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# Rising housing costs and income poverty among the elderly in Germany

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## ABSTRACT

Housing costs have been increasing rapidly in Germany in recent years. Given the importance of housing for the elderly, one may expect many to be forced to dedicate ever-larger shares of their income to housing costs. Using longitudinal data from the German Socio-Economic Panel (GSOEP), we examine how changes in housing costs between 1996 and 2017 have affected income poverty among Germany's over-65s. Our results reveal that higher costs have indeed contributed to increased income poverty in old age in that period. Our pooled probit regression models as applied to Germany's elderly show that increased housing costs mean tenants, homeowners with outstanding mortgages, single-person households and people with migration background all suffer a higher risk of poverty, while the risk remains lower for outright homeowners. Since the relative income position of the elderly is expected to further deteriorate in future, our study suggests a need for policy action to avoid a worsening in figures for old-age income poverty in Germany.

## ARTICLE HISTORY

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poverty; housing costs; elderly

## 1. Introduction

The vast majority of the elderly in Germany depend on the old-age provision schemes: statutory, occupational and/or private pensions. These three pillars of old-age provision have seen an uneven but generally downward trend over recent years (Goebel & Grabka, 2011; Himmelreicher & Frommert, 2006). At the same time, the risk of income poverty in old age has increased from 10% in 2000 to 18% by 2019 (Eurostat, 2019). This evolution has been attributed to various factors, including the pension reforms implemented since the 1990s, an increased rate of interruptions in employment and an expansion of the low-wage sector (Hauser, 2009; Noll & Weick, 2011, 2013). In addition, rising costs – not least in housing – heavily impacts on the financial situation of the elderly. Accordingly, in this study we examine the influence of changes in the housing market on income poverty in old age.

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The literature has long pointed to the housing market as a driving force in social inequality (Baldeus *et al.*, 2019; Belfield *et al.*, 2015; Dustmann *et al.*, 2018; Lebuhn *et al.*, 2017; Saunders, 1984; Wind *et al.*, 2017). The main mechanism by which housing exerts its influence in society has been identified as the unequal distribution of home ownership. The argument goes that homeowners are safe from the rent price fluctuations and are better able to save the ‘hidden income’ that they would otherwise be forced to spend as tenants (Fahey *et al.*, 2004). It has also been proven that home ownership has a strong correlation with one’s labour market position and with the wealth of one’s family (Kurz, 2004; Kurz & Blossfeld, 2004). In other words, it is the financially better off who tend to end up being homeowners. In addition, considering that homeowners usually enjoy lower housing costs and higher income in comparison to tenants (Dustmann *et al.*, 2018), they enjoy a double benefit in old age, while tenants would seem to be doubly penalized by recent developments in the housing market.

The German case is of particular interest as it has one of the highest percentage of tenants (48.9% in 2019) in Europe (Eurostat, 2020). Gross rents increased by an average of 1.2% points annually in the years between 1997 and 2017 (bpb, Bundeszentrale für politische Bildung, 2018). The largest increases of all are being seen in asking prices for new rentals and home purchases. And housing and related factors are of paramount importance to the older and retired population. For a start, people aged over 64 years spend more time at home on average than younger age groups (Engstler *et al.*, 2004). On top of this, they also feel a stronger emotional attachment to their home and neighbourhood, where they have built up a social support network over the years to help them to cope with the difficulties of old age and to contribute to their life satisfaction (Oswald *et al.*, 2011; Shaw, 2005). These factors, together with the fact that they tend to be less willing to move home (Kohli *et al.*, 2008) and that most receive a fixed monthly income, would seem enough to indicate a need to investigate whether and how changes in housing costs over recent years has impacted on income poverty among the over-65s in Germany.

A recent study (Romeu Gordo *et al.*, 2019) has shown that older tenant households in particular have been acutely affected by the various developments in housing costs and household incomes over the last two decades. This would lead us to expect that residual income after paying for housing costs has shrunk among older low-income households, who are mostly tenants, while it has been more stable among the high-income households, who are mostly homeowners. Consequently, we expect that changes in housing costs have contributed over the years to increased net income poverty after housing costs among the elderly. As the largest increases in housing costs have been concentrated in tenant households, we also expect housing costs to have differing impacts depending on tenure status (i.e. between homeowners and tenants). To test whether this holds true, we use data from the GSOEP for individuals aged 65 or older between 1996 and 2017.

Our first step is to outline the context within which poverty and housing costs evolve, as well as reviewing previous research into the links between the housing costs and income poverty, on the basis of which we go on to derive our hypotheses. Secondly, we then describe the data available to us, along with the methods we use

on those data in order to test those hypotheses. Thirdly, we present our main empirical findings. Finally, we discuss the conclusions to be derived from our work.

## 2. Theoretical framework

### 2.1. Developments in housing costs

The term ‘housing costs’ refers to expenditures that a household incurs in relation to its dwelling place. The concept covers rent for tenant households (or the comparable mortgage and interest payments for homeowners), as well as such additional costs as heating, electricity, water and waste disposal. Concern relating to increases in housing costs in Germany is generally concentrated on the steep rise in rent prices that has occurred over recent years due to a large number of contributing factors. Kholodilin and Michelsen (2017) highlight a re-urbanisation trend since the beginning of the 2000s. Germany’s cities and regional centres have become poles of attraction for both Germans and immigrants. The resulting net demographic growth has led to shortages of rental housing, putting upward pressure on rents. In addition, strong economic and employment growth in Germany since 2010, combined with a rise in one-person households have led to an increase in the average per capita demand for living space (Deutscher Bundestag, 2017).

Moreover, it is argued that a retreat by public authorities from the housing market over recent decades has contributed to the increase in rents (Holm, 2014; Schöning, 2013). This withdrawal is due, on the one hand, to the privatization of part of the public housing stock by federal states and municipalities since the end of the 1990s. On the other hand, there has also been a steady reduction in the stock of private social housing over recent years. In fact, the latter has shrunk from around 2.5 million units in 2002 to around 1.3 million in 2016 (BMI, Bundesministerium des Innern für Bau und Heimat, 2018). These two phenomena have generated an increase in the share of the rental market ruled by the free market.

Aside from rents and mortgage payments, both homeowners and tenants have other housing-related expenses to pay: utility costs (water, garbage removal, street cleaning, etc.) as well as heating and electricity costs. Although such costs depend heavily on weather conditions, region and insulation quality, together with such other factors as the regulations governing the energy sector, they have all seen a general increase over the last few years (BBSR, 2011; Bundestag, 2017). This steeper rise in housing costs than in household income has resulted in a major increase in the housing cost burden on older people since 1996, particularly for those among them who live in tenant households (Nowossadeck & Engstler, 2017; Romeu Gordo *et al.*, 2019).

### 2.2. Relative income poverty

A common measure used in the literature on poverty is the concept of ‘income poverty risk’. Using this concept, a person is considered poor or at risk of income poverty if she/he has an equivalised disposable income below the income poverty threshold, which is usually set at 60% of the national median equivalised disposable household income (after social transfers). According to Eurostat (2019), the old-age

income poverty rate – i.e. the proportion of individuals aged 65 or older who live in a household with an equivalised disposable income below the income poverty line – was higher in 2019 in Germany (at 18%) than the EU-28 average (16.5%).

There has been a surge in old-age income poverty in Germany over recent years. The literature on old-age poverty highlights a variety of factors as drivers of this phenomenon. Some scholars point to pension system reforms implemented in Germany since the 1990s and to increasing labour market flexibility and the rise in atypical employment patterns (Hauser, 2009; Noll & Weick, 2011, 2013). The growth of low-wage employment and increased disruptions in employment biographies due to episodes of unemployment lead to reduced entitlements from the statutory pension system and, consequently, to lower pensions. Accordingly, numerous scholars expect the old-age income poverty risk to increase further in the future (Bäcker & Schmitz, 2013; Noll & Weick, 2013; Vogel & Künemund, 2018). Considering that the increase in old-age income poverty has been accompanied by rising housing costs and that both trends are expected to sharpen further in the near future, the task of investigating how housing costs are impacting on income poverty among the elderly takes on a degree of urgency.

### **2.3. The influence of housing costs on income poverty**

The distribution of home ownership within a society is thought to be one of the main mechanisms by which the housing market exerts its impact on social inequalities. On the one hand, homeowners – unlike tenants – are safe from increasing purchase and rent prices (Saunders, 1984; Wind *et al.*, 2017). This is especially true among older homeowners, most of whom have already paid off their mortgages (Romeu Gordo *et al.*, 2019). On the other hand, it has been shown that home ownership has a correlation with both one's position on the labour market and the wealth of one's family of origin (Kurz, 2004; Kurz & Blossfeld, 2004) indicating a degree of social selection in ownership. In other words, the better off are more likely to have access to home ownership. This selectiveness has a comparatively strong influence in Germany as a consequence of its conservative housing finance system (Wind *et al.*, 2017). Given that home ownership also has a correlation with the wealth of one's family, it may be expected that homeowners are more likely to receive inherited wealth, resulting them enjoying a better material position at older ages. Higher housing costs can thus be expected to exert a greater effect on those at greater risk of poverty – i.e. tenants – than those more likely to be comfortably off – homeowners. There is also a third group – owners of multiple properties (i.e. landlords and investors) – who may even benefit economically from any upward trend in rent prices. Thus, movements in housing costs can be expected to affect different population subgroups unequally.

There is a growing body of literature (Belfield *et al.*, 2014; Eurostat, 2018; Fahey *et al.*, 2004; Ritakallio, 2003; Saunders, 2017) that applies what is known as a 'housing expenditures approach' to account for the impact of housing costs on income poverty. Instead of focusing simply on the benefit-in-kind income advantage derived from home ownership and/or from free-rent dwellings (Frick *et al.*, 2007; Frick & Grabka, 2003; Frick *et al.*, 2010), the authors of such work focus both on the advantage derived from home ownership and the disadvantage derived from renting by

taking into account the differences in housing costs incurred by homeowner as against tenant households.

Since most households need to spend a percentage of their monthly income on housing, such scholars argue that inequalities in the distribution of the housing expenditures must be included in any analysis of a society's welfare outcomes, including studies of poverty risk. Accordingly, their approach uses data on household expenditures, moving away from an approach based on raw income data towards a focus that concentrates on the income remaining after deducting housing costs. They claim that this 'income after housing costs' metric better illustrates an individual's standard of living, especially for older households, which tend to overinvest in housing. It also in effect controls for differences in housing costs that depend on the location and/or tenure status (Bradbury & Gubhaju, 2010; Saunders, 2017).

Official statistics from Eurostat (2018) reveal that the risk of income poverty is higher after deducting the housing costs in every country in the European Union. More in-depth studies have shown similar results for the United Kingdom (Belfield *et al.*, 2014) and Australia (Saunders, 2017). Focusing on older populations (aged 65 or older), Fahey *et al.* (2004) found a higher risk of income poverty among that group in only 8 out of the 14 European countries analysed. They also concluded that they could not find clear evidence of any poverty-reducing effect by home ownership among the elderly. It should be noted, though, that they used country-level data from the 1996 European Community Household Panel Survey (ECHP).

In Germany, Dustmann *et al.* (2018), using data from the Income and Expenditure Survey, found that changes in housing expenditure between 1993 and 2013 had exacerbated the trend in net income inequality after deducting housing costs, as the latter had increased greatly for the bottom income quintile, while it had fallen for the topmost one-fifth. As the driving forces of these developments they highlighted a fall in the housing cost burden among homeowners as compared to tenants, changes in household structures and the trend towards re-urbanisation. Their study, however, considered only people aged 20–60 years. In a recent study, tightly focused on households headed by elderly people, Romeu Gordo *et al.* (2019) found that inequality in housing cost burdens increased in Germany between 1996 and 2016. However, no study has as yet examined how recent changes in housing costs have affected income poverty in old age: that is, how they have impacted over the years on the financial situation of the elderly (aged 65 or older) in comparison with the overall population.

We derive the following hypotheses on the basis of previous studies:

**Hypothesis 1a:** Recent changes in housing costs have contributed to an increase in the risk of old-age income poverty in Germany, especially among tenants.

**Hypothesis 1b:** Home ownership has a consistent poverty-reducing effect among elderly people in Germany.

### 3. Data and methods

#### 3.1. Data

The data used for the analysis is taken from the German Socio-Economic Panel (GSOEP). The GSOEP is a representative panel study of private households in

Germany. It surveys all members of the sampled households aged 17 or older every year since 1984 in West Germany and since 1990 in East Germany. The current sample size takes in around 15,000 households and 30,000 individuals. Among other topics, the GSOEP covers a wide range of information related to housing characteristics and costs, along with detailed measures of household income (Goebel *et al.*, 2019). We use data from households and individual people for the period 1996–2017. The information from 2014 and 2015 is excluded due to changes made in those years to questions on housing costs that affect comparability over the time period (SOEP Group, 2019). By choosing to start the analysis period in 1996, we attempt to cover the longest possible time period while nevertheless excluding the major fluctuations in the housing market that occurred in the years immediately after German reunification. Our sample is composed of individuals living in private households, excluding thus those living e.g. in nursing homes. Only 3.5% of individuals living in private households were excluded from the analysis due to missing information on their tenure status, housing expenditure or income.

### 3.2. Relevant variables

The main variables included in the analysis are:

- **Housing costs.** This refers to expenditures that households need to pay every month for their dwelling. The procedure we follow to compute this variable is different for tenant households than for homeowners.
  - Each tenant household's monthly housing costs are the sum of its basic monthly rent plus utility costs and heating costs. Utility costs include monthly costs for water, garbage removal, street cleaning and other additional costs.
  - Each homeowner household's monthly housing costs are the sum of utility costs (costs for water, garbage removal, street cleaning, etc.) plus heating costs. If the household has not yet paid off the mortgage for its dwelling, then its monthly interest and mortgage payments are also added.
- **Household income ('before housing costs').** This refers to net monthly household income in Euros. We use an income variable that includes imputed values for 6.5% of missing income values, which were calculated by the GSOEP team using multiple imputations (SOEP Group, 2019). We obtain the **household income after housing costs** by subtracting the household's monthly housing costs from the household's monthly income.<sup>1</sup>
- **Equivalised household income ('before' and 'after housing costs').** This figure is calculated by dividing household income (before and after housing costs) by the equivalised size of the household. To compute the equivalised household size, we apply the modified OECD equivalence scale (OECD, 2009), i.e. the first adult equals 1.0, each subsequent person aged 14 and above equals 0.5 and each child below the age of 14 equals 0.3. We calculate an equivalised measure of household income both before and after subtracting housing costs. In this way, the housing costs are also adjusted for household size.

- **Income poverty line before housing costs.** This figure is equal to 60% of national median equivalised disposable household income. We take the equivalised disposable household income of individuals aged 17 years or older to calculate median national disposable household income and apply the 60% threshold. We also calculate an **'after housing costs' version of the income poverty line**, which of course equals 60% of national median equivalised disposable household income after housing costs.

### 3.3. Methods

To test whether changes in housing costs have exacerbated the risk of income poverty in older ages (H1a) and whether home ownership has any poverty-reducing effect at older ages (H1b) we carry out an empirical strategy consisting of three steps:

First, we compute yearly old-age income poverty risks before housing costs for the population aged 65 or older by tenure status (i.e. for tenants and homeowners), then do the same after deducting housing expenditures and comparing the two figures to reveal the effect of housing costs on the financial situation of the elderly.

Second, in line with the empirical strategy applied by Dustmann *et al.* (2018), we compute a Blinder–Oaxaca decomposition analysis (Blinder, 1973; Oaxaca, 1973) to outline how housing costs – together with other factors – impact on the risk of old-age income poverty after housing costs over time. This method is usually used to decompose differences in mean outcomes between two groups into two parts: one that can be explained by the group differences in the mean values of the independent variables and another unexplained part, due to group differences in the coefficient effects of the independent variables (Jann, 2008). In our case, we decompose the change in the old-age income poverty rate after housing costs between two periods: one taking in the years 1996–2001, a period in which housing costs were relatively stable after the large increases of the early 1990s; and a second between 2012 and 2017, in which the housing costs increased strongly. Taking into account that the dependent variable, income poverty in old-age, is binary, we compute our non-linear decomposition using the weighting method described by Yun (2004). As independent variables, we include a variety of factors that, according to the literature (Dustmann *et al.*, 2018; Romeu Gordo *et al.*, 2019), have been found relevant to increasing housing cost burden, including changes in the demographic make-up of households, regional distributions, changes in dwelling characteristics, durations of occupancy, income distributions and changes in the size of housing costs.

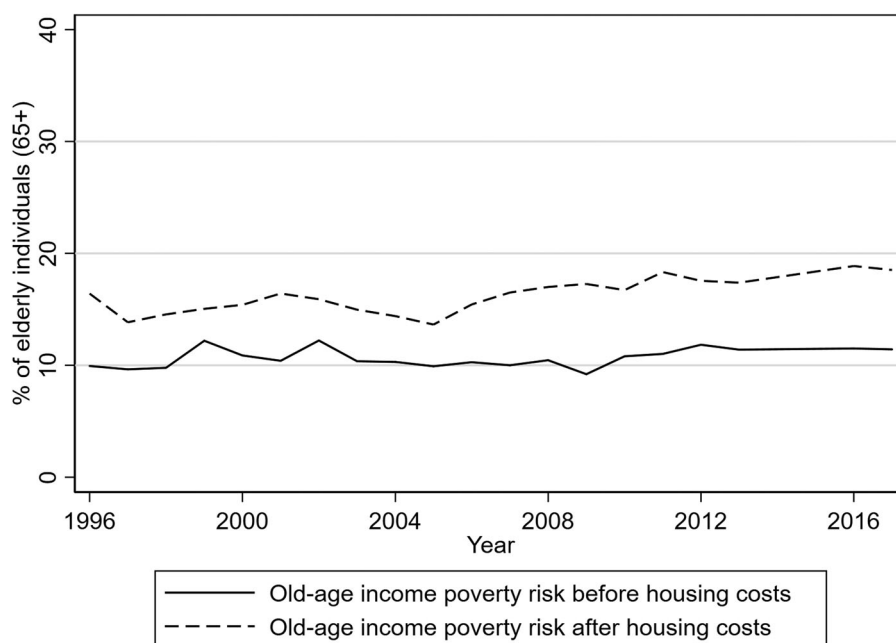
Our final step is to calculate four probit regression models designed to examine the factors (whether socio-demographic, regional or relating to dwelling characteristics) that may induce an individual aged 65 or older to fall into relative income poverty in Germany, both before and after accounting for the housing costs, both in the first time period (1996–2001) and in the second (2012–2017). These analyses are calculated using Stata 15.

## 4. Empirical findings

### 4.1. Old-age income poverty risk over time

Old-age income poverty risk refers to the percentage of elderly individuals (aged 65 or older) with an equivalised disposable monthly household income below the



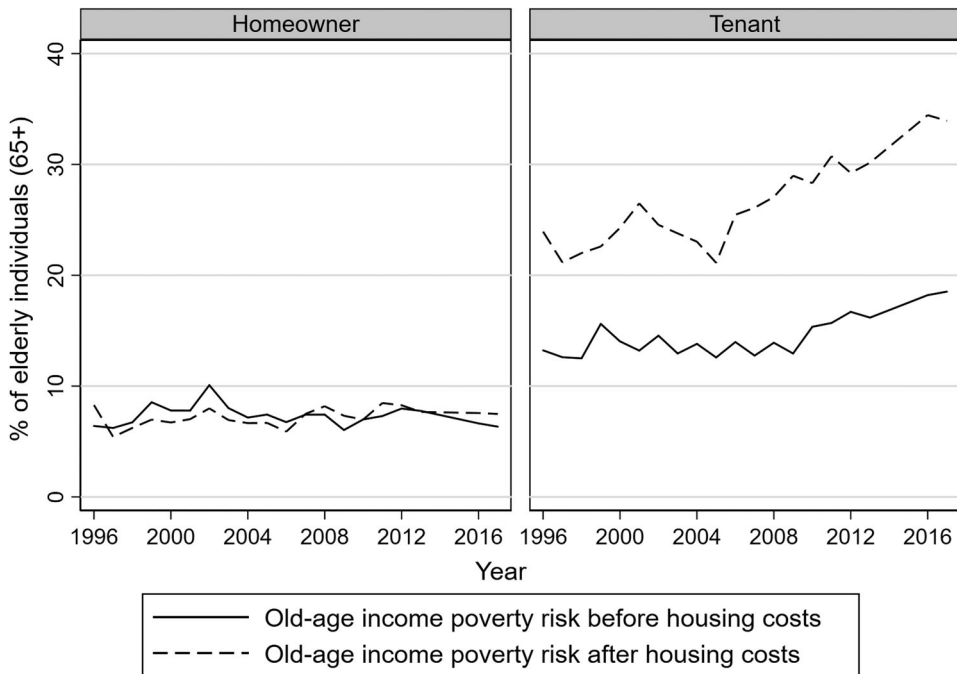


**Figure 1.** Old-age income poverty risk (before and after housing costs) by year. Source: GSOEP v34. Years 1996–2017. Years 2014 and 2015 are excluded. (N = 83,715); Own calculations, weighted.

poverty line. The 1996 poverty line before housing costs was calculated at 654 Euros, while the figure after housing costs was 519 Euros. The figures for 2017 were 1000 Euros before housing costs and 805 Euros afterwards. Risk of poverty in old age before housing costs remained relatively stable in Germany between 1996 and 2017, increasing minimally from 9.9% in 1996 to 11.4% in 2017 (Figure 1). Income poverty risk in old age *after* housing costs, however, was significantly higher over the entire period. For example, in 2017 old-age income poverty risk after housing costs was 7% points higher than the similar risk before housing costs. What this means is that in 2017 18.5% of all individuals aged 65 or older had a monthly equivalised disposable income after housing costs lower than 60% of the applicable median national equivalised household income. Applying the after-housing-costs approach thus reveals a higher rate of relative old-age income poverty than the before-housing-costs approach. But we have yet to examine what tenure-based differences there may be in the impact of housing costs on old-age income poverty.

The average risk of old-age income poverty before housing costs is consistently much higher among the tenant households than among the homeowner households<sup>2</sup> over the entire period (Figure 2). Whereas around 18.5% of the tenants aged 65 or older were considered at risk of relative income poverty in 2017 before housing costs, only 6.3% of homeowners fell below the poverty line by the same measure.

In addition, Figure 2 reveals that the risk of old-age income poverty before housing costs grew between 1996 and 2017 among tenants, whereas the same metric for homeowners has remained relatively steady. Turning to the old-age income poverty risk *after* housing costs, the figure increases substantially for tenants between 1996



**Figure 2.** Old-age income poverty risk (before and after housing costs) by tenure status. Source: GSOEP v34. Years 1996–2017. Years 2014 and 2015 are excluded. (N = 83,715); Own calculations, weighted.

and 2017, especially towards the end of that period. It grew from around 23.9% in 1996 to 33.9% in 2017. In contrast, the proportion of elderly homeowners at risk of poverty after paying their housing costs does not change substantially over the analysis period. One may consequently conclude that deducting housing costs reveals a larger proportion of individuals at risk of old-age income poverty, especially if they are tenants. The group making up this difference does not fall under the poverty line if one looks merely at their income, but their housing cost burden is such that they qualify as poor as soon as one looks at the amount of disposable income they have left once they have paid such costs.

#### 4.2. Changes in the composition of the elderly population over time

Table 1 presents the evolution of various household and dwelling characteristics that, according to previous studies (Dustmann *et al.*, 2018; Romeu Gordo *et al.*, 2019), may influence the financial burden of the housing costs, and thus condition the increase in old-age income poverty risk after housing costs have been factored in. The table shows the figures for the elderly in general, as well as for tenants and for homeowners separately, for two periods: 1996–2001 and 2012–2017.

The descriptive statistics show that the proportion of elderly individuals living in couple households increased by 6% points between the two periods, with tenants experiencing a larger increase (+5% points) than homeowners. The percentage of older individuals possessing a migration background was also higher (+4% points) in

**Table 1.** Changes in the composition of the elderly population over time.

	All 65+			Homeowners 65+			Tenants 65+		
	1996–2001	2012–2017	Diff.	1996–2001	2012–2017	Diff.	1996–2001	2012–2017	Diff.
<b>Household characteristics</b>									
Single-male household	6%	12%	6%	5%	10%	5%	7%	15%	8%
Single-female household	37%	27%	–10%	24%	20%	–4%	49%	37%	–13%
Couple household	53%	59%	6%	65%	67%	3%	41%	47%	5%
Other household combinations	4%	2%	–2%	6%	2%	–3%	2%	1%	–1%
Aged 85 or older	9%	10%	0%	8%	8%	1%	11%	11%	0%
With migration background	10%	14%	4%	9%	10%	1%	11%	19%	8%
<b>Region</b>									
Urban area	69%	69%	0%	64%	67%	2%	73%	71%	–2%
Rural area	31%	31%	0%	36%	33%	–2%	27%	29%	2%
East Germany	19%	17%	–1%	11%	12%	1%	26%	25%	–1%
West Germany	81%	83%	1%	89%	88%	–1%	74%	75%	1%
<b>Tenure type</b>									
Private Tenant	31%	29%	–1%				60%	69%	9%
Tenant (municipal or cooperative housing)	21%	13%	–7%				40%	31%	–9%
Outright homeowner	42%	49%	7%	85%	85%	0%			
Homeowner with a mortgage	7%	9%	1%	15%	15%	0%			
<b>Dwelling characteristics</b>									
With garden	59%	64%	5%	90%	86%	–4%	29%	36%	6%
With cellar	96%	95%	0%	97%	96%	–1%	94%	94%	0%
Dwelling size per person (1–29.9 m <sup>2</sup> )	11%	6%	–5%	5%	2%	–3%	17%	11%	–6%
Dwelling size per person (30–59.9 m <sup>2</sup> )	51%	44%	–7%	47%	36%	–12%	55%	55%	0%
Dwelling size per person (60–99.9 m <sup>2</sup> )	30%	38%	7%	35%	43%	9%	27%	30%	3%
Dwelling size per person (≥100 m <sup>2</sup> )	8%	12%	5%	13%	19%	5%	2%	4%	2%
<b>Occupancy duration</b>									
0–5 years	12%	9%	–3%	6%	4%	–2%	19%	17%	–1%
6–15 years	16%	19%	3%	11%	13%	2%	21%	28%	7%
16–35 years	34%	30%	–4%	35%	32%	–3%	33%	27%	–6%
≥36 years	37%	41%	4%	48%	51%	3%	27%	28%	0%
<b>Income</b>									
Quintile 1 (poorest)	20%	20%	0%	15%	14%	0%	24%	27%	3%
Quintile 2	23%	23%	0%	23%	20%	–3%	24%	28%	4%
Quintile 3	23%	25%	2%	21%	26%	4%	24%	23%	–1%
Quintile 4	19%	17%	–2%	21%	20%	–1%	17%	13%	–4%
Quintile 5 (richest)	16%	15%	0%	20%	20%	0%	11%	9%	–2%
<b>Housing costs</b>									
<100 €	28%	9%	–19%	47%	10%	–37%	11%	8%	–3%
100–399 €	60%	51%	–10%	47%	75%	28%	73%	17%	–55%
400–699 €	10%	29%	19%	4%	8%	4%	15%	56%	41%
≥700 €	1%	11%	10%	2%	6%	4%	1%	18%	17%

Source: GSOEP v34, 1996–2001 & 2012–2017. Years 2014 and 2015 are excluded. N=36,991 observations. Housing costs are adjusted by the consumer price index (base year = 2011). Own calculations, weighted. All figures rounded to nearest whole number.

the second period than in the first, having increased by 1 percentage point among the homeowners and by 8% points among the tenants. Home ownership became more widespread in the second period. While only 49% of the elderly owned their own home in 1996–2001, almost 60% were owner-occupiers in the 2012–2017 period. Despite this, the share of outright owners among the homeowners remained stable at around 85%. Within the tenant group, however, the share of tenants living in a

municipal or cooperative housing decreased sharply (−9% points). Turning to the issue of dwelling quality, the percentage of older individuals with a living space of at least 60 square metres was 12% points higher in the second period than in the first. Looked at by tenure status, the main beneficiaries of this improvement in dwelling space per person were homeowners. The figures for duration of occupancy reveal that the elderly in the period 2012–2017 had been living in their dwelling for a longer period than the elderly population in 1996–2001. Again, the magnitude of this change differs by tenure status. While average duration of occupancy rises steeply among homeowners, it actually falls among tenants.

Turning to the distribution of equivalised housing costs, the proportion of the elderly paying more than 400 Euros per month on housing<sup>3</sup> shows an increase of 8% points in the second period over the first among homeowners, while it increases by 58% points among tenants, showing that the increase in housing costs has mainly affected the latter. Taking the tenants alone, one sees an increase in the percentage in the first (+3% points) and second income quintiles (+4% points) between the first and second period, showing an increase over time in the concentration of older tenants in the poorest income groups. Among older homeowners, however, the income quintile which increased most was the third (+4% points). Overall, the results demonstrate that the make-up of the elderly population changed between the two periods. This divergence apparently becomes even larger if we look at changes by tenure status. In order to analyse how these changes may have contributed to the increase in the risk of income poverty in old age, concentrating particularly on the contribution of changes in housing costs, we decompose the change in old-age income poverty risk between two periods (1996–2001 versus 2012–2017), firstly among the elderly in general, and then among tenants and homeowners separately.

### **4.3. Blinder–Oaxaca decomposition**

Table 2 presents the results of three Blinder–Oaxaca decomposition analyses. The first model, which includes the entire elderly population, results in an old-age income poverty rate after housing cost of 15% in the first period (1996–2001). This increases to 18% in the second period (2012–2017). According to the model, the composition (the ‘explained part’) and the residual effect (the ‘unexplained part’) reflect a difference between the two periods of 3.07% points. On the one hand, the composition effect – that is, the changes in the independent variables discussed above – explain 169% of this increase. This means that the old-age income poverty rate would have been 5.18% points higher in the first period if the values for the independent variables had been equal to those in the second period. On the other hand, the residual part contributed to a decrease of 2.11% points (−69%) in the difference. The detailed decomposition of the explained part shows that the change in the distribution of housing costs between the two periods is the most important factor in explaining the increase in income poverty risk after housing costs among the elderly between those same periods, thereby confirming our first hypothesis (H1a). In other words, the increased proportion of individuals suffering high housing costs (Table 1) explains 5.6 percentage points, or 182%, of the difference in old-age income poverty. In

**Table 2.** Decomposition of difference in old-age income poverty risk after housing costs: 1996–2001 vs. 2012–2017.

	65+		Tenants		Homeowners	
	Value	Share	Value	Share	Value	Share
Old-age income poverty after housing costs (2012–2017)	0.1809*** (0.0020)		0.352*** (0.0036)		0.0772*** (0.0023)	
Old-age income poverty after housing costs (1996–2001)	0.1502*** (0.0024)		0.2606*** (0.0041)		0.0649*** (0.0027)	
Difference	0.0307*** (0.0031)	100%	0.0914*** (0.0055)	100%	0.0123*** (0.0036)	100%
Explained part	0.0518*** (0.0021)	169%	0.1118*** (0.0051)	122%	0.0115*** (0.0032)	93%
Unexplained part	−0.0211*** (0.0036)	−69%	−0.0203*** (0.0072)	−22%	0.0007*** (0.0047)	6%
<i>Detailed decomposition</i>						
Household characteristics	−0.0024*** (0.0006)	−8%	−0.005*** (0.0012)	−5%	0.0001 (0.0005)	1%
Region	0.0002*** (0.0000)	1%	0.0004*** (0.0001)	0%	−0.0001 (0.0001)	−1%
Tenure	−0.0032*** (0.0006)	−10%	0 (0.0005)	0%	0.0001*** (0.0000)	1%
Dwelling characteristics	−0.001 (0.0007)	−3%	0.0009 (0.0008)	1%	0.0014 (0.0008)	11%
Occupancy duration	−0.0009*** (0.0002)	−3%	−0.0003 (0.0004)	0%	0 (0.0002)	0%
Income	0.0035*** (0.0019)	11%	0.0268*** (0.0011)	10%	−0.0018*** (0.0033)	−15%
Housing costs	0.0558*** (−0.0019)	182%	0.089*** (0.0054)	97%	0.0119*** (0.0004)	97%

Source: GSOEP v34, 1996–2001 & 2012–2017. Years 2014 and 2015 are excluded. N=36,991 observations. Significance levels: \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. Standard errors in parentheses. The decomposition analysis includes dummies for all variables presented in Table 1.

addition, changes in income explain 11% (or 0.35% points) and changes in the regional spread of older people explain merely 1% of the increase between the two periods. Nevertheless, there are other changes that have made a negative contribution to the rise in old-age income poverty risk. Indeed, changes in the tenure distribution – that is to say, the increase in the home ownership rate – and the changes in demographic structure (the larger number of couple households) reduce the old-age income poverty risk after housing costs by 10% (0.32% points) and by 8% (0.24% points), respectively. The changes in occupancy duration (the higher percentage of older individuals who have lived for longer in their present homes) and in dwelling characteristics (the increased living space per person) also reduced the old-age income poverty risk – by 3% each.

As one might expect from Figure 2, the decomposition analyses by tenure status (the second and third columns of Table 2) show that both the level of old-age income poverty after housing costs and the difference in that level between the two periods are estimated to be much higher among tenants than among homeowners. Indeed, whereas the old-age income poverty risk among the tenants increases by 11% points between the first and the second period, it only increases by 1% point among the homeowners. Interestingly, the changes – i.e. the increase – in housing costs, explain 97% of this difference for both groups. The magnitude of the difference, however, varies according to tenure status. Changes in housing costs contributed to an increase in old-age income poverty risk after housing costs of around 9% points among

tenants, while the figure was only 1% point for homeowners. The contribution of income also differs radically depending on tenure status. While changes in income among the tenants over time – that is, the increase in the number of people belonging to the poorest income quintiles – contributed to 10% (2.7% points) of the rise in old-age income poverty risk after housing costs, the increased wealth of homeowners contributed to a reduction of 15% (0.2% points) in their income poverty risk in old age. In addition, among tenants, the increase in the number of couple households – since couples experience, on average, a lighter housing cost burden (Romeu Gordo *et al.*, 2019) – contributed to a slight reduction (–5% or 0.5% points) of income poverty in old age risk after housing costs between the two analysis periods. Taken overall, the three decomposition analyses lead us to conclude that changes in housing costs between the 1996–2001 and the 2012–2017 periods have contributed, among other factors, to the increase in old-age income poverty after housing costs (Hypothesis 1a) for both tenants and homeowners.

#### **4.3. Determinants of old-age income poverty risk before and after housing costs**

Next, we examine the determinants of the risk of falling into poverty in old age before and after deducting housing costs. Accordingly, we calculate four pooled probit regression models including information on individuals, household demographics and dwelling characteristics: Models 1 and 3 for the pooled sample of the first period (1996–2001) and Models 2 and 4 for the second (2012–2017). Table 3 represents the marginal effects yielded by the probit regression models. The dependent variable in Models 1 and 2 is a dummy variable which takes the value 1 if the individual is considered as income poor before housing costs during the relevant periods. Results show that, among the elderly in both analysis periods, those living in single-person households, with migration background, with low educational attainment and those living in a rental dwelling or resident in West Germany all suffer a greater likelihood of falling below the poverty threshold before housing costs. On the other side of the coin, individuals living in households that include members who are still working, or that have private retirement income or receive income from rents or leases enjoy lower probabilities of falling into poverty before housing costs.

In Models 3 and 4 we examine the drivers that govern whether a person not counted as poor before deducting housing costs switches over into the poor category after making that deduction. The dependent variable takes a value of 1 if an individual aged 65 or older lives in a household that would not be considered poor before deducting housing costs but qualifies as such once they have been taken into account. It takes a value of 0 if the household would not be classified as poor on the basis of equivalised disposable income either before or after housing costs.

The marginal effects of the probit regression models reflect that, in the second period, individuals aged 65 to 70 have a higher probability of falling into relative income poverty after having paid housing costs than the individuals from the very oldest age group (80 years and over). This effect, however, is not significant in the first period (Model 3). Something similar happens in single-male households.

**Table 3.** Determinants of old-age income poverty.

	Model 1: Poverty before housing costs (1996–2001) M.E.	Model 2: Poverty before housing costs (2012–2017) M.E.	Model 3: Poverty after, but not before housing costs (1996–2001) M.E.	Model 4: Poverty after, but not before housing costs (2012–2017) M.E.
<i>Age group (Reference category: 80+ years)</i>				
65–70 Years	0.0217**	0.0382***	0.0007	0.0081***
71–80 Years	–0.0029	0.0163***	–0.0036	0.0034**
<i>Household structure (Ref. cat.: Couple household)</i>				
Single-male household	0.0277**	0.0639***	0.0010	0.0234***
Single-female household	0.0950***	0.0692***	0.0267***	0.0371***
Other household combination	0.0164	0.0691***	0.0008	0.0074
<i>With migration background</i>				
	0.0794***	0.1263***	0.0098**	0.0112***
<i>Education (Ref. cat.: University degree)</i>				
No training/education	0.0795***	0.0824***	0.0073**	0.0141***
Vocational education	0.0274***	0.0280***	0.0049**	0.0099***
<i>With private retirement income</i>				
Rentier (with income from rents and leases)	–0.0637***	–0.0646***	–0.0068***	–0.0121***
	–0.0319***	–0.0111*	–0.0013	–0.0003
<i>At least one household member in work</i>				
	–0.0413***	–0.0441***	–0.0057**	–0.0077***
<i>Health status (1: poor – 5: very good)</i>				
	–0.0081***	–0.0092***	–0.0019*	–0.0008
<i>Region (Ref. cat.: East Germany)</i>				
West Germany	0.0525***	0.0259***	–0.0025	0.0038*
<i>Area (Ref. cat.: Urban area)</i>				
Rural area	0.0259***	0.0159***	0.0008	0.0008
<i>Average rent prices in federal state and regional area</i>				
	–0.0001	–0.0000	0.0001**	0.0000**
<i>Tenure status (Ref. cat.: Outright homeowner)</i>				
Private tenant	0.0104	0.0227***	0.0743***	0.0736***
Tenant (municipal or cooperative housing)	0.0071	0.0201**	0.0466***	0.0702***
Homeowner with outstanding mortgage	–0.0084	–0.0088	0.1051***	0.1097***
<i>Dwelling size per person (Ref. cat.:1–29.99 m<sup>2</sup>)</i>				
30–59.99 m <sup>2</sup>	–0.0445***	–0.0560***	0.0079***	0.0021
60–99.99 m <sup>2</sup>	–0.0686***	–0.1001***	0.0091***	–0.0073**
≥100 m <sup>2</sup>	–0.0820***	–0.1129***	0.0255**	–0.0077*
<i>Type of dwelling (Ref. cat.: Farmhouse or other)</i>				
1- to 2-family house	–0.0708***	–0.0925***	–0.0025	–0.0159*
Apartment in building with 3+ units	–0.0893***	–0.1099***	0.0113*	–0.0135
<i>Facilities (Ref. cat.: not available)</i>				
Garden	–0.0133*	–0.0062	–0.0022	–0.0075***
Cellar	–0.0353**	–0.0197*	0.0049*	–0.0080*
<i>Occupancy duration in years</i>				
	0.0004***	–0.0002	–0.0001**	–0.0002***
<i>Pseudo R<sup>2</sup></i>				
	0.13	0.19	0.23	0.28
Observations	14,279	20,732	12,891	18,721

Source: GSOEP v34. Years 2014 and 2015 are excluded. M.E. = Marginal Effects. Significance levels: \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01. Own calculations.

Although the probability of such men being considered poor after housing costs is not significantly higher than for couple households in the first period, they do suffer a significantly higher probability of being poor after housing costs in the period 2012–2017, a problem they shared with women living in single-person households. In both periods, private renters and those living in municipal or cooperative housing alike suffer a greater risk of being poor after housing costs than outright homeowners. This result confirms our second hypothesis (H1b), though only in part: only outright homeowners seem to benefit from this reduced risk of poverty in old age.

Indeed, homeowners still paying off their mortgage in old age suffer the highest likelihood of all over the entire period of falling below the poverty line once their housing costs are taken into account.

Interestingly, the effect of living space per household member on the probability of becoming poor after housing costs changes between the first and second period. While the probability of falling below the poverty line after housing costs increased with increasing dwelling size per person in the first period, in the second the opposite was the case: the larger the dwelling size, the lower the likelihood of being income poor after housing costs. This change may be due to increased prices in the smaller apartment segment as a result of supply constraints over recent years (Lebuhn *et al.*, 2017), a phenomenon that has often made it cheaper to stay in the same large rental apartment under an old rental contract than to move into a smaller one under a new contract. Indeed, Models 3 and 4 both show that the longer an older person has lived in their dwelling, the lower their probability being classified as income poor after housing costs. The effect of living in West Germany increases in the second period, to the extent that older individuals living in West Germany between 2012 and 2017 have a significantly higher probability of being income poor after housing costs than those living in East Germany. In addition, living in a region where rent prices are higher than average also increases the risk of poverty after housing costs in both periods.

## 5. Discussion

So, do housing costs increase poverty among the elderly in Germany? The answer is clearly yes. We have addressed research questions relating to whether and how changes in housing costs between 1996 and 2017 have impacted on the relative income poverty risk among the elderly in Germany. Using data from the GSOEP, we find that old-age income poverty as calculated using residual household income after deducting housing costs (which we labelled ‘after housing costs’) was higher than when using the standard measure of old-age income poverty (‘before housing costs’). In other words, the relative financial situation of the elderly, and especially of tenants, deteriorates once one takes their housing costs into account. Looking at how this situation has evolved over time, we find that changes in housing costs between 1996 and 2017 contributed to the increase in old-age income poverty after housing costs, thus confirming our first hypothesis (H1a). We also find that changes in income distribution contribute to this increase, albeit less strongly. In addition, results show that other changes in the composition of the elderly population over the last years – such as the increase in its home ownership rates, the rise in the numbers living in couple households and the longer occupancy durations – have actually somewhat attenuated the increase in old-age income poverty between the late 1990s and the most recent years.

A multivariate analysis using probit regression models sheds some light on the determinants of relative income poverty before and after housing costs over the analysis period. Our second hypothesis (H1b) suggests that being a homeowner rather than a tenant should be related to a lower probability of being classified as poor.



Looking at the determinants of poverty *before* housing costs, we find that homeowners had a significantly lower probability of being considered poor only in the last few years of the analysis period. However, considering the same determinants *after* having deducted the housing costs, the results show that of the possible tenure types, outright homeowners had the lowest probability of being poor. Indeed, owning a house and still having to pay interest and mortgage payments has the largest marginal effect on the risk of poverty in old age after housing costs. Obviously, however, these results only refer to the comparison between groups and no longitudinal or ‘counterfactual’ conclusions can be drawn from this evidence. Among tenants, the results show that, although the risk of poverty in old-age after housing costs is higher among individuals living in the private rented sector than among those in municipal or cooperative housing during the analysis period, this difference between tenants narrows sharply in the 2012–2017 period as compared against 1996–2001. This finding lends support to the conclusions of Deschermeier *et al.* (2019), who suggested that over the last two decades municipal housing companies in Germany have increasingly assimilated their way of doing business and generating profit to the behaviour of large private companies. We also find that single-person households, people with low educational attainment, with a migration background, living in West Germany and in areas with higher rent prices all have a higher risk of falling into relative income poverty after housing costs. Overall, then, our study shows the relevance of changes in the housing market to any analysis of welfare outcomes. This is particularly important in the case of the elderly due to the high level of social inequality in Germany. According to Eurostat, Germany is in fact among the EU countries with the highest risk of old-age income poverty after housing costs, 9 percentage points above the EU-27 average in 2019, with as much as double the rate of France (Eurostat, 2019).

Given that the relative income position of the elderly is expected to worsen in future (Bäcker & Schmitz, 2013; Noll & Weick, 2013; Vogel & Künemund, 2018), our research suggests that policy action is required to avoid a further deterioration of the relative financial situation of the elderly in Germany as a consequence of high and increasing housing costs. In particular, when we take into account that the highest rent increases are taking place in the new rental contracts’ market, which may potentially lead to higher housing cost burdens among the future cohorts of elderly people. There would seem to be a need for policy makers to intervene in two main areas if they hope to counteract this tendency: on the one hand, they could work to improve incomes in older households – by increasing provision for old age, via transfers and tax reductions – and, on the other hand, they may want to draw up policies aimed at increasing the supply of affordable housing over the medium and long term. They might well start by working to increase the stock of social housing, which has shrunk drastically over recent years (BMI, Bundesministerium des Innern für Bau und Heimat, 2018), since social housing provision has proven to be a very effective instrument in reducing poverty risk (Dewilde & Raeymaeckers, 2008). In addition, since older single-person households have higher probabilities of being poor before and after having paid the housing costs and the numbers of such households are expected to increase in Germany, policy-makers need to consider putting more small flats into the German housing market with the goal of providing affordable housing for the elderly.

## Notes

1. After deducting the housing costs, 0.4 percent of observations yielded negative values for income. In order to minimise possible measuring errors, such values were bottom-coded at 0 Euros.
2. It should be noted that nowhere in the study do we consider household wealth. The measure we use for old-age poverty is that of relative income poverty in old age, which includes only household income. If wealth were taken into account, it might become difficult to gauge poverty in relation to homeowner households.
3. The housing costs are adjusted to the CPI (100 = 2011).

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