

ARTICLE

The retirement impact on housing cost burden: are homeowners better off than tenants after retirement?

Alberto Lozano Alcántara^{1*} , Laura Romeu Gordo¹, Heribert Engstler¹ and Claudia Vogel²

¹German Centre of Gerontology, Berlin, Germany and ²Department of Social Work and Education, Neubrandenburg University of Applied Sciences, Neubrandenburg, Germany

*Corresponding author. Email: alberto.lozano@dza.de

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Abstract

Existing research on housing cost burden focuses on its evolution over time. Few empirical studies, meanwhile, investigate changes in housing cost burden as a function of age. Literature is also scarce on how people's housing cost burden is affected by the act of retiring. In order to fill this research gap, we examine how the burden of housing costs tends to change after retirement and how the impact of retirement on housing cost burden differs for tenants as compared to homeowners. Taking advantage of the longitudinal data provided by the German Socio-Economic Panel (1993–2019), we estimate fixed effects regressions and model impact functions to estimate how people's housing cost burdens change after they retire. In addition, we interact the retirement event with tenure status. Our results show that retirement is associated with an increase in housing cost burden and that this association is stronger among tenants than among homeowners. We contribute to the literature on housing cost burden by taking a longitudinal perspective and showing that critical life events such as retirement do have an impact on the financial pressures exerted on households by housing costs and can even exacerbate the existing inequality in terms of housing cost burden between tenants and homeowners. We also demonstrate the importance for policy makers and future research of identifying social groups that may be particularly prone to financial overburden as a result of elevated housing costs in old age in order to implement policies that avoid such overburden and prevent the increase in social inequality after retirement.

Keywords: retirement; housing cost burden; longitudinal analysis; lifecourse; financial overburden; German Socio-Economic Panel (SOEP)

Introduction

People living in Germany have had to face large increases in housing costs over recent decades, most especially in the period since 2010 (Dustmann *et al.*, 2018). This increase has been particularly pronounced in large cities. Rents – especially

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new contract rents – increased in Germany’s seven major cities by around 55 per cent during the 2010–2020 period (Deutsche Bundesbank, 2021) and between 2013 and 2018 the purchase price of second-hand apartments increased by 85 per cent in urban areas (Bundesinstitut für Bau-, Stadt- und Raumforschung, 2021).

These developments have inspired much public debate (Spiegel Online, 2019, 2021) on the affordability of housing. They are also at the heart of sociological debate on increasing social inequalities and rising poverty rates among the older people. This debate has been accompanied by an accumulation of empirical literature studying changes in housing prices and affordability (Lebuhn *et al.*, 2017; Dustmann *et al.*, 2018; Baldenius *et al.*, 2019; Romeu Gordo *et al.*, 2019; Lozano Alcántara and Vogel, 2021).

It is doubtless very useful to know how housing costs and relative housing cost burden – the percentage of household income spent on housing – evolve over time, yet the empirical literature has so far neglected to investigate how housing cost burden changes over the course of an individual person’s lifetime. A longitudinal analysis might therefore be expected to add a new dimension to the empirical literature on housing costs and should be expected to provide some new pointers for social policy. Indeed, it is this prospect that provides the inspiration for the present article. Among older adults – and especially retirees – the percentage of household income devoted to paying for housing becomes an even more crucial factor, given both the restricted opportunities available to retirees to supplement their income and the increasing prospect of having to face medical or care costs in old and very old age.

Our study focuses on Germany, a country in which the rates of homeownership are among the lowest in Europe (51.4% in 2018) (Eurostat, 2021a) and where older individuals exhibit a strong preference to remain living in their own homes throughout their later lives (Kramer and Pfaffenbach, 2016). While the residential mobility rates in Germany for the working-age population are relatively high and comparable to those in the Nordic countries, they decrease appreciably for the retirement-age population (Tatsiramos, 2006). Germany is also among the European Union countries whose residents spend the highest share of their disposable income on housing (25.9% in 2019). Indeed, within the population aged 65 or older, 20.4 per cent dedicate more than 40 per cent of their disposable income to housing, a figure that puts them into the category of overburdened (Eurostat, 2021b). In addition, tenants spend a higher percentage of their income on housing on average than do homeowners (Dustmann *et al.*, 2018; Romeu Gordo *et al.*, 2019). This heavier burden becomes especially onerous in old age, by which time most homeowners have already finished paying off their mortgage, with the effect that tenants face a higher risk of becoming financially overburdened than homeowners. This is exacerbated by the fact that they have less flexibility in adjusting their housing expenditure than do owners.

We add new insights to the literature by adopting a lifecourse approach in our efforts to analyse how housing cost burden changes as one moves into retirement. Focusing on older age groups, we examine retirement as a crucial life event in terms of its effect on housing affordability. Retirement is usually associated with a drop in household income at a time when it is difficult to make short-term adjustments to one’s housing costs, especially in times when housing costs are rising steeply. The transition into retirement might therefore be expected to bring with it an

increase in housing cost burden for some groups that can often be large enough to restrict substantially the capacity to consume. We therefore formulate the main research question examined in our paper as follows:

- How does one's housing cost burden change after retirement?

We devote special attention to the differences between the two tenure statuses. Again, taking a longitudinal perspective on the issue, we analyse whether homeowners, tenants and those whose tenure status has changed (from tenancy to homeownership or *vice versa*) face differing patterns of changes in their housing cost burden when they enter retirement.

To address this research question, we use data from the German Socio-Economic Panel (SOEP) for 1993 to 2019 and apply it to estimate fixed effects models. The SOEP offers detailed longitudinal information both on households' housing costs and on their income over the observed period. Due to the nature of the data available in the set, we use information for *households* in relation to income and housing costs, but focus on the information for *individuals* in relation to the age and timing of retirement of the main household earners aged between 55 and 75.

In the study, we first review the main findings in existing literature and recall various theories relating to predictions of consumption behaviour over a person's lifecycle, on whose foundation we build the theoretical framework for our hypothesis. Second, we describe the data and methods that we have decided to use. The main goal of our description of the data is to provide clarity on how we combined household information with data on individuals (household members) for the purposes of our analysis. Third, we present the results of our estimations, and finally go on to discuss their implications.

Literature overview

The body of empirical studies dedicated to investigating the evolution of housing costs and housing cost burden over time has been growing in recent years (*see e.g.* Dustmann *et al.*, 2018; Junker, 2018; Romeu Gordo *et al.*, 2019). Some of such studies distinguish between age groups and then analyse cohort effects: it has been shown, for example, that individuals born in the 1940s show higher rates of homeownership than those born in the 1930s or before (*see* Nowossadeck and Engstler, 2017; Dustmann *et al.*, 2018). To the best of our knowledge, however, there are few empirical studies that investigate changes in housing cost burden as a function of age. Literature is also scarce on how people's housing cost burden is affected by the act of retiring.

Retirement and household income

Retirement is usually associated with a reduction in economic resources (*see* Fasang, 2010; Fasang *et al.*, 2013; Strauß and Ebert, 2013). Pension systems provide retirement income to replace earnings from paid employment, yet in Germany the net pension replacement rate is rather low, reaching 51.9 per cent in 2018 (Organisation for Economic Co-operation and Development, 2021). Further,

there is a good deal of heterogeneity in the size of such reductions in earnings after retirement, depending on the specific applicable regulations at the particular time and place, so that, all in all, the financial consequences of retirement essentially depend on such factors as one's employment history, one's last status on the labour market and on socio-demographic variables (Wetzel *et al.*, 2019).

Retirement and housing costs

So then, how does retirement and its associated reduction in economic resources affect expenditure on housing? According to the lifecycle hypothesis in economic theory (Modigliani and Brumberg, 1954; Friedman, 1957), individuals will tend to plan their consumption and savings behaviour over their lifetimes in such a way that their consumption remains relatively steady over the course of their lives. This means that individuals tend to save when they are earning and deplete their savings once they have retired, thus keeping their levels of consumption stable. However, more recent empirical studies (Banks *et al.*, 1998; Schwerdt, 2005; Haider and Stephens, 2007) have found that retirement is associated with a sharp decline in consumption, contradicting the predictions of the basic lifecycle model. This phenomenon is often referred to as the 'retirement consumption puzzle'.

This theoretical framework may have differing implications for housing spending depending on whether housing is thought of as a consumption good or an investment. In the case of tenants, it can be thought of more as a consumption good and in the case of homeowners, who have usually finished paying off their mortgages by the time they retire, as an investment. Beblo and Schreiber (2021) investigate adaptation in housing consumption for male tenants after retirement. They argue that, since consumption of housing is at least in part complementary to one's leisure consumption – and because retirement should increase the leisure available to the retiree – the lifecycle hypothesis predicts that spending on housing should typically reduce less than on other consumption goods after retirement. Indeed, the results show that income reductions suffered by tenants on entering retirement tend to reduce their housing consumption, but that the effect is not large. Yet all in all these findings support to some extent the existence of a retirement consumption puzzle, contradicting the idea that consumption tends to be smoothed out over one's lifetime, as the lifecycle model would claim.

In general, the peculiarities of the housing market make it difficult for tenants to make big reductions in their housing consumption. The decision made by retirees to age in place, the main preference in German households as much as in households in other European countries (Pani-Harreman *et al.*, 2021), goes hand in hand with costs remaining constant or even with increases in monthly payments. Moving costs are usually also quite large, and rapidly changing prices can be an impediment to cost reduction even if one does decide to downsize. All in all, the likelihood is that housing costs will increase over time as a result of (often automatic) increases in rents (which affect both those who have decided to stay put and those who move).¹

Housing can be also seen as an investment. Homeowners have the option of selling their properties or of obtaining a reverse mortgage in order to finance their consumption during retirement. However, studies on housing equity (*see* Chiuri and

Jappelli, 2010; Banks and Mazzonna, 2012; Angelini *et al.*, 2014) show that homeowners generally tend to be reluctant to draw down their housing equity during retirement. According to the literature on the retirement consumption puzzle, this could have any of three types of explanation (Suari-Andreu *et al.*, 2019). First, uncertainty: since individuals do not know the exact length of the post-retirement phase of their lives, they prefer to keep their investments as far as possible intact. Second, individuals are often keen to leave bequests to their heirs, to the extent that the bequest motive constitutes an important reason for accumulating wealth. Third, many people are careful to keep a firm hold on their housing assets so that they have a cushion to face any unpredictable future medical expenses or the like. Further, aside from these economic motivations, Germans, as we have already mentioned, exhibit a strong preference to remain living in their own homes throughout their later lives (Kramer and Pfaffenbach, 2016), as is reflected in the small number of people who move home after retirement (Angelini *et al.*, 2011; Winke, 2017). This may be explained either by emotional factors or by a preference for living in one's own home in order to preserve one's independence from the will of the landlord. This suggests that homeowners might also consider their house as a consumption good. Nakajima and Telyukova (2020), using HRS data from the United States of America, also find evidence that homeowners dissave slowly due to their preference not to move. Further, depending on where one lives, it may be difficult to sell one's home at one's preferred price.

Hypotheses

To summarise, both tenants and homeowners – whether because of restrictions in the market, uncertainty or personal preferences – tend not to reduce their housing expenditure after retirement. This fact, together with the almost universal decrease in income that occurs after retirement, leads us to assume that housing cost burden will increase after retirement (Hypothesis 1).

But can any difference in this effect be seen between tenants and homeowners? The 2001 German pension reform had the effect of reducing statutory pensions in comparison to wages (Deutsche Rentenversicherung Bund, 2020). This reduction was to be compensated for by providing additional private and occupational pension arrangements. However, none of these additional pension provision options was made mandatory, and the take-up of such options has been very patchy ever since their introduction (Coppola and Gasche, 2011; Kistler and Trischler, 2014: 207; Geyer and Himmelreicher, 2021; Geyer *et al.*, 2021). Those with less lucrative employment biographies – *i.e.* those for whose benefit the reform measures were actually intended – tend to make less use of such additional provision. The upshot of this was that the inequalities in old age between those with continuous employment biographies and those with more interrupted – and most likely shorter – employment biographies is now increasing, contributing to the general increase in social inequality in old age (Simonson *et al.*, 2012).

Considering the social selectivity of homeownership in Germany and the strong positive relationship between better occupational status and more continuous employment biographies, on the one hand, and access to homeownership, on the other (Kurz, 2000, 2004; Wagner and Mulder, 2000; Lersch and Dewilde, 2015),

we expect homeowners to enjoy higher incomes in retirement than tenants. In fact, in Germany, homeowners have a general asset value of about ten times that of tenants (Grabka and Halbmeier, 2021) and higher-income groups are more likely to be entitled to occupational and private pensions (Heien and Krämer, 2018) than their peers with lower incomes. Retired homeowners can more often than not rely on more than just their old-age income from the mandatory public pension system, usually enjoying additional income from other sources, such as occupational pensions and income streams unchanged by their transition into retirement, such as rental incomes or inheritances. Moreover, as a side-effect of the correlation between homeownership and family formation (Wagner and Mulder, 2000), homeowner households are more likely to be made up of couple-based households whereas tenants will tend more often to live alone (Romeu Gordo *et al.*, 2019), meaning that they have no income from other household members to count on when they retire.

We therefore expect tenants to suffer a larger relative decline in household income after retirement than homeowners. Furthermore, since most older households are not in a position to easily adjust their housing costs downwards, the housing cost burden is likely to increase more among newly retired tenants. In other words, we expect the effect of retirement on the housing cost burden to be greater for tenants than for homeowners (Hypothesis 2).

Data and methods

Sample

We use data from the SOEP from 1993 to 2019. The SOEP is a representative panel study of private households that has been surveying all members of households aged 17 or older every year since 1984 in West Germany and since 1990 in East Germany (Goebel *et al.*, 2019). By starting in 1993, we exclude the first few years after German reunification, which are characterised by a period of social change and fluctuations in the housing market. The reason the SOEP data fit our analysis particularly well is that they provide detailed information on the housing costs incurred by households as well as on their income over an extended period. The data also allow one to relate housing information to other relevant socio-economic factors, thus permitting one to compare a wide variety of groups against one another.

In our analysis, we focus on the transition of household breadwinners into retirement.² Firstly, because the retirement of the main income earner is likely to produce the greatest decrease in household income, due to the fact that in the majority of cases in Germany, which exhibits a rather traditional division of work, the breadwinner earns a larger share of the household income than a spouse or partner also in work (Dieckhoff *et al.*, 2020) and, secondly, because we want to focus our analysis on the most far-reaching single event rather than multiple events affecting each household. We therefore include in our estimation only sample households whose breadwinner is between 55 and 75³ years old, and who might potentially have retired between 1993 and 2019. In total, we count 9,134 household breadwinners in the SOEP, all aged between 55 and 75 years, adding up to a total of 62,189 household-years. We apply a variety of exclusion criteria in order to obtain

Table 1. Selection of estimation sample

	Household-years		Households	
	N	%	N	%
Household breadwinners aged 55–75 between 1993 and 2019	62,189	100	9,134	100
Exclusion criteria:				
Fewer than two household-years	2,892	5	2,892	32
Households with breadwinners who have already retired when first observed	1,858	3	225	2
Household-years with missing data in one or more variables ^{1,2}	9,441	15	74	1
Estimation sample	47,873	77	5,905	65

Notes: 1. Due to changes in the German Socio-Economic Panel (SOEP) questionnaire, 1,817 household-years (3%) relate to homeowner breadwinners with missing housing cost information referring to 2014 (*i.e.* from the 2015 survey wave). 2. The large number of household-years with missing information is mostly explained by the transformation carried out in our data so that all information refers to the same point in time; this caused our data to leave out the information for the last household-year of each breadwinner in our sample.

Source: SOEP v36.

the final estimation sample (*see* Table 1). First of all, we exclude those breadwinners who have taken part in the SOEP only once. Secondly, we drop those households whose breadwinners were already retired on the first occasion that they were observed in the SOEP. Thirdly, we exclude those household-years for which data are missing on relevant variables. The amount of missing data in our sample is due to the data transformation we needed to do for the analysis. The information on household income and homeowners' housing costs in the SOEP questionnaire refer to the previous year ($t - 1$). We therefore transformed those variables so that they refer to the current year (t). This had the effect of making all our dependent, independent and control variables refer to the same survey year (t). A by-product of this transformation is that the information for the last household-year for each breadwinner in our sample is missing from our dataset. As a result, although we use data from 2019, our analysis covers the period up to 2018. Our final estimation sample contains 5,905 households (with 4,229 male breadwinners and 1,676 female breadwinners) representing a total of 47,873 household-years. This is 65 per cent of the number of the households in the initial data and 77 per cent of the total number of breadwinners' household-years. Following the recommendation of Brüderl and Ludwig (2019: 52), the breadwinners in the 3,080 households (representing a total of 13,477 household-years) for whom we have no information on their transition into retirement are retained in our analyses as a control group.

Dependent variables

The focus of our analysis (and our dependent variable) is housing cost burden. To calculate that housing cost burden, we combine the available information on

household income and housing costs. *Net household income* represents combined yearly net income in euros of all individuals in the household. It includes the ‘family income from labor earnings, asset flows, private retirement income, private transfers, public transfers, and social security pensions minus total family taxes’ (Grabka, 2020: 42). The variable therefore includes a number of income components especially relevant to our research question: income from rent, for example, which is included within asset flows, and housing allowances, which are included under the rubric of public transfers. Because the information is available on a yearly basis, we divided it by 12 to obtain monthly net household income. This variable did not have any missing values, as any values not given by the respondents were imputed by the SOEP team.⁴ In total, 10 per cent of the income values were imputed.

The *housing cost* figures refer to expenditures in euros that a household has to spend every month on its dwelling place. It is worth noting that, to ensure comparability, the procedure we follow to compute this variable for tenant households is different to the procedure we chose for homeowners. The housing costs for tenant households are calculated as the sum of monthly rent plus utility and heating costs. Homeowner households’ housing costs consist of the sum of utility costs, heating costs, building management and maintenance expenditure plus maintenance costs. If a household has not yet paid off the mortgage for its home, then its monthly interest payments⁵ are also added. Changes made in the questionnaire have caused homeowners’ housing costs for the year 2014 (the numbers contained in the 2015 wave) to be no longer comparable to costs for the other years. They were thus deemed missing and we were forced to drop them during the data preparation process. Other expenditures, such as electricity costs and property tax, are not included, as the relevant information is not available for all years included in the study. The figure for *housing cost burden* is constructed from the ratio of housing cost over income. It provides an indication of the percentage of household income spent monthly on housing costs. To control for outliers, the number is top-coded at 51.8 per cent.⁶ As a result of this precaution, 5 per cent of housing cost burdens of our estimation sample ended up being top-coded. Further discussion on how to operationalise housing costs and housing cost burden can be found in Lozano Alcántara and Romeu Gordo (2020). As explained above, household income and housing costs for homeowners had to be transformed so that the information was made to refer to the current year (*i.e.* the interview year). This means, for example, that the information on household income and housing costs for a breadwinner owning their own house in 2000 is taken from the information surveyed in the 2001 wave, whose relevant monetary values refer to 2000.

Explanatory variables

The main interest pursued by our study is the analysis of the effect of retirement on housing cost burden. It would seem sensible then to be as accurate as possible when determining the date at which each breadwinner transitions into retirement for the first time. We achieve this by generating a dummy variable for *retirement status*. To compute this variable, we combine the information from the variable generated in

the SOEP for employment status with the information on whether the household breadwinner obtains any kind of retirement income. The resulting time-varying dummy variable takes a value of 1 if the breadwinner has received retirement income at some point of the previous year.⁷ The average number of years pre-retirement per breadwinner eventually retiring is 4.2 years in our sample, while the average number of years post-retirement is 4.5.⁸ *Tenure status* is another variable that plays a central role in our study. We differentiate between tenant and homeowner households, regardless of whether or not those in the latter category have paid off their mortgage. In addition, there is also a very small group of households (7.4%) whose tenure status has changed. From these households, we create two further groups: a third group consisting of household breadwinners who start out in the SOEP as tenants but end up becoming homeowners within the last two household-years recorded in the data, and a fourth group consisting of those who started out in the SOEP as homeowners but are living in rented dwellings by the end of the period. Any household that may have changed its tenure status over the analysis period but finishes up with the same status as during its first household-year is categorised as a tenant or homeowner household depending on the status they retained for the longer period of time.

The four groups that were formed by taking their tenure status into account differ from one another in terms of several socio-economic indicators. As shown in [Table 2](#), homeowner households have, for example, a higher level of household income (before and after the breadwinner's retirement) than tenants. Among households whose tenure status has changed, those changing from tenants to homeowners have, on average, a higher level of income than those changing from homeowners to tenants. This is also reflected in the employment status of the breadwinner before retirement. In homeowner households, breadwinners are more often in full-time employment than tenants. In households changing from tenants to homeowners, breadwinners are also more likely to work full time than in households changing from homeowners to tenants. Regarding marital status, breadwinners in homeowner households and households changing status are more likely to be married than breadwinners in tenant households. This is also reflected in household size: tenant households are, on average, smaller than the households from the other groups.

Control variables

In all our models we control for *age*, which we included in the form of 21 age dummies: it simply refers to the breadwinner's age (55–75 years). We also control for *period effects* by introducing a categorical variable for controlling for five different periods and used the first one as a reference category: 1993–1996, 1997–1999, 2000–2005, 2006–2012, 2013–2018. The first period (1993–1996) coincides with the construction boom that happened in Germany in the years after the fall of the Berlin Wall, during which time the majority of older unemployed people in East Germany were pushed into early retirement (Ernst, 1996). Also during this period, the pension reform of 1992 closed off many opportunities to enter early retirement. The period between 2000 and 2005 coincides with a period of slow economic growth, high unemployment and a range of pension reforms of relevance to our topic of study (Berkel and Börsch-Supan, 2004). To ensure that the flow of

Table 2. Summary statistics

	Not retired (59.7%)									
	All		Tenant (41.5%)		Homeowner (50.3%)		Homeowner → Tenant (3.3%)		Tenant → Homeowner (4.9%)	
	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD
Age	58.8	2.9	58.7	2.9	58.8	2.9	59.2	3.0	59.0	2.8
Household net income (€)	3,569.8	3,260.5	2,457.0	1,677.3	4,439.0	3,887.8	3,635.0	2,981.4	4,013.9	3,675.8
Housing costs (€)	528.5	511.9	528.2	253.1	527.1	646.0	527.6	484.2	547.2	601.9
Housing cost burden (%)	19.1	13.3	25.9	12.4	13.8	11.4	17.8	14.6	16.0	11.1
Household size	2.3	1.1	2.0	1.1	2.5	1.0	2.2	1.1	2.3	1.1
Gender (%):										
Men	72.1		61.0		80.9		72.4		75.3	
Women	27.9		39.0		19.1		27.6		24.7	
Employment status (<i>t</i> – 1) (%):										
Full-time employment	63.3		52.7		70.5		65.8		68.9	
Regular part-time employment	8.0		8.9		7.7		7.7		5.3	
Marginal, irregular part-time employment	2.6		3.3		1.9		1.7		4.5	
Not employed/sheltered workshop	23.0		33.0		16.1		23.9		15.2	
No information	3.1		2.0		3.7		0.9		6.1	
No children in household (%)	67.4		73.0		62.1		71.1		71.4	
Children in household (%)	32.6		27.0		37.9		28.9		28.6	
Marital status (%):										

(Continued)

Table 2. (Continued.)

	Not retired (59.7%)									
	All		Tenant (41.5%)		Homeowner (50.3%)		Homeowner → Tenant (3.3%)		Tenant → Homeowner (4.9%)	
	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD
Married	63.8		48.6		76.2		65.0		64.7	
Single	5.9		9.0		3.5		3.2		5.5	
Widowed	5.8		7.0		4.8		7.4		4.2	
Divorced	17.1		27.1		9.0		14.7		18.4	
Separated	3.5		5.3		1.9		7.0		2.7	
No information	3.9		3.0		4.7		2.6		4.5	
Birth cohort (%):										
1923–1939	11.3		11.7		10.5		11.4		15.8	
1940–1949	37.6		35.0		38.3		52.8		41.5	
1950–1959	44.1		45.9		43.7		34.0		39.4	
1960–1962	7.1		7.5		7.6		1.8		3.3	
Number of breadwinners	5,905		2,425		3,043		184		253	
Number of breadwinner-years	28,557		11,838		14,371		956		1,392	

(Continued)

Table 2. (Continued.)

	Retired (40.3%)									
	All		Tenant (38.5%)		Homeowner (49.7%)		Homeowner → Tenant (6.1%)		Tenant → Homeowner (5.7%)	
	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD
Age	66.6	4.2	66.5	4.3	66.7	4.1	66.7	4.1	67.0	4.0
Household net income (€)	2,662.5	2,016.7	2,009.7	1,415.0	3,168.8	2,340.4	2,458.8	1,533.0	2,877.9	1,529.3
Housing costs (€)	468.1	479.8	498.7	234.9	451.8	579.0	394.7	357.1	481.6	772.0
Housing cost burden (%)	20.9	13.9	28.7	12.1	15.7	12.3	18.2	15.0	16.6	11.7
Household size	1.9	0.8	1.8	0.8	2.0	0.7	1.9	0.9	2.1	1.1
Gender (%):										
Men	74.8		65.2		82.5		74.9		72.8	
Women	25.2		34.8		17.5		25.1		27.2	
Employment status (<i>t</i> – 1) (%):										
Full-time employment	63.4		55.2		69.4		62.6		68.5	
Regular part-time employment	7.3		7.3		7.6		7.6		4.8	
Marginal, irregular part-time employment	2.4		2.8		1.8		2.1		5.1	
Not employed/sheltered workshop	24.7		33.2		18.6		26.8		18.0	
No information	2.2		1.5		2.6		0.9		3.8	
No children in household (%)	87.7		90.8		85.2		90.1		86.3	
Children in household (%)	12.3		9.2		14.8		9.9		13.7	
Marital status (%):										
Married	66.8		55.0		76.4		61.9		68.7	

(Continued)

Table 2. (Continued.)

	Retired (40.3%)									
	All		Tenant (38.5%)		Homeowner (49.7%)		Homeowner → Tenant (6.1%)		Tenant → Homeowner (5.7%)	
	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD	Mean or %	SD
Single	4.6		6.6		3.1		3.8		5.5	
Widowed	11.9		13.2		10.5		17.8		8.5	
Divorced	10.9		18.0		5.2		11.0		12.2	
Separated	2.6		3.8		1.7		3.2		1.4	
No information	3.2		3.3		3.1		2.1		3.8	
Birth cohort (%):										
1923–1939	30.2		32.6		27.7		27.4		38.3	
1940–1949	57.6		55.1		59.2		64.0		53.7	
1950–1959	12.1		12.2		12.9		8.6		8.1	
1960–1962	0.1		0.1		0.2		0.0		0.0	
Number of breadwinners	2,825		1,062		1,472		142		149	
Number of breadwinner-years	19,316		7,442		9,605		1,177		1,092	

Note: SD: standard deviation.

Source: German Socio-Economic Panel (SOEP) v36, own computations.

contributions remained steady during this period, the pension authorities introduced a sustainability factor in the pension formula, a measure that also had the additional effect of reducing benefits. To compensate for losses induced by that sustainability factor, the authorities began a separate voluntary state-aided old-age provision scheme known as the ‘Riester-Pension’ (Wörz, 2011). The last period (2013–2018) was marked by large increases in rent and housing prices combined with relatively favourable economic conditions and low unemployment. It is important to note that fixed effects models implicitly control for time-constant characteristics such as birth cohorts.

Table 2 reports summary statistics of the main variables used in this study and other time-constant variables included to better describe our sample.

Method

Our analysis involves calculating fixed effects models in order to estimate the effect of retirement on housing cost burden. The fixed effects models use only *within variation*; that is to say, they compare the housing cost burden of individuals after retirement exclusively against the housing cost burden they themselves carried prior to retirement. In our analyses we control for age and period effects. On top of all this, we have been careful to employ panel-robust standard errors.

We conducted our analytical strategy as follows. First, we calculated a fixed effects model designed to reveal the effect of retirement on housing cost burden among our sample of breadwinners aged 55–75 who might potentially retire. Next, we model dummy impact functions that describe differences in housing cost burden (but also in net household income and housing costs) during the three years immediately before the breadwinner’s first full year in retirement as compared against the pre-retirement years from the age of 55 and upwards. After calculating the effects of retirement among our analytical sample, we interact retirement with tenure status in order to analyse how the impact of retirement on housing cost burden differs as a function of tenure status. Lastly, we also estimate dummy impact functions to describe the changes in housing cost burden in the years immediately before and after retirement in comparison to the pre-retirement years for the various tenure groups. To check the robustness of our results, we control, first, for the number of persons in the household; second, for whether there is another person in the household who earns labour income or another person in the household who is retired; and third, for various control variables included in Table 2 (whether there are children living in the household, employment status before retirement, gender, marital status and number of persons in the household). The results are presented in the online supplementary material. In none of these cases did the inclusion of the control variables have any substantial effect on results. Thus, we continued with our model specification where we only control for age and period effects.

Results: retirement effect on housing cost burden

Breadwinners’ retirement and housing cost burden

To calculate the impact of the retirement of the household’s main breadwinner on housing cost burden, we estimate a number of fixed effects regressions and model

dummy impact functions. Model 1, shown in Table 3, shows the coefficients of the effect of retirement on housing cost burden after controlling for age and period effects. It shows that the housing cost burden of households whose breadwinners have retired between ages 55 and 75 increases by 1.6 percentage points after retirement, thus confirming Hypothesis 1.

However, it is especially interesting to analyse how retirement affects housing cost burden in the short to medium term and whether any anticipation effects have an influence on that burden. To examine any such effect, we apply a number of event time dummies (Model 2 in Table 3, the initial years are plotted in Figure 1): -2 represents the second year before retirement; -1 represents the year before retirement; 0 represents the last observation at which we observe that the breadwinner is not yet in retirement; and 1 represents our first observation of the breadwinner after the transition into retirement. This codification implies that retirement occurs at some point between year 0 and year 1. Dummies 2-5 represent subsequent annual observations of the breadwinner in retirement. The reference period is taken as the period before the two years prior to retirement (but after the breadwinner has reached the age of 55). So, the line plotted in Figure 1 can be interpreted as the change in housing cost burden in the relevant year as compared to the average for the reference period.

Figure 1 indicates that housing cost burden increases even during the first year before retirement as compared against the reference period. It indicates that an anticipation effect does indeed exist, which may be due to the fact that some people reduce their working hours or actually become unemployed in the last few years before retirement. Thus, as early as year 0, housing cost burden is an average of 1.7 percentage points higher than in the reference period. In the first full year of retirement (year 1), the effect on housing cost burden increases to 2.7 percentage points and then up to 3 percentage points in the second year after retirement. From that year onwards, the retirement effect wanes somewhat, stabilising at around 2 percentage points, a figure indicating that even as much as 3 years after a breadwinner retires the affected household's housing cost burden settles at around 2.6 percentage points higher than it was before retirement. What this shows is that retirement exerts an immediate and persistent effect on housing cost burden. Although this result may not seem very strong, changes on such a scale can make the difference in the medium and long term between affordable housing and financial overburden.

To better understand this dynamic, we also modelled the effect of retirement over the two dimensions that lie behind the housing cost burden: household income and housing costs (the results of this operation are not shown). In relation to income, anticipation of a breadwinner retiring has an impact on a household's net income. Right back in the first years studied, before the breadwinner's retirement, the household incomes turn out to be between €107 and 464 per month lower than within the reference period. As we have already seen, this may be due to some breadwinners being subject to changes in their income prior to retirement. During the first five years after retirement, household income ranges between €736 and 949 lower than during the reference period. In relation to the effect of retirement on the household housing costs, we find no statistically significant effect in any of the post-retirement years. This shows that, all in all, the increasing housing

Table 3. Regression results

	Fixed effects			
	Model 1	Model 2	Model 3	Model 4
Retirement status (Ref. Not retired)	1.661*** (0.2)			
Retirement $t - 2$ (Ref. Retirement $t < t - 2$)		0.274 (0.3)		
Retirement $t - 1$		0.958** (0.3)		
Retirement t		1.705*** (0.3)		
Retirement $t + 1$		2.671*** (0.4)		
Retirement $t + 2$		2.987*** (0.4)		
Retirement $t + 3$		2.477*** (0.5)		
Retirement $t + 4$		2.642*** (0.5)		
Retirement $t + 5$		2.696*** (0.6)		
Retirement $t + 6$		2.241*** (0.7)		
Retirement $t + 7$		2.844*** (0.7)		
Retirement $t + 8$		2.813*** (0.8)		
Retirement $t + 9$		3.080*** (0.9)		
Retirement $t + 10$		3.001** (0.9)		
Retirement $t + (11-19)$		2.587* (1.1)		
Homeowner \times Retirement status			-0.702 (1.0)	
Tenant \times Retirement status			-0.941 (0.7)	
Homeowner \rightarrow Tenant \times Retirement status			0.593* (0.3)	
Tenant \rightarrow Homeowner \times Retirement status			3.811*** (0.3)	

Homeowner × Retirement $t - 2$	-0.569 (0.3)
Homeowner × Retirement $t - 1$	-0.216 (0.4)
Homeowner × Retirement t	1.029* (0.4)
Homeowner × Retirement $t + 1$	1.734*** (0.5)
Homeowner × Retirement $t + 2$	1.981*** (0.5)
Homeowner × Retirement $t + 3$	1.290* (0.6)
Homeowner × Retirement $t + 4$	1.519* (0.6)
Homeowner × Retirement $t + 5$	1.381* (0.7)
Homeowner × Retirement $t + 6$	0.378 (0.7)
Homeowner × Retirement $t + 7$	0.894 (0.8)
Homeowner × Retirement $t + 8$	0.281 (0.9)
Homeowner × Retirement $t + 9$	0.375 (0.9)
Homeowner × Retirement $t + 10$	0.182 (1.0)
Homeowner × Retirement $t + (11-19)$	-0.803 (1.1)
Tenant × Retirement $t - 2$	1.359*** (0.4)
Tenant × Retirement $t - 1$	2.959*** (0.4)
Tenant × Retirement t	3.078*** (0.4)
Tenant × Retirement $t + 1$	4.253*** (0.5)
Tenant × Retirement $t + 2$	5.290*** (0.5)
Tenant × Retirement $t + 3$	5.193*** (0.6)
Tenant × Retirement $t + 4$	5.249*** (0.6)
Tenant × Retirement $t + 5$	5.558*** (0.7)
Tenant × Retirement $t + 6$	6.217*** (0.8)

(Continued)

Table 3. (Continued.)

	Fixed effects			
	Model 1	Model 2	Model 3	Model 4
Tenant × Retirement $t + 7$				6.832*** (0.8)
Tenant × Retirement $t + 8$				7.127*** (0.9)
Tenant × Retirement $t + 9$				7.424*** (0.9)
Tenant × Retirement $t + 10$				7.831*** (1.0)
Tenant × Retirement $t + (11-19)$				7.716*** (1.1)
Homeowner → Tenant × Retirement $t - 2$				1.357 (1.3)
Homeowner → Tenant × Retirement $t - 1$				0.103 (1.3)
Homeowner → Tenant × Retirement t				0.437 (1.4)
Homeowner → Tenant × Retirement $t + 1$				0.869 (1.2)
Homeowner → Tenant × Retirement $t + 2$				-0.178 (1.3)
Homeowner → Tenant × Retirement $t + 3$				0.206 (1.4)
Homeowner → Tenant × Retirement $t + 4$				0.094 (1.6)
Homeowner → Tenant × Retirement $t + 5$				-0.064 (1.7)
Homeowner → Tenant × Retirement $t + 6$				-1.636 (1.7)
Homeowner → Tenant × Retirement $t + 7$				-0.444 (1.8)
Homeowner → Tenant × Retirement $t + 8$				2.595 (1.8)
Homeowner → Tenant × Retirement $t + 9$				0.914 (2.0)
Homeowner → Tenant × Retirement $t + 10$				-0.081 (1.7)
Homeowner → Tenant × Retirement $t + (11-19)$				-0.879 (1.8)
Tenant → Homeowner × Retirement $t - 2$				0.639 (0.9)

Tenant → Homeowner × Retirement $t - 1$				−0.037 (1.1)
Tenant → Homeowner × Retirement t				1.215 (1.2)
Tenant → Homeowner × Retirement $t + 1$				3.739** (1.3)
Tenant → Homeowner × Retirement $t + 2$				1.255 (1.3)
Tenant → Homeowner × Retirement $t + 3$				−1.316 (1.1)
Tenant → Homeowner × Retirement $t + 4$				−0.775 (1.3)
Tenant → Homeowner × Retirement $t + 5$				−0.352 (1.4)
Tenant → Homeowner × Retirement $t + 6$				−2.158 (1.4)
Tenant → Homeowner × Retirement $t + 7$				−1.57 (1.6)
Tenant → Homeowner × Retirement $t + 8$				−2.439 (1.5)
Tenant → Homeowner × Retirement $t + 9$				−0.101 (1.8)
Tenant → Homeowner × Retirement $t + 10$				−1.274 (1.8)
Tenant → Homeowner × Retirement $t + (11-19)$				−2.075 (1.8)
R^2 (within)	0.010	0.012	0.016	0.024
Number of breadwinners	5,905	5,905	5,905	5,905
Number of breadwinner-years	47,873	47,873	47,873	47,873

Notes: In all models, age (age dummies from 55 to 75 years) and period effects (1993–1996, 1997–1999, 2000–2005, 2006–2012, 2013–2019) have been controlled for. Standard errors are in parentheses. Ref.: reference category.

Source: German Socio-Economic Panel (SOEP) v36, own computations.

Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

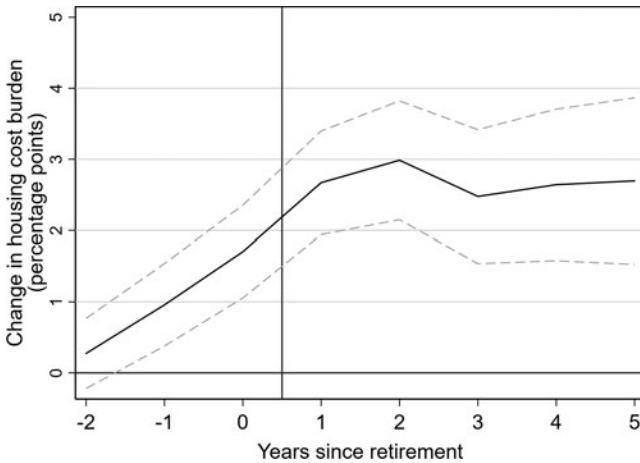


Figure 1. Change in housing cost burden immediately before and after retirement. *Notes:* The vertical line indicates that retirement happens at some point between years 0 and 1. The dashed lines indicate the 95% confidence intervals. Regression results can be found in [Table 3](#) (Model 2). *Source:* German Socio-Economic Panel (SOEP) v36, own computations.

cost burden due to a big drop in household income when the breadwinner retires is not compensated for by any adjustment of housing costs over the following years. This result suggests that there is no substantial drop in housing consumption after retirement which would contradict the existence of a retirement consumption puzzle in housing and be in line with the predictions of the basic lifecycle model (consumption smoothing over the lifecycle). Nevertheless, we argue that some groups (*e.g.* tenant households) may be more affected than others (*e.g.* homeowner households) by this transition. Such differences are analysed in the following section.

Breadwinners’ retirement and housing cost burden by tenure status

In order to test Hypothesis 2, we investigate whether the effect of retirement on housing cost burden differs between tenants and homeowners. To do this, we calculate a fixed effects regression model that includes an interaction effect between tenure status and retirement (Model 3 in [Table 3](#)). The estimated nested effect is shown by tenure status in [Figure 2](#). It can be seen that retirement increases the housing cost burden for tenants (by 3.8 percentage points) while the effect for homeowners is close to zero (plus 0.6 percentage points). The effect of retirement among those household breadwinners who change their tenure status during old age is either negative or close enough to zero as to be statistically insignificant at the 5 per cent level. These results show thus that the only place retirement impacts substantially is on the housing cost burden of the tenants, thus confirming our Hypothesis 2.⁹

To better understand the differences between tenure statuses, [Figure 3](#) offers more information on how the retirement effect differs for tenants as compared to homeowners. The results plotted are the marginal effects estimated in Model 4 ([Table 3](#)), in which we interact tenure status with the various dummy years before and after retirement. Here again, the reference period used is the years leading up to

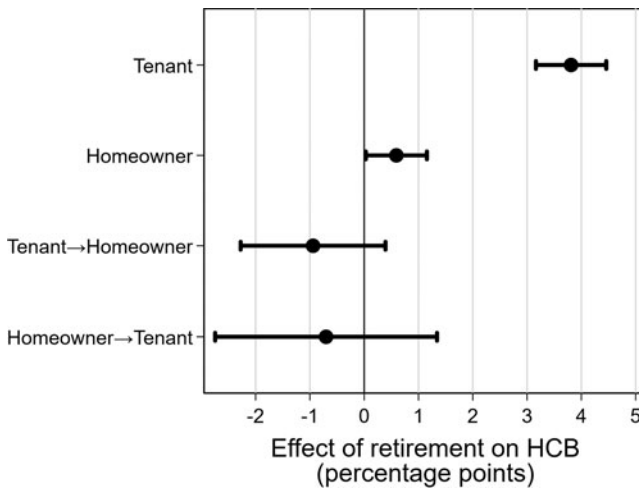


Figure 2. Tenure-specific effects of retirement on housing cost burden (HCB).

Notes: Horizontal error bars represent the 95% confidence intervals. Regression results can be found in Table 3 (Model 3). Source: German Socio-Economic Panel (SOEP) v36, own computations.

the second year before retirement and the household breadwinner actually retires at some point between year 0 and 1. Starting with homeowners, we detect no statistically significant anticipation effect. However, we do see a moderate significant retirement effect from year 0 up to the fourth year after retirement. In the first year after retirement, the housing cost burden is 1.7 percentage points higher than during the reference period (up to two years before retirement but after the breadwinner's 55th birthday). The retirement effect produces up to a 2 percentage-point difference in the second year but thereafter reduces and stabilises at a long-term increase of around 1 percentage point. We can conclude, then, that among homeowners, a breadwinner's retirement has an instant effect on the housing cost burden but that the effect then reduces in the years after retirement. One factor that explains the reduction in the effect on housing cost burden in the years after retirement is that mortgage interest payments reduce after retirement. There are several reasons for this: first, mortgage interest payments reduce over time. Second, anticipating that their income will decline after retirement, they might have planned their mortgage payoff to coincide with the period close to retirement. We see in our data that, whereas around 37.6 per cent of homeowners had mortgage interest expenses in the second year before retirement, this was only the case of 20 per cent in the fifth year after retirement. This means that 47 per cent of homeowners with a mortgage redeemed their mortgage in the years close to retirement. Third, homeowners might also have adjusted their mortgage repayment with the bank in order to decrease their housing costs after retirement.

Among tenants, on the other hand, the effect of a household breadwinner retiring looks quite different. First, an anticipation effect of retirement can clearly be seen among the tenants, as the value for that effect is positive and statistically significant as compared against the reference period (*i.e.* the period previous to the 2 years before retirement). This may be an indication of a higher probability among

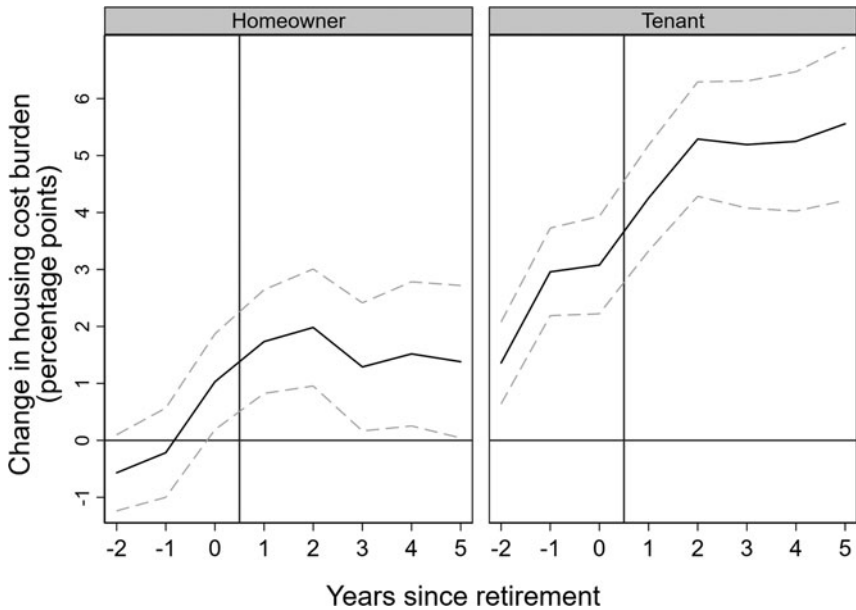


Figure 3. Change in housing cost burden immediately before and after retirement by tenure status.
Notes: The vertical line indicates that retirement happens at some point between years 0 and 1. The dashed lines indicate the 95% confidence intervals. Regression results can be found in [Table 3](#) (Model 4).
Source: German Socio-Economic Panel (SOEP) v36, own computations.

tenants of experiencing unemployment or inactivity in the labour market before retiring. In fact, as can be seen in [Table 2](#), the share of tenants who are unemployed or inactive in the year before retirement is around 33 per cent *versus* 19 per cent in the case of homeowners. Second, in contrast to homeowners, the change in housing cost burden continues increasing after the breadwinner has retired. For instance, in the first four years after retirement, the housing cost burden among tenants is between 4.2 (in year 1) and 5.2 (in year 4) percentage points higher than in the reference period. In the fifth year, the housing cost burden is even higher (plus 5.5 percentage points). There are several factors that explain why housing cost burden increases after retirement for tenants. First, there might be variations in income after retirement due, for example, to widowhood (*see* Lozano Alcántara *et al.*, 2022), or due to the fact that individuals who still earn some labour income after retirement quit their activity. On the other hand, rents can also increase with time, even if individuals remain in their houses. These results further support Hypothesis 2, which predicts a stronger retirement effect among tenants than among homeowners. While the retirement effect begins only upon retirement and reduces after the second year in retirement among the homeowners, the effect of the breadwinner’s retirement on the housing cost burden borne by tenants is both stronger and continues to increase for several years after retirement; in other words, well into the medium term. Given that average housing cost burden levels among tenants are already high (*see* the descriptive statistics in [Table 2](#)), these results show that the act of retirement further exacerbates the financial burden

of housing costs on tenants. In fact, the housing cost burden after retirement among the tenants is, on average, around 29 per cent, that is, close to the 30 per cent limit established in the literature at which one considers a dwelling unaffordable (Pelletiere, 2008); among homeowners, however, the average housing cost burden remains below 20 per cent even after retirement. Besides showing that, through its effect on housing cost burden, retirement has a more serious effect on tenants' financial burden, it can be argued that retirement further entrenches the inequality in living standards between the two groups.

To better understand what causes retirement to have a greater impact on the tenants' housing cost burden, we estimated two additional dummy impact functions using household net income and housing costs as dependent variables (see Figure 4). The results show that, although decreases in household net income are larger in absolute terms among the homeowners, looked at in relative terms, the reduction in income experienced in the fifth year after retirement as compared against the average income in the reference period is larger among the tenant households than among the homeowners. Nevertheless, when looking at the evolution of the housing costs by tenure status immediately before and after retirement, homeowner households tend to reduce their costs while tenant households' housing costs increase. So, contrary to our assumption, the greater impact of retirement on the housing cost burden of tenants as against homeowners does not come simply from a larger reduction in their household income, but also from a difference in the housing costs' development between both groups. While housing costs tend to reduce among homeowners in the first years before and after retirement, they tend to be higher for tenants. As argued above, this can be due to the reduction in mortgage interest payments; first, because they reduce over time, second, because some of the homeowners may have structured their mortgage repayments in such a way that the full amortisation of their debt is timed to coincide with their retirement, meaning that they no longer have to pay mortgage interest after retiring and, third, they may have adjusted their mortgage repayment with the bank. In the case of tenants, however, though their heating costs may allow them some flexibility, their rents and additional costs are relatively hard to bring down. It is clear that unlike homeowners, tenants do not have the freedom to decide on the best moment to conduct maintenance and modernisation, works that in Germany are usually accompanied by rent increases.

Turning to households that change their tenure status late in life, no clear retirement effect can be detected. Among those households that change from homeownership to living in a rented dwelling, retirement has no statistically significant effect on housing cost burden in any of the years immediately before or after the year of retirement; and among those moving in the other direction in old age, from living as tenants to owning their home, the only period in which the retirement effect is statistically significant in a positive direction is in the first year after retirement. After that, the impact approaches zero, ceasing to be statistically significant. Although these results do not allow us to draw any firm conclusions, one possible explanation for the statistically insignificant effect of retirement among such households may have to do with their freedom to plan and adjust their capacity: anticipating or responding to changes in income due to retirement, such households may have changed their tenure status – probably by moving home –

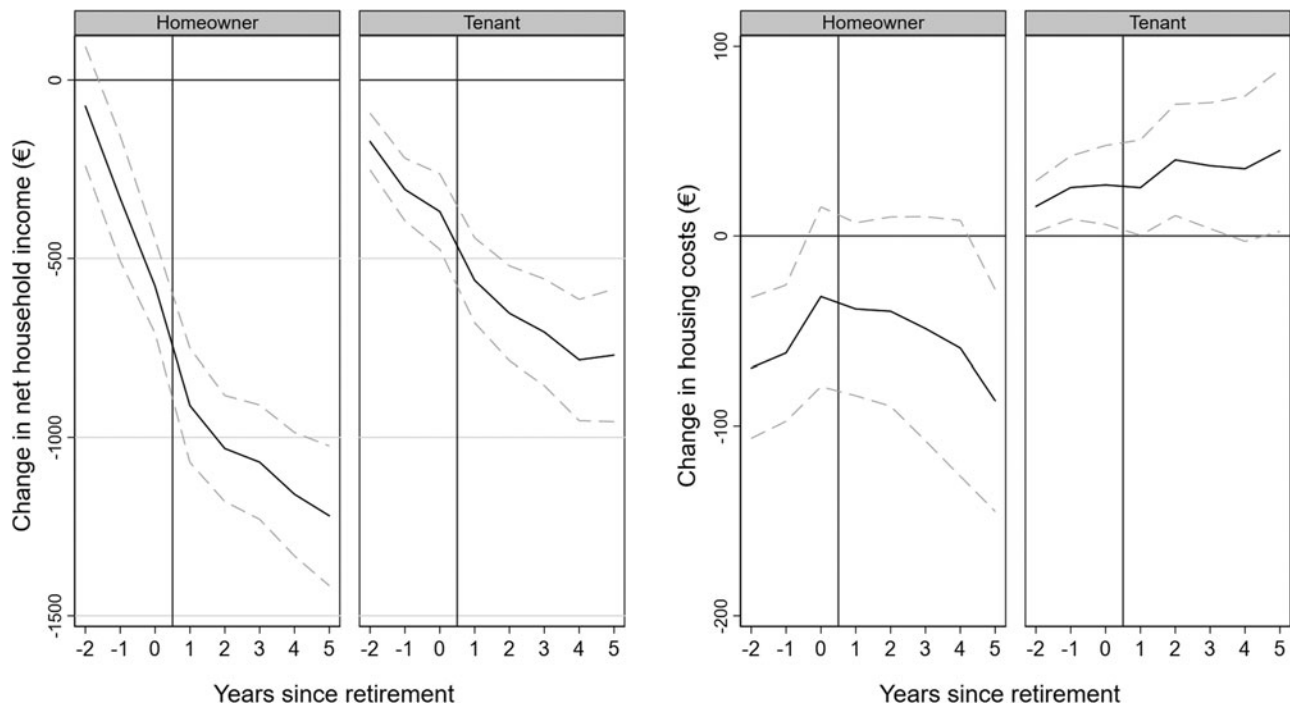


Figure 4. Change in household net income (left) and housing costs (right) immediately before and after retirement by tenure status.

Notes: The vertical line indicates that retirement happens at some point between years 0 and 1. The dashed lines indicate the 95% confidence intervals. Regression results are not shown.

Source: German Socio-Economic Panel (SOEP) v36, own computations.

either before or after retirement, precisely to prevent their retirement impacting negatively on their housing cost burden. It may be relevant that households that move out of tenancy and into homeownership do so on average one year before they retire, while those moving from homeownership to tenancy do it one year afterwards. In addition, those changing to tenancy after retirement downsize (from an average dwelling size of 109 square metres (m²) in the five years before retirement to 102 m² in the five years after retirement) while those moving into homeownership increase their dwelling size (from an average of 99 to 103 m²). This might be taken as an indication that tenants changing to homeownership should be looked upon as planners and homeowners changing to tenancy should be seen as *post facto* adapters to their new situation – whether that adaptation might be voluntary or forced upon them by circumstances.

Summary and discussion

This study adds to the literature on housing costs by taking a longitudinal perspective in analysing how retirement impacts on housing cost burden. Our results show that the retirement of a breadwinner, due to the significant decrease in household income associated with it, exerts an effect on the share of income that households spend on housing. Concretely, it coincides with an increase of 1.6 percentage points in housing cost burden.

However, our results also indicate that tenants confront such changes after retirement in a manner that differs significantly from the experience of homeowners. While household income decreases for both groups, homeowners are in a better position than tenants to notably reduce their housing costs after the transition into retirement, a difference that results in a greater increase in housing cost burden among the tenants as compared to homeowners. In contrast to owners, who seem to have more direct control over many aspects of their housing costs, tenants are more dependent on landlord decisions – about modernisation and rent, for example, especially in tight local housing markets in which demand outweighs supply. This result suggests that tenants are closer to the predictions of the basic life-cycle model, while we observe a certain housing consumption drop by homeowners which is more in line with the predictions of the retirement consumption puzzle.

Since the average housing cost burden among tenants is already much higher than among homeowners before retirement, the stronger retirement effect on housing cost burden among tenants further increases the inequality in terms of that burden between the two groups. While the housing cost burden increases for homeowners modestly from 13.8 to 15.7 per cent, it increases for tenants by a much larger amount: from 25.9 per cent to 28.7 per cent. Household income left over after paying housing costs is as a result even more unequally distributed between tenants and homeowners after retirement. These findings support previous literature which, based on the cumulative dis/advantage hypothesis (Dannefer, 2003), has identified retirement as a life event that exacerbates the intra-cohort social inequality (Wetzel *et al.*, 2019). This finding is particularly relevant in a country like Germany, where society is divided into two almost equal parts between tenants and homeowners. Looking at these issues from a longitudinal perspective in the context of a dynamic housing market can provide some very useful insights into

the topic. Instead of simply showing the financial consequences of increasing housing prices on the population, our methodology has enabled us to illustrate the ways in which the financial pressures exerted on households by housing costs can change after critical life events such as retirement. This provides an important insight, as the financial situation of households and their housing needs will vary over a person's lifespan, and being able to identify the phases of life in which financial pressures are likely to be greater can help one to develop appropriate policies aimed at preventing (or at least alleviating) financial shortfalls and poverty at the later stages of people's lives. Due to increases in life expectancy and the long number of years that people now spend in their own private home after retirement, the issue of affordable housing acquires greater importance as a person approaches very old age.

In addition, our results contribute to the debate on the best strategies to optimise provision for people's old age in the context of a three-pillar pension system like the one in existence in Germany. While the homeowners in our analyses are spared increasing housing costs in old age, this pattern might well change for coming birth cohorts as they begin entering retirement, particularly if housing prices continue to rise steeply – more steeply than pension income – and if a larger number of households remain with debt still left to pay off as their breadwinners reach statutory retirement age. Again, it may well be that tenant households are less able to compensate for decreasing household income after retirement and are more affected by rising rents, while homeowners seem better able to compensate for the employment income they have lost through income from a variety of other sources (such as stock market gains and rental income) and to be in a better position to control and limit their housing costs.

This study has also shown that changes in housing cost burden differ from social group to social group. In our case, we have concentrated on examining differences between households according to their differing tenure status. Homeowners, who will usually have finished repaying their mortgages by the time they reach retirement, tend on average to enjoy the benefits of stable housing costs and may even be in a position to reduce them, while tenants generally do not enjoy such benefits and face increasing costs. This differentiated result also has relevance to policy makers, as it demonstrates the importance of identifying households and social groups that may be more prone to financial overburden as a result of elevated housing costs after retirement. Although, owing to space constraints, the only distinction we have made in this study is between owners and tenants, we nevertheless recommend that future research should focus on other specific social groups, such as single-person households and older tenant households living in large cities.

Our results have a range of social policy implications. First of all, they show that affordable housing for older tenants must rank high on the political agenda if one wishes to prevent people suffering financial overburden due to high housing costs. This is especially important in view of the fact that numbers of new retirees are now increasing drastically in Germany as baby-boomers exit the labour market. One helpful proposal is to construct new affordable flats adapted for the needs of older people. Germany's stock of social housing has been reducing over recent years, which suggests that greater investment is required in this direction to help ease tightness in the housing market in the medium and long term. Inserting our findings into the mix in the debate on ageing-in-place – an important aim

of policy decision making – one must take housing cost burden into account if one wishes to create successful strategies to allow pensioners to age in place. One policy that might have positive effects in the short term would be more intensive use of public transfers such as housing allowance benefits (what is referred to as *Wohngeld* in German), so that a greater number of potential recipients can claim and benefit from such schemes. Lastly, considering the difficulties involved in moving and downsizing during old age in order to reduce housing costs, there would also seem to be a demand for programmes that enable home exchanges while maintaining the existing rent contracts, as well as for subsidies and support measures for relocations within people's neighbourhoods or close to their social networks.

Supplementary material. The supplementary material for this article can be found at <https://doi.org/10.1017/S0144686X23000119>.

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Conflict of interest. The authors declare no conflicts of interest.

Ethical standards. Since the article relies on secondary data, ethical approval was not required.

Notes

1 Tenants in Germany are generally protected against rent increases in existing contracts. Nevertheless, there are some cases in which there can be rent increases, e.g. when the dwellings or buildings are modernised by the owners, as has been quite common in recent years. Furthermore, the rents can be raised if they are below the local comparative rents. This situation often occurs when the owner of the apartment changes (through sale or inheritance) and the previous owner had not increased the rent for a long time. In addition, more and more landlords prefer to use rental agreements with automatic yearly rent increases (*Staffelmietverträge*).

2 The breadwinner of the household is defined as the person with the highest individual income in the relevant household for the longest time in years before retirement. When it is not possible to identify the breadwinner by applying this condition (e.g. if there are two household members who have accumulated the same number of years as the breadwinner in the data), other criteria – such as the household member who has answered the SOEP most often as head of the household or with the longest participation in years in the SOEP – are applied.

3 Eighty-five per cent of individuals (breadwinners and non-breadwinners) who retired between 1993 and 2019 are 55 years old or older.

4 According to Grabka (2020: 57), 'the predominant imputation technique used to fill in missing values is based on the row and column imputation procedure developed by Little and Su (1989). In the case of lacking longitudinal data purely cross-sectional imputation techniques are applied. For further details, see: Grabka and Frick (2003)'.

5 Because the SOEP does not ask about precise interest payments but instead requests a single figure for principal and interest payments taken together, we were forced to estimate interest payments with the help of information from the Einkommens- und Verbrauchsstichprobe (Survey of Income and Expenditure). Using data from the EVS, we calculated the average percentage of mortgage payments devoted to mortgage interest for the 55+ population. We then used the portion thus obtained to calculate the amount of interest paid by households on their mortgages by applying that percentage to the SOEP figures. Since there is information available from the EVS only for the years 2003, 2008, 2013 and 2018, we interpolated the percentages for the intervening years. In our estimation sample, the interest payments were calculated in this

way for around 34 per cent of homeowners. For more specific information on this estimation procedure, see Lozano Alcántara and Romeu Gordo (2020: 12–13).

6 This upper fence has been calculated by applying the interquartile range method (also known as box plot method) for identifying outliers (Aguinis *et al.*, 2013). In estimating the upper fence at 51.8 per cent, we use all persons included in the SOEP between 1993 and 2019, excluding those from the 2015 wave, for whom we lack valid information on housing cost burden. We have used other upper fences (80 and 100%) as robustness checks and found that they do not change the results significantly. When applying a threshold at 80 per cent, the effect of retirement was just 0.06 percentage points higher than the effect calculated with the threshold at 51.8 per cent used in the present paper; and when top-coding at 100 per cent, the effect of retirement was just 0.01 percentage points higher.

7 In the year before going into retirement, around 63 per cent were in full-time employment, around 10 per cent worked part-time or were marginally employed and around 25 per cent were not employed. The remaining 2 per cent were people for whom the information was not specified.

8 The same analysis has been carried out with an alternative definition of retirement. We have alternatively defined ‘retirement’ as the transition from having labour income to not having labour income for those aged 55–75 years. By calculating the effect of this transition on housing cost burden, we observe a similar effect to the one obtained with the original definition used in this paper. The main difference (especially among the tenants) is that, with the alternative definition, the largest effect on housing cost burden coincides in timing with the transition. By taking the original definition of transition (official retirement, that is to say, the moment when the breadwinner receives retirement income for the first time), the timing of the transition and the largest effect of it do not coincide, since the official retirement does not always coincide with a reduction in labour income (as the exit from the labour force can happen before or after receiving retirement income for the first time).

9 In order to check whether the differences by tenure status are robust, we calculated five random effects models (see Table S2 in the online supplementary material), including various control variables which could have an impact on the results, such as the employment status before retirement, the existence of children in the household, the gender of the breadwinner, marital status and the number of persons in the household. Although some of these variables have a statistically significant effect on the housing cost burden, the inclusion of these variables did not change the different effect of retirement by tenure status.

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