent relative to median income exceeds 20%, one can distinguish Australia, Belgium, Spain, Greece, Ireland, Italy, and Slovenia. The countries where this ratio is the lowest are Switzerland, Czechia, and Estonia. It is worth noting that for the latter two countries, imputed rent has been estimated using a different approach (the 'user cost' method). This also applies to Slovakia, for which average imputed rent expressed in absolute terms is also low. Thirdly, comparisons between mean and median values allow conclusions about the skewness of the distribution of imputed rent in the elderly population. In the case of homeowners, mean values are slightly greater than or equal to median values, which indicates a narrow right-tail asymmetry or symmetry in the distribution. The results are more mixed in the case of other non-homeowner category. For some countries, the medians are slightly greater than the means, which implies that the asymmetry is driven by the left tail of the distribution.

The relative imputed rent presented above assumes a fixed reference point, which is median income in the country population. However, it does not fully reflect the relevance of imputed rent in household budgets, especially those belonging to the lower income groups, which are at the greatest risk of poverty. Figure 2 shows in a somewhat different manner how imputed income relates to household income. Namely, it reports median values for the ratio between imputed rent and household equivalised income (net of imputed rent) calculated for particular income quintiles. With reference to homeowners, countries with the greatest imputed rent proportionally to household income in the case of the bottom income quintile are Australia, Spain, Ireland, Italy and Greece. In contrast, countries reporting the lowest imputed rent as a share of household equivalised income are Czechia and Estonia. Thus, these results converge to a great extent with the statistics presented for relative imputed rent in Table 1. As expected, the median ratio decreases in higher income quintiles (from 27% to 13% in the joint sample), but country-specific slopes differ substantially. The greatest drops between the bottom to the upper quintile are reported for Australia, Spain and Ireland, and the smallest reductions for Czechia, Estonia, and Denmark. With respect to other non-homeowners, the results are more mixed. However, this can be a consequence of the low number of observations in this group when the split into particular income quintiles is adopted.



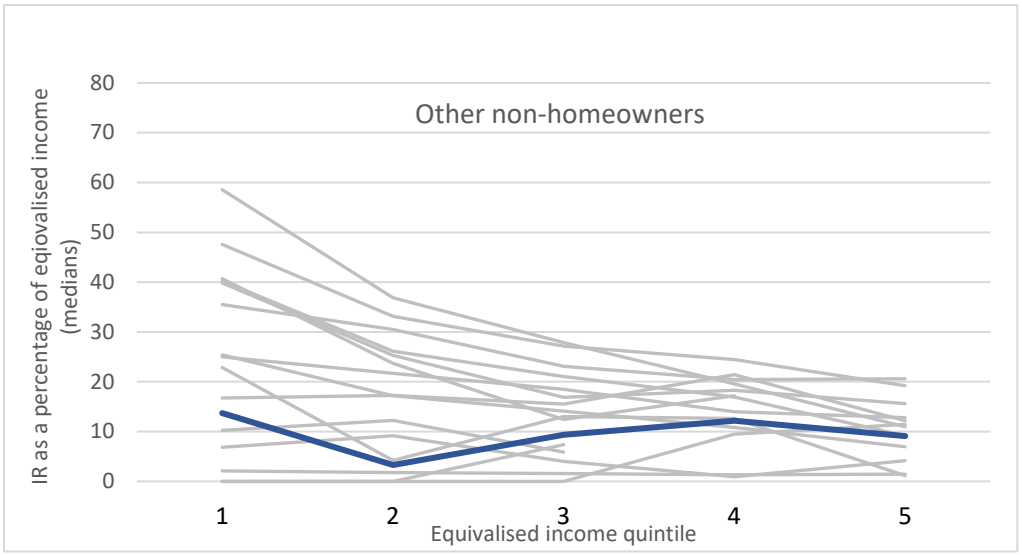


Figure 2. Imputed rent as a percentage of household equivalised income
Note: Income quintiles

Source: Authors' own calculations based on LIS weighted data

Table 2 presents the results of the regression analysis. We employ binary logistic regression to assess the impact of imputed rent on poverty. The outcome variable is a binominal variable that informs whether a given household is at risk of poverty. It assumes a value of 1 when household equivalised income, including imputed rent, is below the relative poverty threshold, which is defined here as 50% of the median equivalised income in the whole population (elderly and non-elderly households), and 0 otherwise.

Table 2. Logistic regression results

	B	S.E.	Wald	df	Sig.	Exp(B)
constant	1.45	0.27	29.00	1	0.00	4.26
IR/median income	-11.47	0.40	831.83	1	0.00	0.00
employed (dummy)	-1.69	0.14	149.90	1	0.00	0.19
living with partner (dummy)	-1.24	0.06	418.45	1	0.00	0.29
age	-0.03	0.00	63.21	1	0.00	0.97
gender (dummy, 1=female)	0.06	0.05	1.74	1	0.19	1.06
educ low = ref. (dummy)			302.31	2	0.00	
educ medium	-0.57	0.05	126.46	1	0.00	0.57
educ high	-1.16	0.07	283.08	1	0.00	0.31
homeowners=ref. (dummy)			15.56	2	0.00	
renters at market price	-0.11	0.07	2.28	1	0.13	0.89
other non-homeowners	0.16	0.06	7.00	1	0.01	1.18
at = ref. (dummy)			1699.60	16	0.00	
au	0.57	0.14	17.66	1	0.00	1.77
be	-0.38	0.12	9.30	1	0.00	0.68
ch	0.00	0.10	0.00	1	0.99	1.00
cz	-1.05	0.11	87.84	1	0.00	0.35
de	0.09	0.10	0.81	1	0.37	1.09
dk	-2.98	0.20	225.07	1	0.00	0.05
ee	1.09	0.09	131.83	1	0.00	2.97
es	0.16	0.16	1.05	1	0.31	1.17
fi	-1.10	0.13	72.61	1	0.00	0.33
gr	-0.61	0.15	16.40	1	0.00	0.54
ie	0.12	0.15	0.66	1	0.42	1.13
it	-0.25	0.12	4.00	1	0.05	0.78
nl	-1.49	0.13	124.82	1	0.00	0.23
si	-0.68	0.18	14.52	1	0.00	0.51
sk	-0.65	0.14	20.57	1	0.00	0.52
us	1.47	0.10	224.02	1	0.00	4.35

Source: Authors' own calculations based on LIS weighted data

The key explanatory variable expressing imputed rent value is *IR/median income*. This is a relative measure defined as a ratio between the monetary value of imputed rent estimated for a given household and the median income in the whole population (elderly and non-elderly). This way we relate the amount of imputed rent to a fixed, country-specific average income level. Unlike in the previous studies on the distributional impact of imputed rent (e.g. List 2022; Saarimaa 2011) we do not consider imputed rent relative to the household's equivalised income. The particular size of this ratio naturally results from the amount of an individual household's income and the amount of imputed rent; the proportions between them make the ratio lower or higher. Thus, the information provided in this manner does not allow one to assess the actual size of imputed rent. On the other hand, the absolute (monetary) value of imputed rent, even adjusted by PPP, is not particularly suitable

for cross-country comparisons due to differences in housing pricing. Thus, to present imputed rent in relative terms, and at the same time make it independent of income size, we apply the ratio imputed rent to median equivalised income. Other explanatory variables serve to control for household socio-demographic characteristics, i.e. age in years, gender, education, and employment of the household head, as well as living with partner. Additionally, binary variables representing tenure status of a household and a set of country dummy variables are included.

The regression estimates presented in Table 2 prove that the higher the value of imputed rent, the less likely a household is to fall in the poverty area. One may find this result to be expected, and it is, but only in a narrow context. In a wider context, in which pensioners incomes are very often compared to the incomes of the working generation, this result may have an important policy implication. Namely, as discussed previously, in line with the life cycle hypothesis, the probability of homeownership increases with age. This refers to both mortgage and outright homeownership; however, older people are more likely to have a home without a mortgage than other age-groups. Thus, any comparisons of pensioners income both to the incomes of working generation (e.g. using the replacement rate) or to the poverty line in the whole population (e.g. using relative poverty rates based on the median equivalised income) in which an imputed rent is not included in the income of older people, underestimate their living conditions and overestimate poverty among them. As a consequence, any actions taken by the government aiming to improve the income adequacy of a pension system burdening the working or young generation should be motivated not only by monetary income but by total income comprising both components, i.e. monetary and non-monetary. The control variables included in the model report parameters mostly in line with expectations. For instance, a household, in which head of household is active in the labour market, has higher education, and lives with a partner, has lower chances to be included as at risk of poverty. The odds ratio is also slightly below 1 when household head age is considered. However, the parameter for being a renter at market price is insignificant. In contrast, the tenure status of other non-homeowners (i.e. free rent or with public subsidy) increases the probability of being at risk of poverty as compared to homeowners. The reason for this may be not only smaller imputed rental incomes on average terms but also the fact that those eligible for free or subsidized housing usually have to meet appropriate low-income requirements.

Conclusions

As elaborated in the previous sections, imputed rent constitutes an important category of income in kind, that results from its wide coverage, as residential property is a key component of household wealth, irrespective of country. The study focuses on the older population in a cross-country comparative framework. It demonstrates that imputed rental income is quite universal. In most of the countries studied, the share of entitled households that comprise both owner-occupiers and subsidized or free renters is higher than 80%. Thus, the impact of imputed rent on the financial well-being of the elderly on the macro scale does not arise from the sole fact of having this type of non-monetary income, but the actual financial relief that a household experiences when having this income, as compared to households paying rent at a market price. Our empirical study aiming to assess the actual relevance of imputed rent as an income component covers a broad range of countries. The results obtained allow one to identify countries where imputed rent plays a greater role relative to the elderly incomes. Our results suggest that in countries such as Australia, Belgium, Spain, Greece, Ireland, Italy, and Slovenia, in average terms (per household) it exceeds 20% of the median income in the whole population. This implies that an equivalent sum can be spent by an average household to meet other consumption needs. Especially for older people in the bottom income quintiles, imputed rent constitutes a substantial proportion of their monetary incomes.

These findings have some implications for policymakers in the generational context. One can expect that this financial relief experienced by the current older population resulting from the common access to the non-monetary income may be not so evident when the current working population, especially younger cohorts, enters retirement age. Growing wealth concentration, which also includes the concentration of housing assets, and the reported retreat from homeownership after the financial crisis (see e.g. Dewilde 2020; Smith et al. 2022) imply that in the future a smaller number of households will move into homeownership, and thus, will receive imputed rental income resulting from this tenure status. This raises some concerns in regard to the welfare of the elderly in the face of the lower public pension benefits adequacy anticipated in the future as a consequence of population ageing. Thus, housing policy is expected to play a greater role in alleviating poverty among elderly, mainly through development of subsidized rental sector.

This study covers a broad range of countries, which entails some methodological limitations. As our study employs statistics delivered by data producers included in LIS datasets, there are some comparability issues regarding the estimates of imputed rental incomes. This is a common problem for non-cash incomes, and particularly imputed rent. As elaborated in the previous sections, in multi-country studies due to differences in housing arrangements, as well as data availability and reliability problems, the development of a consistent and unified methodological framework for the estimation is a serious problem, as yet unsolved. To some extent, the findings presented by Balcázar et al. (2017) may be useful. They summarize the methodological constraints associated with the selection of imputed rent estimation methods and conclude that there is 'a lack of evidence on re-ranking, changes in poverty profiles, and on the distributional effects of using different imputation techniques in a comparative framework'. A minor impact of the imputation technique on the results is also shown by Ceriani et al. (2019). In our study, for the great majority of countries the 'rental equivalence method' has been used, albeit with different specific solutions comprising stratification and regression. Three countries report imputed rent obtained using capital market approach, and one country using self-assessment approach. We can roughly conclude that there is a difference between the results of these estimation procedures, and they suggest that the 'user cost method' applied in the datasets underestimates imputed rent, as compared to the 'rental equivalence method'.

Acknowledgements

This work was supported by the National Science Centre (Poland) under Grant Number DEC-2018/31/B/HS4 /01270.

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Table A1. LIS datasets characteristics

Country	Year of survey	Name of survey	Responsible institution	Total sample size (unweighted)	Elderly sample size (unweighted)	Imputed rent estimation method
Australia	2016	Survey of Income and Housing (SIH) and Household Expenditure Survey (HES)	Australian Bureau of Statistics (ABS)	17768	4406	rental equivalence
Austria	2017	Survey on Income and Living Conditions (SILC)	Statistics Austria / Statistik Austria	6103	1463	rental equivalence
Belgium	2017	Survey on Income and Living Conditions (SILC)	Statistics Belgium (StatBel)	5946	1556	rental equivalence
Czechia	2016	Survey on Income and Living Conditions (SILC)	Czech Statistical Office / Český Statistický Úřad (CSU)	8701	2769	user cost
Denmark	2016	Law Model (based on administrative records)	Ministry of Economic Affairs and the Interior / Økonomi- og Indenrigsministeriet Statistics Denmark / Danmarks Statistiks	89245	22777	n/a
Estonia	2016	Estonian Social Survey (ESS) / Survey on Income and Living Conditions (SILC)	Statistics Estonia / Eesti Statistika (ES)	6155	1513	user cost
Finland	2016	Income Distribution Survey (IDS) / Survey on Income and Living Conditions (SILC)	Statistics Finland / Tilastokeskus	10210	2008	rental equivalence
Germany	2017	German Socio-Economic Panel (GSOEP)	German Institute for Economic Research / Deutsches Institut für Wirschaftsforschung (DIW)	18240	2985	rental equivalence
Greece	2016	Survey on Income and Living Conditions (SILC)	Hellenic Statistical Authority (ELSTAT) / Ελληνική Στατιστική Αρχή (ΕΛΣΤΑΤ)	22743	6896	rental equivalence
Ireland	2017	Survey on Income and Living Conditions (SILC)	Central Statistics Office (CSO)	4382	1253	rental equivalence
Italy	2016	Survey of Household Income and Wealth (SHIW)	Bank of Italy / Banca d'Italia	7421	2642	self-assessment
Netherlands	2017	Survey on Income and Living Conditions (SILC)	Statistics Netherlands / Centraal Bureau voor de Statistiek (CBS)	12493	3512	rental equivalence
Slovakia	2017	Survey on Income and Living Conditions (SILC)	Statistical Office of the Slovak Republic (SOSR)	5662	1300	user cost

Slovenia	2015	Household Budget Survey (HBS)	Statistical Office of the Republic of Slovenia / Statistični urad Republike Slovenije	3750	649	rental equivalence
Spain	2016	Survey on Income and Living Conditions (SILC)	National Statistical Office / Instituto Nacional de Estadística (INE)	13740	3294	rental equivalence
Switzerland	2017	Statistics on Income and Living Conditions (SILC)	Federal Statistical Office (FSO) / Bundesamt für Statistik (BFS) / Office fédéral de la statistique (OFS)	6680	1728	rental equivalence
United States	2017	Current Population Survey (CPS) - Annual Social and Economic Supplement (ASEC)	Bureau of Labor Statistics (BLS) U.S Census Bureau	67909	12039	rental equivalence

Notes: Information on the elderly households sample size based on the elderly household definition adopted in the paper; n/a – information on imputed rent estimation method for Denmark not publicly available.

Source: LIS Cross-National Data Center, Australian Bureau of Statistics, Törmälehto and Sauli (2013), Frick et al. (2014), Baffigi et al. (2016), Eurostat (2020b), van Duym and Awuku-Budu (2022), Authors' own elaboration