The homeownership rate of the elderly and the Life Cycle Hypothesis: European evidence with data at the household and individual level

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Abstract

One of the central predictions of the Life Cycle Hypothesis is that individuals should run down their wealth during retirement. Although housing wealth is the largest component of total household wealth in most countries, the empirical evidence supporting the decumulation hypothesis is mixed. In this paper we examine the housing tenure decision of the aged with microdata at both the household and individual level. The results, based on data from the European Community Household Panel for thirteen European countries, show that for nearly all countries (except for Germany and Denmark) the homeownership rate of the elderly does not decline with age, rejecting the Life Cycle Hypothesis. The results are robust to the level (household or individual) data is analyzed. The estimates also show a significant positive cohort effect for most European countries, so that the later the year of birth the higher the homeownership rate.

Key words: housing consumption, homeownership rate, elderly, age-cohort effects, life-cycle hypothesis.
(**JEL** D12, D91, R21)

* The authors acknowledge financial support from the Ministerio de Educación y Ciencia through project SEJ2007-65255.

1. Introduction

The ageing population has renewed the interest among academics to know about the behaviour of the elderly. With regards to their economic status, one of the central decisions of the elderly is concerned with their housing choices (Hurd, 1990). At a microeconomic level, because of the high cost of houses compared to yearly income, housing tenure decisions *(i.e., owning versus renting)* can greatly affect the welfare of the elderly.[1] At an aggregate level, housing decisions made by the elderly might have severe consequences on house prices, as analyzed by Mankiw and Weil (1989) and subsequent literature. Further, because housing wealth is the largest component of households' wealth in most countries (Börsch-Supan, 2003; Mitchell and Piggott, 2004; Bover et al., 2005), the age pattern of housing tenure decisions obtained at the microeconomic level is basic to explain the relationship between saving and economic growth at the macroeconomic level (Modigliani, 1986; Paxson, 1996).

The standard theoretical model in literature on consumption/saving is the life-cycle hypothesis (henceforth, the LCH).[2] In this model individuals are supposed to save when income is high and decumulate wealth when income is low. Consequently, one of the main predictions of the LCH is that individuals should run down their wealth during retirement. If households consider housing wealth as a means for financing their consumption during retirement, then the life cycle model predicts a decreasing age pattern for elderly housing arrangements.

[1] See, for instance, the literature on reverse mortgages.
[2] See Browning and Lusardi (1996) and Deaton (1997) for a review of the literature on the LCH.

Focusing on housing wealth, the main ways to decumulate wealth are twofold: (1) downsizing ownership positions and (2) the tenure transition from ownership to rental (Jones, 1997). From these two options, the one with the highest impact on housing wealth is own-to-rent transitions.

This paper focuses on the homeownership decisions of the elderly as they age. Previous empirical literature on the age pattern of the tenant status of the elderly is mixed (see Section 2). In fact, the results seem to be conditional on the type of microdata analyzed. Papers that examine cross-sectional data usually support the LCH as they obtain a decreasing age-homeownership rate for the elderly. However, cross-sectional estimates confound age and generational effects (Shorrocks, 1975), so that longitudinal data is required to disentangle both effects. For this regard, papers with panel data do not detect a substantial change in tenant status as the elderly age, meanwhile pseudo-panel data provides mixed results.

This paper attempts to add to the debate on the homeownership rate of the elderly in a number of ways: first, previous empirical literature has mostly been based on US and UK data,[3] that are countries with high ownership rates. In this paper we use microdata drawn from the European Community Household Panel (henceforth, the ECHP). This survey allows us to analyse a sample of 13 European countries (Austria, Belgium, Denmark, Germany, France, Ireland, Italy, Greece, Luxembourg, The Netherlands, Portugal, Spain, and United Kingdom) with a standardised questionnaire. In addition to complementing previous literature, the sample provided by the ECHP is interesting in that the predominant tenant status, and consequently the institutional characteristics

[3] See, among others, Mankiw and Weil (1989), Börsch-Supan (1990), Jones (1995, 1997), Sheiner and Weil (1992), VanderHart (1994), Ermish (1996), Linneman et al. (1997), Megbolugbe et al. (1997), Ermish and Jenkins (1999), and Venti and Wise (2000, 2001).

promoting the access to housing, is different among European countries (Maclennan et al., 1998; European Central Bank, 2003). Thus our results allow to examine whether the age pattern of the homeownership rate of the elderly is dependent upon the predominant tenancy status in each country. Second, the ECHP was conducted on a yearly basis during eight consecutive years. Unlike single cross-sectional data, the longitudinal dimension of the ECHP enables to estimate the age profile net of cohort effects. Recent literature has emphasized the importance of accounting for cohort effects in the analysis of housing careers (Guiso y Jappelli, 1999; Myers, 1999; Venti y Wise, 2000, 2001; Chiuri y Jappelli, 2002; Crossley y Ostrovsky, 2003). In fact, not controlling for cohort effects may bias the test for the age-homeownership rate profile predicted by the LCH. We address this issue via the use of pseudo-panel techniques, with cohorts defined according to the year of birth of individuals. Although this paper is aimed at estimating the age profiles, the estimates of the cohort profiles across European countries are also interesting in their own. Third, we examine whether the age profiles obtained are robust to the level data is grouped to construct the pseudo-panels. In particular, pseudo-panels are constructed from grouping data at both the household level, where the household reference age is that of the household head, and the individual level. Using data at the household level is the usual approach in literature on housing. The implicit hypothesis when using data at the household level is that household heads last in this position indefinitely. However, households can form and disintegrate as people regroup through divorce, children leaving home, death or the elderly moving in with their children. All these issues suppose that summarizing household information by means of the household head might generate a sample bias, so that household heads need not be representative of all individuals at his age in the sample. Unlike household information limited to the household head (reference person), using information at the individual level for all household members allows to overcome all these potential sample biases (Deaton and Paxson, 2000).[4]

The main findings of this paper are the following. The results show that the age-homeownership rate profiles are very sensitive to the inclusion of the cohort variables in the estimates. In particular, a decreasing age pattern, similar to the one obtained when data is treated as pooled cross-sectional data, is obtained when the cohort effects are not accounted for. However, the inclusion in the estimates of the cohort variables changes significantly the age-profiles obtained, showing now either a slightly increasing or flat homeownership rate with age for most countries. Only Germany and Denmark keep on showing a decreasing age profile. Thus, data from most of the European countries analyzed do not support the own-to-rent transition predicted by the LCH during retirement. As regards the cohort profiles, a significant positive cohort effect is obtained for most European countries. That is, the percentage of households (individuals) that own their dwelling increases the later the generation was born. Finally, it is worth noting that the age-profiles net of cohort effects are robust to the level data is grouped to construct the pseudo-panels, while the cohort effects are stronger with data grouped from the individual level.

The remainder of this paper is organised as follows. Section 2 reviews the literature on the homeownership rate of the elderly. Section 3 describes the data set and discusses the estimation strategy. The main results are commented in Section 4, meanwhile the concluding remarks are outlined in Section 5.

[4] The methodological issues to infer individual information from household data are discussed in Section 3.

2. Literature review

The particular characteristics of housing make that individual when deciding their housing arrangements, in addition to taking into account the effect on their utility when consuming housing services they also bear in mind saving considerations (Henderson y Ionnides, 1983). The standard theoretical model in literature on consumption/saving is the life-cycle hypothesis. In this model the consumer smooths their life-cycle total income along his life span so that he keeps constant his intertemporal marginal utility. In the basic model, where there is certainty and financial markets are efficient enough (Modigliani, 1986), individuals save in periods when income are high and dissave when income are low, so that individuals would be expected to save during the working period and dissave during retirement. If households consider housing wealth as a means for financing their consumption during retirement (Venti y Wise, 2000), then they would be expected to decumulate housing wealth during retirement as they age (Jones, 1997).

The empirical literature on the age pattern of the homeownership rate of the elderly is mixed. Those papers that rely on cross-sectional data usually obtain a decreasing homeownership rate as elderly age, supporting the LCH (Mankiw and Weil, 1989; Vanderhart, 1994; Jones, 1995, 1997; Ermish, 1996; Linneman et al., 1997). As commented above, however, cross-sectional estimates confound age and generational effects. The individuals interviewed in any cross-section belong to generations that differ in mortality rates, preferences, institutional arrangements, and lifetime resources (Jappelli, 1999). Thus a decreasing age-homeownership rate profile might simply be the result of comparing individuals belonging to generations with lower permanent income the earlier they were born. In order to obtain age profiles net of cohort effects longitudinal data is required, so that these time fixed effects can be controlled for in the estimates. For this regard, Börsch-Supan (1990) shows how different the housing age patterns can be depending on whether panel data from the American PSID is analyzed as either pooled cross-sectional or longitudinal data.

Regarding the results with longitudinal data, those papers that use panel data do not obtain substantial own-to-rent transitions (Feinstein and McFadden, 1989; Börsch-Supan, 1990; Sheiner and Weil, 1992; Megbolugbe et al., 1997; Ermish and Jenkins, 1999; Walker, 2004; Tatsiramos, 2006). Indeed, when detected they correspond to very old individuals and are associated to precipitating shocks in the household status, like the death of a spouse or significant money disborsaments due to entry to a nursing home.[5] On the other hand, those papers that apply pseudo-panel techniques are not highly supportive of the LCH; Venti and Vise (2000, 2001) obtain a flat age profile with US data, meanwhile Crossley and Ostrovsky (2003) obtain a decreasing but not steeply age pattern with Canadian data.

The life-cycle model also incluyes differences in the level of consumption among households due to a generational effect. Modigliani (1986) supposes that if productivity grows over time, then each generation holds higher lifecycle resources the later she was born.[6] In this context, a positive and growing relationship between the year of birth of individuals and their housing demand. In fact, the empirical literature supports the existence of cohort effects for the homeownership rate (Guiso and Jappelli, 1999; Venti and Wise, 2000, 2001; Crossley and Ostrovsky, 2003).

[5] This evidence is in accordance with the treatment of housing wealth as precautionary saving (Skinner, 1993).
[6] In the basic LCH it is assumed that productivity growth is generation specific. This implies that any productivity shock would induce a parallel shift of the age-wealth profile without affecting its shape. In other words, age and cohort effects are supposed independent.

3. Data and estimation strategy

3.1. The data set

This paper draws on data from the European Community Household Panel. The ECHP is a standardized multi-purpose annual longitudinal survey providing comparable microdata about living conditions in the European Union Member States (Eurostat, 1996). The survey is annually representative of households and individuals in each country, where over 60,000 households and 130,000 adults across the European Union were interviewed at each wave. The topics covered in the survey include income, demography, labour, health, education and training, housing and social relations. The survey began in 1994 in twelve countries (Belgium, Denmark, Germany, France, Ireland, Italy, Greece, Luxembourg, Netherlands, Portugal, Spain, and the United Kingdom) and three additional countries joined the survey in the succeeding years (Austria in 1995, and Finland and Sweden in 1997). The last survey was conducted in 2001, so that for most countries the ECHP covers the period 1994 to 2001. In this paper all these countries, except for Finland and Sweden due to longitudinal data requirements, were analyzed.

One of the attractive features of the ECHP for the purpose of this paper is that it provides information about the tenant status of dwellings together with demographic data for all adult household members. Thus we can work with information at both the household and individual level. As regards the tenant status, the ECHP collects information whether the household owns its dwelling or rents it. Those households for whom this information was either missing or not applicable were excluded. As the aim of this paper was to examine the tenant status of the elderly we focused on those households with the head aged 50 or older. In the ECHP the age information is top coded for those individuals born in 1909 or before. Consequently, those households with the head born before year 1910 were also excluded, so that our sample is restricted to households with the reference person aged between 50 and 91 years (henceforth, the household elderly sample). Notice that the availability of tenancy information up to the age of 91 is interesting because, as commented in the literature review, some authors only detect transitions out of ownership at very old ages.

As commented above, however, the analysis of the age profile by means of the household head age supposes that his tenure decisions are representative of all individuals at his age. As surveys usually identify the household head as the family main earner, it is obvious that there might be a selectivity issue. Indeed, individuals do not always last as household heads over their whole life cycle: Divorces and widowhood suppose changes in the household reference person. Further some elderly move in with their children, so that they are no longer household heads and disappear from the sample of household heads.[7] All these sample selection issues might generate a misleading age-homeownership profile among the elderly when the household age reference is that of the household head. In order to sort out all these selection issues we generated a new sample that included all household members older than 49 years and born later than 1909 whatever their household status (hereafter, the individual elderly sample). Unlike with information at the household level, where at each wave we had one observation per household, at the individual level we had as many observations as elderly household members were at each wave. A final issue to construct the sample at the individual level was the imputation procedure of the household tenant status to its

[7] As shown in Table 1, this is a relevant issue in several, mainly Southern, European countries.

family members. In this paper we followed the work by Deaton and Paxson (2000), where total household expenditure is imputed to the household members. We suppose that homeownership is a public good for spouses, so that when a household owns (rents) its dwelling it is considered that both partners are owners (renters). For the rest of household elderly members homeownership is supposed to be a private good, so that they are always computed as renters.

Table 1 presents the homeownership rate for the European countries in 1994 and 2001. For the sake of comparability this table provides information for the household elderly sample but also for all households with heads aged twenty and older. Three main conclusions can be drawn from Table 1. First, the homeownership rate presents wide differences across Europeans countries whatever the age sample. In 1994 these differences ranged from 39.2% for Germany to 85.1% for Ireland for the household elderly sample. Second, the figures are higher for the elderly sample than for the whole sample in nearly all countries.[8] Finally, the comparison between the years 1994 and 2001 shows a significant increase in the homeownership rate for both age samples in most European countries. Particularly note worthy are the cases of the Netherlands, the United Kingdom and Greece, with increases of eight percentage points or higher.[9]

(INSERT TABLE 1 ABOUT HERE)

Drawing attention on the elderly samples, Figure 1 shows the homeownership rate by age groups pooling all the waves available in the ECHP. Panels 1a and 1c plot the age profiles for the household elderly sample. Broadly speaking in these two panels own-to-

[8] This evidence is also obtained in Mitchell and Piggot (2004) with data for Japan, US and Australia.
[9] Engelhardt (2007) also obtains a significant increase in the homeownership rate for American elderly households over the period 1977-2000.

rent transitions increase with age in all countries, especially for those households aged 70 and above. It is remarkable the sharp fall in the ownership rate of British and Dutch households. Panels 1b and 1d display the age-homeownership rate profile for the individual elderly sample. Compared to panels 1a and 1c, transitions out of ownership are higher with data at the individual level. This is especially true for those countries with a high percentage of elderly living with their children, that are plotted in panel 1b.

(INSERT FIGURE 1 ABOUT HERE)

3.2. Estimation strategy

At first sight, the declining age-homeownership rate profile displayed in Figure 1 might seem in contradiction with the general upward trend for the elderly shown in Table 1 in the period 1994-2001. The element that reconciles both facts is the potential existence of cohort effects in the data. In particular, if at a given age each generation has a different homeownership rate, higher the later the generation was born, then the decreasing homewnership rate with age drawn with pooled data could be the result of generational differences. Further, despite differences in the homeownership rate by cohorts, they all might follow the same trend over time, explaining evidence in Table 1.

As a result, testing for the housing wealth decumulation hypothesis predicted by the LCH requires disentangling the age and cohort effects while controlling for time common effects. This implies that single cross-sectional data is not suitable to test for the age-homeownership rate profile. Unlike cross-sectional data, longitudinal data allows to disentangle how these three effects affect the tenant status:

$$T_{it} = f(\text{age}, \text{generation}, \text{time}) \quad [1]$$

where T_{it} is the tenant status variable of household (individual) *i*, that takes the value 1 if the household (individual) owns its dwelling, and 0 if it is rented. Time variables refer to the year when data was collected and are intended to control for macroeconomic shocks common to all households (individuals) in the sample.[10]

Although a true panel approach is possible with the ECHP, several issues are at hand. First, the survey suffers from a severe attrition problem (Peracchi, 2002).[11] Second, because the ECHP is intended to reflect changes in the population over time the survey follows the evolution of the initial sample through the formation of new households from the split off of existing ones. Again, in many cases, the longitudinal dimension of these new households is short. Third, the percentage of households that show tenant status transitions during the period available are minor in most countries (Tatsiramos, 2006). Thus most of the sample variability is not longitudinal, but cross-sectional.

In order to sort out all the above factors and take advantage of the whole elderly sample available in the ECHP, in this paper pseudo-panel techniques were applied. Pseudo-panels are generated by means of grouping households (individuals) on the basis of a time invariant characteristic; usually, the year of birth of the household head (individual). Taken the year of birth as the reference variable, information from each

[10] In the ECHP other socio-demographic information was also available. It was not included in the model because we were interested with the unconditional age profiles. For this regard, the results were robust to its inclusion in the estimates, so that we followed previous housing literature (see, for instance, Ermish (1996)) and not included it.

[11] The percentage of households from the initial sample that completed all the waves was 54.4% in Spain, 48.9% in Denmark, 55.8% in the Netherlands, 55.6% in Belgium, 58.4% in France, 37.7% in Ireland, 61.8% in Italy, 60.6% in Greece, 75.9% in Portugal, and 48.2 in Austria. As regards the annual attrition rate it was 8.29% in Spain, 9.66% in Denmark, 7.95% in the Netherlands, 8.02% in Belgium, 7.36% in France, 12.91% in Ireland, 6.60% in Italy, 6.85% in Greece, 3.85% in Portugal, and 18.5 % in Austria.

wave can be tracked so as to follow the average behaviour of each cohort over time. For this regard, each cohort can be construed as a synthetic household (individual) with as many time observations as waves are available (Deaton, 1997). When applying pseudo-panel techniques expression [1] can be presented as:

$$\overline{T_{ct}} = f(\text{age, generation, time}) \qquad [2]$$

where $\overline{T_{ct}}$ corresponds to the homeownership rate for all households (individuals) belonging to cohort *c* that were interviewed at year *t*. If the age, cohort and year variables are specified as a set of dummy variables, then equation [2] can be estimated as:

$$\overline{T} = D^{a}\alpha + D^{c}\gamma + D^{t}\delta + u_{ct} \qquad [3]$$

where $\overline{T}$ is a stacked vector of the homeownership rate with elements corresponding to each cohort in each year. D^a, D^c y D^t are matrices of age, cohort (year of birth), and year dummies, respectively. α, γ y δ correspond to the coefficients on the age, cohort and year effects, respectively, and u_{ct} is the error term.

Each cohort was constructed by grouping households (individuals) into five-year of birth intervals, where the age assigned to each cohort was its mid-age. For instance, cohort 1 was defined for those household heads (individuals) born between 1910 and 1914. Thus the age interval for this cohort in year 1994 was 80-84 and its age assigned was 82. In year 1995 the age interval was 81-85, so that the age assigned was 83. Notice that because cohorts are defined as a five-year band and the ECHP is available for eight consecutive years, then cohorts overlap for three years, so that our pseudo-panels have common information for the same age but different cohorts. The year-of-birth intervals, the range over which the median age of each cohort is observed in 1994, in 1997 and in 2001, and the average cell size for each cohort are reported in Table 2. Each country pseudo-panel sample had 64 observations (except for Austria with 56 observations), corresponding to eight cohorts during eight years.

[INSERT TABLE 2 ABOUT HERE]

Finally, as it is known, there is a linear direct relationship between age, generation and year; given the year-of-birth, *b*, and the sample year, *t*, then the age, *a*, can automatically be inferred because of the identity, $a=t-b$. Any of these three effects can be explained as a combination of the other two effects, so that identifying age, cohort and year effects requires strong assumptions to be imposed on the parameters (Mason y Fienberg, 1985). Ways to solve the identification problem typically rely on the separability assumption between age and cohort effects, plus restrictions on time effects or specification of a model for at least one of the three effects (Brugiavini and Weber, 2003). In this paper we have adopted the standard approach in literature, following the identification proposal of Deaton y Paxson (1994). These authors suppose, by means of conditions [4] and [5], that year dummies sum to zero and are orthogonal to the time trend composed by the age and cohort effects (a+b). In other words, these restrictions suppose that all trends in the data can be interpreted as a combination of age and cohort effects and are therefore, by definition, predictible (Jappelli, 1999). Thus year dummies can be interpreted as deviations around that time trend.

$$\sum_{a+b=t}^{T} D^t = 0 \qquad [4]$$

$$\sum_{a+b=t}^{T} (a+b) D^t = 0 \quad [5]$$

where D^t is a set of year dummies, and *a* and *b* the age and cohort effects.

4. Results

In this section the estimation results are discussed. As commented in Section 3 the estimates include age, cohort and year dummy variables, where the latter are transformed to impose Deaton and Paxson's (1994) restriction. The dependent variable, that is, the homeownership rate for cohort *c* at year *t*, T_{ct}, is expressed in *log-odds* form: $\ln[T_{ct}/(1-T_{ct})]$.[12] Equation 3 was estimated using Weighted Least Squares, with cohort size (i.e., the number of households or individuals grouped for each cohort) at time *t* used as the weights.

Tables 3 and 4 present the results for the pseudo-panels with information grouped from the household and individual elderly samples, respectively. In both tables the F-statistics (and their p-values) of joint significance of the whole model and of the age, cohorts and year dummy variables are reported. The results in Table 3 for the household elderly sample show that both the age dummies as well as the cohort dummies are jointly significant at the 5% level for all countries, except for the age dummies for Austria that are significant at the 7% level. As for the year dummies, they are not significant at the 5% level for most countries. Regarding the explanatory power of each set of variables,

[12] This functional form ensures that the predicted values will always lie between 0 and 1, which would not be the case with a standard linear specification.

the Wald tests reported in Table 3 show that compared to age and time effects, the cohort variables are, by far, the ones with the highest explanatory power. The results for the pseudo-panels with information grouped from the individual elderly sample were very similar to those reported in Table 3. It is worth commenting, however, that the explanatory power of the cohort variables is higher in Table 4.

[INSERT TABLE 3 ABOUT HERE]

[INSERT TABLE 4 ABOUT HERE]

Figure 2 plots the estimated age-homeownership rate profiles for each country. To assess the relevance of controlling for both the cohort effects and the potential sample selection biases incurred when data is used at the household level, in Figure 2 we present three different estimated age-ownership profiles; the first two age profiles, obtained from the pseudo-panels based on grouping information at the household level, differ in the inclusion/exclusion of the cohort variables. On the other hand, the third age profile is obtained from estimates of the pseudo-panels based on grouping information at the individual level when cohort variables are included in the regressions.

[INSERT FIGURE 2 ABOUT HERE]

The age-homeownership rate profiles (not cohort-adjusted) with information at the household level shown in Figure 2 display a general decreasing age pattern, as also obtained in the empirical literature with cross-sectional data. In some countries (Germany, Denmark, Holland, Belgium, Austria and the UK) this pattern is observed at all ages, while in other countries (France, Italy and Greece) it is obtained only at older ages as the age profiles describe an inverted U-shape. The rest of countries (Luxembourg, Spain and Portugal) show a flat home-ownership rate by age. The age profiles, however, change dramatically when the cohort variables are included in the regressions. As commented above, the fact that cohort effects show a high explanatory power supposes that age profiles are biased when the generational effects are not accounted for. In fact, the declining ownership rates with age highlighted above do only remain for Germany and Denmark. For the case of Holland, the decreasing age profile becomes flat. For the rest of countries (Belgium, Luxembourg, France, United Kingdom, Italy, Spain, Portugal and Austria), the age profile increases with age. That is, once that time effects and generational differences are accounted for, in most countries the homeownership rates do not decline with age, not supporting then the Life-Cycle hypothesis when estimating pseudo-panels constructed from the elderly household sample.

However, household level information might unveal the sample selection issues commented in Section 3. Interestingly, the age profiles net of cohort effects obtained at the household and individual level show similar patterns (see Figure 2). That is, the absence of a declining age-homeownership rate of the European elderly is robust to the level at which information is grouped.[13] Notwithstanding, it is worth noting that in several countries (Germany, Denmark, Luxembourg, Italy, Spain, Portugal and Austria) the estimated homeownership rate is lower at the individual than at the household level, especially for the old olders.

[13] Wald tests were applied to test for the equality of the age dummy coefficients. For this purpose, the age dummies were grouped into four groups: 50 to 59 years old, 60 to 69 years, 70 to 79 years and, finally, 80 years old and above. In most of the cases the null hypothesis of equality between the coefficients of consecutive age groups could not be rejected at the usual statistical level for both types of pseudo-panels. For the sake of brevity these results are not shown, but are available from the authors upon request.

[INSERT FIGURE 3 ABOUT HERE]

With regarding the cohort effects, Figure 3 plots the estimated homeownership rates by cohorts. Following Figure 2, two cohort patterns, one for each type of pseudo-panel, are presented for each country. The results highlight a nearly general pattern across European countries, regardless of the level at which information is grouped: a positive cohort effect, so that the later the year of birth the higher the homeownership rate.[14] The only exceptions to this pattern are Germany and Denmark. Interestingly, these were the two countries with a decreasing age-homeownership rate. Finally, a comparison of the estimated cohort profiles obtained from both types of pseudo-panels shows substantial differences in some countries. In particular, as expected, the estimated ownership rates by cohorts are lower but increase faster the later the year of birth with pseudo-panels from individual data for those countries with a higher percentage of households where old individuals live with their children. This result highlights the importance of controlling for the sample selection issues incurred when working at the household level; for instance, for those papers interested in future housing demand projections.

5. Conclusions

This paper was aimed at analyzing the homeownership decisions of European elderly. The housing literature on the degree to which the elderly reduce homeownership is mixed. Previous literature suffers from several drawbacks: (1) Those papers that rely on cross-sectional data do not disentangle age and cohort effects, (2) part of the papers do

[14] We also run Wald tests for the equality of the coefficients on adjacent cohorts. The results rejected the equality restriction in nearly all cases, showing that the positive cohort effect is statistically significant. These tests are available from the authors upon request.

not follow households up to very old ages, and (3) most papers with microdata use information at the household level, so that several sample selection issues that can alter the results are unvealed. This paper has attempted to add to existent literature on several ways. First, the longitudinal data requirement to estimate age-homeownership rates net of cohort effects was achieved by analyzing pseudo-panels with microdata from the ECHP. Second, the information for thirteen European countries available in this data set has allowed us to complement previous literature, mostly based on US and UK data. Further, the ECHP provides information up to the age of 91 years, so that it was possible to examine the tenancy decisions for old olders. Finally, following Deaton and Paxson (2000) we have examined whether the age profiles were robust to the level (household/individual) data was analyzed.

The regression results have shown that the age-homeownership rate profiles are very sensitive to the inclusion of the cohort variables in the estimates. In fact, the results show a decreasing age pattern, similar to the one obtained when data is treated as pooled cross-sectional data, when the cohort effects are not accounted for. Interestingly, pseudo-panels constructed from data at the individual level display a steeper decreasing age pattern, showing the severe sample biases incurred with data at the household level. However, the inclusion in the estimates of the cohort variables changes significantly the age-profiles obtained, showing now either a slightly increasing or flat homeownership rate with age for most European countries. Only for Germany and Denmark we obtain a decreasing age profile. The analysis of the pseudo-panel with data grouped from the individual level show similar results for most countries. That is, the age patterns net of cohort effects obtained are robust to the level data are analyzed. Further, notice that the age profiles of Europeans do not depend on the age extension of the sample, because the ownership rates for old olders are consistent with those for young olders. On the other hand, the age-profiles do not seem to be sensitive to the dominant tenancy status in each country.

From a theoretical perspective the results drawn from European data, with the exceptions for Germany and Denmark, do not support then the Life-Cycle hypothesis that the homeownership rate should decline as households (individuals) become older, as also obtained in most previous literature with longitudinal data. As an extension, the results suggest that European households (individuals) do not consider housing wealth as a means for financing their consumption during retirement. In fact, these results are in accordance with much of the empirical literature on savings, where it is observed that households do not consume all their disposable income during retirement (Poterba, 1994; Börsch-Supan, 2003). From a policy-making perspective, the general flat ownership rates with age suppose that an increasingly percentage of olders in European societies due to ageing populations should not suppose a massive increase in the number of houses for selling and, consequently, that housing prices need not be severely affected by ageing.

Finally, this paper has also shown the existence of strong cohort effects for European households (individuals). In fact, compared to age and year variables, the cohort variables are the ones with the highest explanatory power in the estimates. Again with the exception of Germany and Denmark, the rest of European countries present a positive cohort effect. That is, holding age fixed, the later the year of birth the higher the homeownership rate. This result is particularly interesting, as it shows an increasing preference of European households (individuals) for owning their dwelling over time.

As a result, this positive cohort effect means that in a context of a stagnating population, the generation replacement should suppose an increasing trend of the aggregate homeownership rate. On the other hand, unlike age-profiles, the cohort effects obtained are stronger with data grouped from the individual level. This result highlights the importance of controlling for the sample selection issues incurred when working at the household level; for instance, for those papers interested in housing demand projections.

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Table 1. Home-ownership rate across European countries in 1994 and 2001, and percentage of households with elderly living with their children (whole period)

	Home-ownership rate				**% of households where the elderly are living with their children****
	1994		2001		
	Households aged 20+ (a)	Households aged 50+ (b)	Households aged 20+ (c)	Households aged 50+ (d)	(e)
Belgium	67.6	72.7	73.2	77.6	1.03
Denmark	61.6	64.9	66.5	68.8	0.08
Germany	39.2	47.4	41.4	46.7	1.45
France	56.4	67.5	61.2	73.0	1.78
Ireland	85.1	90.7	87.1	91.4	2.90
Italy	72.5	77.5	77.3	82.4	4.12
Greece	73.6	85.5	83.4	89.0	11.41
Luxembourg	70.8	81.4	70.1	82.3	6.25
Netherlands	50.3	44.9	59.6	53.0	0.18
Portugal	67.8	71.7	73.4	76.5	6.36
Spain	79.4	84.1	84.7	89.3	8.92
United Kingdom	66.5	66.3	74.9	76.2	1.57
Austria	59.0*	64.9*	61.4	62.6	3.26

Note: (*) this figure corresponds to the year 1995. (**) Values are based on those households with heads born between 1930 and 1950

Table 2. Year-of-birth intervals, age bands and average cell size by cohorts

	Cohorts by year of birth							
	1910-14	**1915-19**	**1920-24**	**1925-29**	**1930-34**	**1935-39**	**1940-44**	**1945-49**
Age interval in 1994	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49
Age interval in 1997	83-87	78-82	73-77	68-72	63-67	58-62	53-57	48-52
Age interval in 2001	87-91	82-86	77-81	72-76	67-71	62-66	57-61	52-56
Average cell size								
Belgium	74.5 (89.3)	109.7 (135.3)	207.2 (273.2)	209.1 (310.5)	229.3 (359.2)	185.0 (305.8)	185.8 (315.0)	301.7 (497.0)
Denmark	72.0 (80.1)	109.6 (132.3)	133.6 (183.2)	147.1 (210.0)	157.2 (240.2)	179.1 (272.8)	216.8 (351.3)	273.1 (431.3)
Germany	83.7 (114.1)	120.2 (144.5)	437.3 (617.5)	402.8 (630.0)	474.7 (770.0)	664.5 (1101.0)	627.6 (1108.6)	569.0 (977.5)
France	152.6 (193.6)	168.7 (218.7)	384.5 (527.6)	429.6 (673.1)	466.8 (755.2)	445.5 (757.0)	424.8 (717.6)	603.0 (1079.0)
Ireland	57.7 (81.6)	125.7 (163.5)	189.3 (265.8)	206.3 (316.5)	251.2 (379.8)	238.8 (437.7)	275.5 (480.1)	294.7 (553.0)
Italy	182.0 (255.0)	194.2 (278.7)	411.6 (600.6)	545.5 (816.3)	600.6 (968.3)	637.5 (1136.0)	654.6 (1199.6)	717.8 (1428.3)
Greece	110.3 (203.6)	178.0 (298.0)	266.7 (486.2)	415.8 (760.0)	460.1 (879.0)	401.3 (779.2)	399.8 (733.2)	490.7 (869.8)
Luxembourg	33.7 (62.3)	51.5 (84.6)	99.7 (170.8)	149.3 (245.1)	160.1 (288.5)	189.8 (334.5)	197.0 (363.1)	200.2 (405.5)
Netherlands	83.3 (95.1)	153.7 (204.6)	256.5 (338.5)	314.0 (473.7)	309.0 (493.6)	311.6 (500.6)	370.7 (610.1)	490.2 (827.2)
Portugal	125.7 (194.5)	205.2 (304.5)	401.5 (626.5)	486.5 (787.3)	497.5 (852.3)	456.0 (825.5)	439.8 (824.5)	416.7 (833.3)
Spain	149.6 (266.6)	252.0 (405.6)	442.5 (693.2)	536.3 (843.2)	591.8 (1010.3)	488.5 (906.0)	510.5 (946.3)	509.6 (988.1)
United Kingdom	138.3 (159.1)	213.0 (266.0)	356.2 (473.7)	364.1 (523.1)	337.1 (536.1)	355.5 (557.0)	415.2 (692.3)	497.3 (861.5)
Austria	62.8 (86.4)	62.5 (85.0)	187.0 (269.0)	204.4 (320.7)	212.4 (337.8)	249.7 (430.1)	268.7 (478.0)	224.0 (435.5)

Note: between parentheses the average cell size for the individual elderly sample.

Table 3. Estimation results of the home-ownership rate by country with pseudo-panels constructed when grouping information from the household level

Country	F-test *(whole model)*	$\overline{R}^2$	Age dummies	Cohort dummies	Year dummies
Germany	11.68 (0.0001)	0.898	2.65 (0.050)	8.30 (0.0017)	3.03 (0.093)
Denmark	140.89 (0.000)	0.991	10.96 (0.000)	64.17 (0.000)	8.58 (0.004)
Netherlands	492.79 (0.000)	0.997	7.95 (0.0002)	110.89 (0.000)	1.52 (0.258)
Belgium	22.03 (0.000)	0.943	3.00 (0.022)	16.59 (0.000)	1.61 (0.240)
Luxembourg	5.42 (0.001)	0.955	3.77 (0.008)	5.36 (0.005)	1.17 (0.344)
France	59.62 (0.000)	0.979	8.80 (0.0001)	54.80 (0.000)	0.91 (0.429)
United Kingdom	74.55 (0.000)	0.983	3.81 (0.008)	48.18 (0.000)	0.15 (0.864)
Ireland	13.20 (0.000)	0.907	5.02 (0.002)	34.39 (0.000)	2.12 (0.162)
Italy	27.93 (0.000)	0.955	5.47 (0.001)	37.41 (0.000)	3.14 (0.079)
Greece	29.91 (0.000)	0.958	11.02 (0.000)	35.28 (0.000)	17.31 (0.0003)
Spain	25.67 (0.000)	0.951	12.40 (0.000)	47.98 (0.000)	5.64 (0.018)
Portugal	8.61 (0.001)	0.858	4.65 (0.003)	34.83 (0.000)	0.02 (0.975)
Austria	18.53 (0.0007)	0.939	3.28 (0.069)	15.43 (0.0019)	52.90 (0.002)

Note: The table reports F-statistics and associated p-values (in parentheses) for the whole model, and for the age, cohort, and year effects.

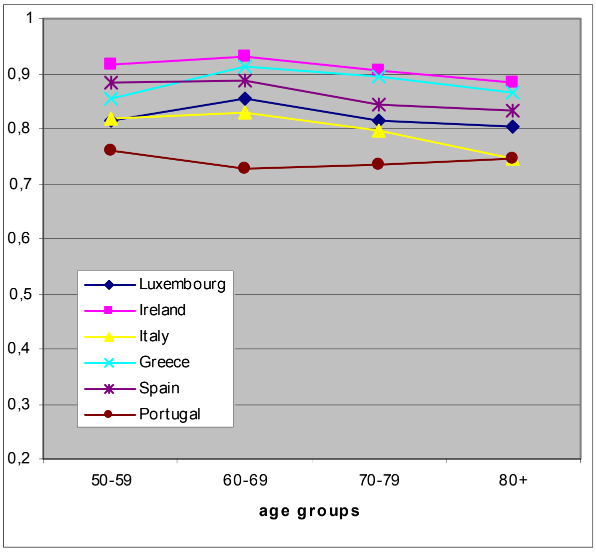
Table 4. Estimation results of the home-ownership rate by country with pseudo-panels constructed when grouping information from the individual level

Country	**F-test** *(whole model)*	$\overline{R}^2$	**Age dummies**	**Cohort dummies**	**Year dummies**
Germany	15.91 (0.0000)	0.925	2.14 (0.099)	10.13 (0.0008)	2.12 (0.171)
Denmark	102.23 (0.000)	0.987	7.32 (0.0003)	30.56 (0.000)	9.19 (0.0038)
Netherlands	544.43 (0.000)	0.997	15.12 (0.0000)	113.65 (0.000)	4.02 (0.046)
Belgium	76.02 (0.000)	0.983	7.15 (0.0004)	70.00 (0.000)	4.26 (0.040)
Luxembourg	7.02 (0.0004)	0.828	2.44 (0.067)	3.21 (0.036)	8.46 (0.0051)
France	63.65 (0.000)	0.9804	6.43 (0.0007)	33.41 (0.0000)	0.18 (0.8335)
United Kingdom	143.43 (0.000)	0.9913	5.52 (0.0014)	80.58 (0.000)	0.26 (0.7771)
Ireland	24.30 (0.000)	0.949	3.77 (0.0084)	29.59 (0.000)	1.12 (0.357)
Italy	239.55 (0.000)	0.994	8.08 (0.0002)	103.90 (0.000)	8.01 (0.006)
Greece	262.35 (0.000)	0.995	22.21 (0.000)	141.67 (0.000)	16.16 (0.0004)
Spain	330.11 (0.0000)	0.996	7.71 (0.0003)	141.13 (0.000)	4.76 (0.030)
Portugal	122.70 (0.0000)	0.989	8.99 (0.0001)	148.41 (0.000)	2.03 (0.174)
Austria	11.05 (0.003)	0.899	1.35 (0.381)	8.38 (0.0009)	14.97 (0.004)

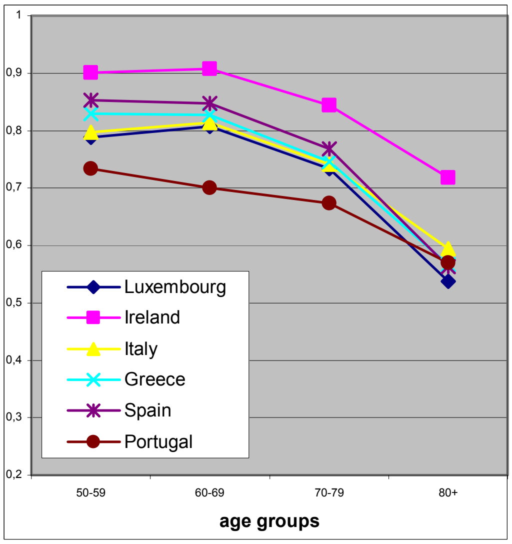
Note: The table reports F-statistics and associated p-values (in parentheses) for the whole model, and for the age, cohort, and year effects.

Figure 1. Home-ownership rates across European countries by age groups (pooled data).

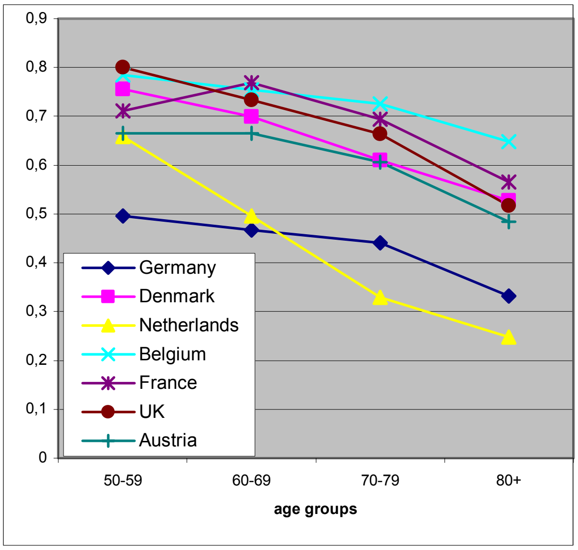
Panel 1a



Panel 1b



Panel 1c



Panel 1d

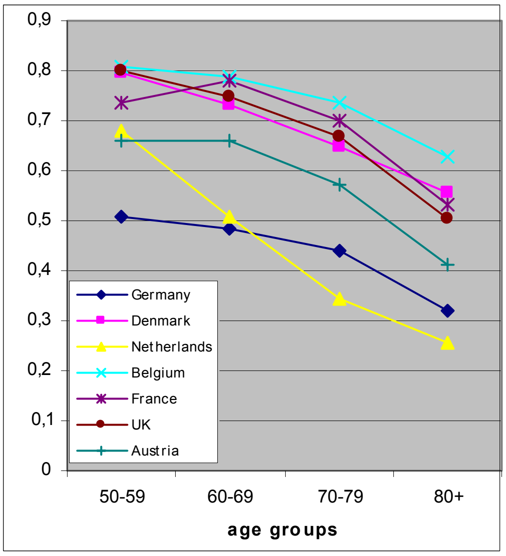
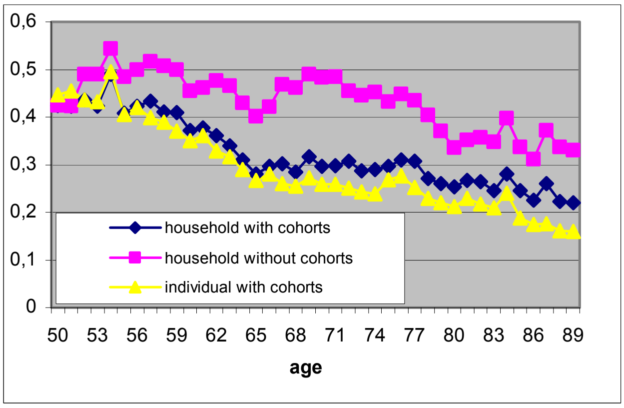
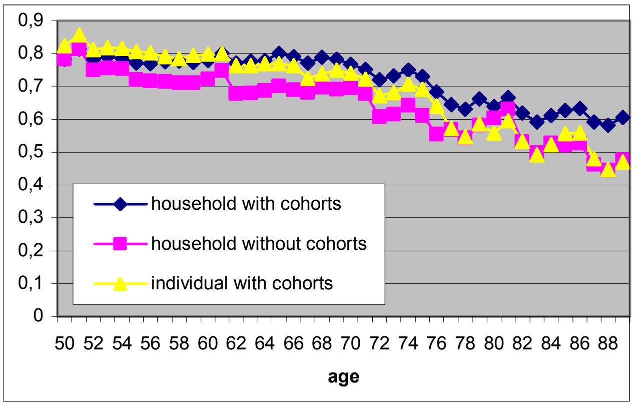


Figure 2. Estimated age-homeownership rate profiles including/excluding cohort variables at the household level, and with cohorts at the individual level

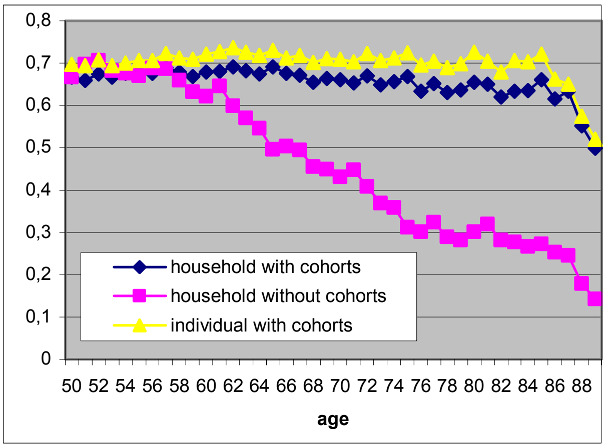
Germany



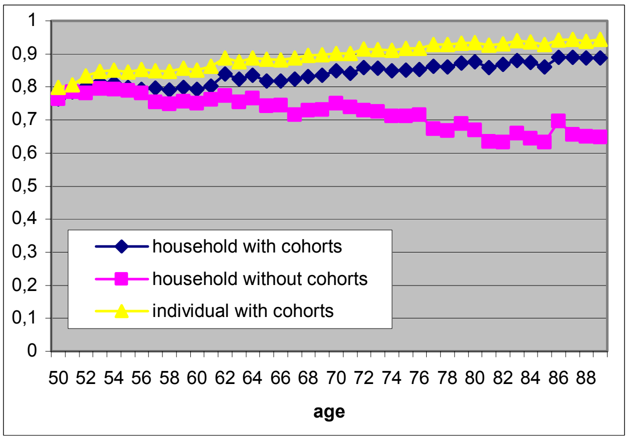
Denmark



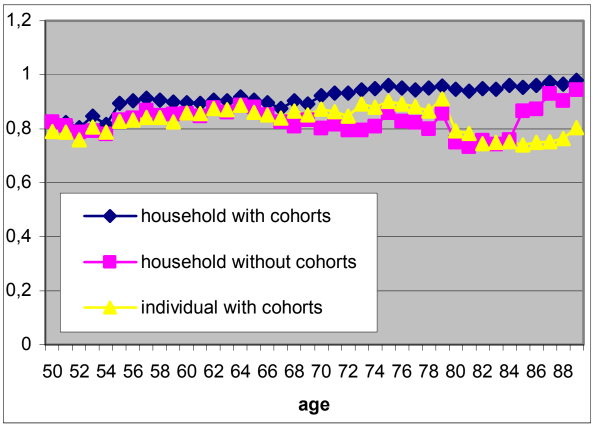
Netherlands



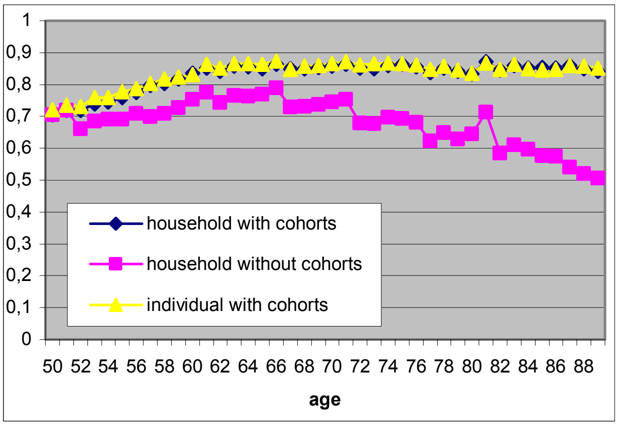
Bélgica



Luxembourg

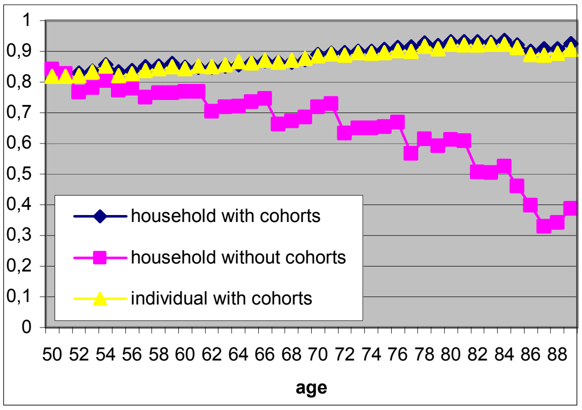


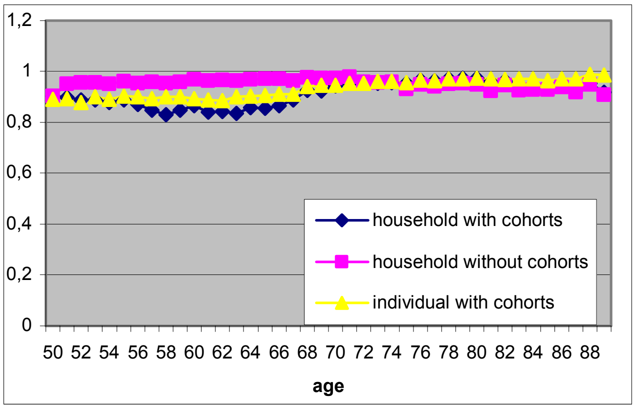
France



United Kingdom

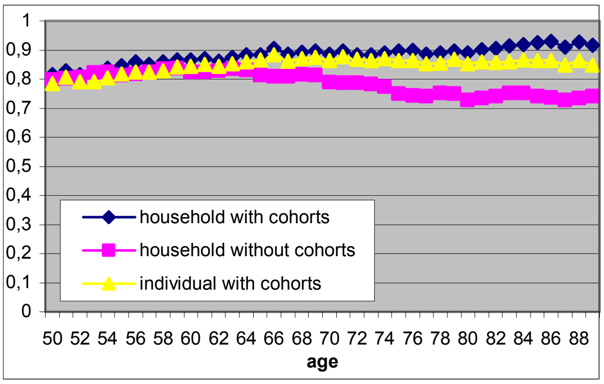
Ireland

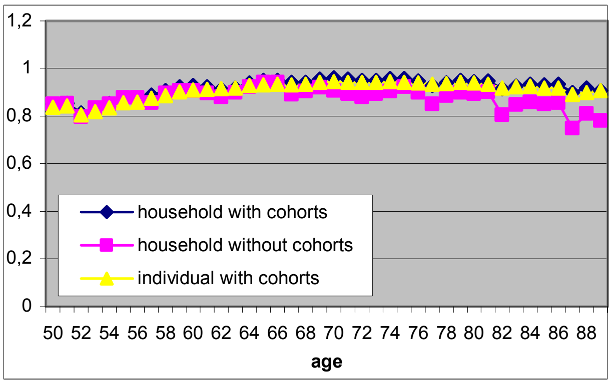




Italy

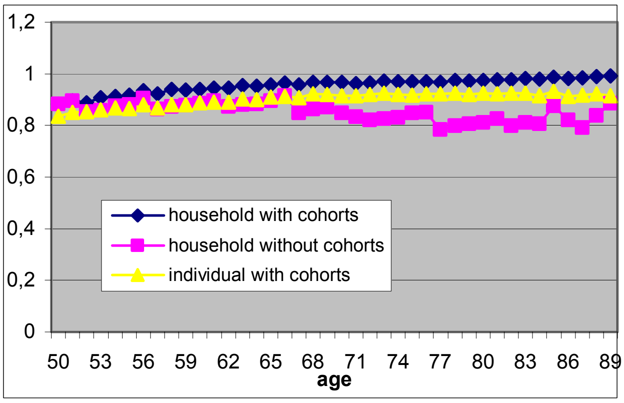
Greece

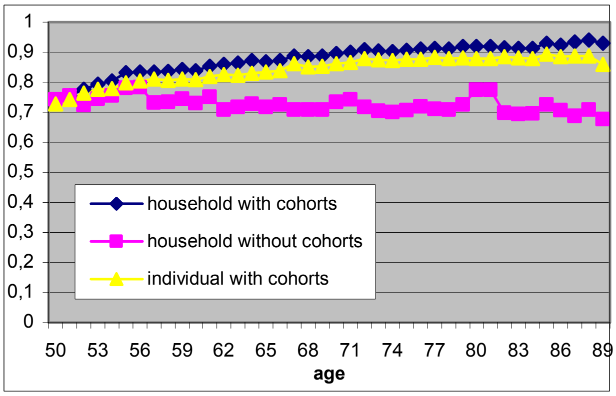




Spain

Portugal





Austria

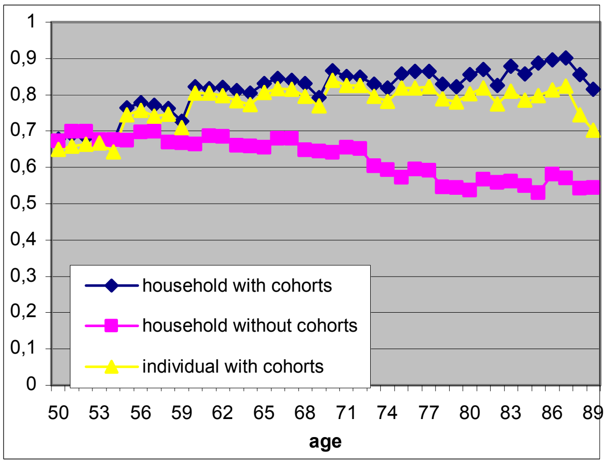
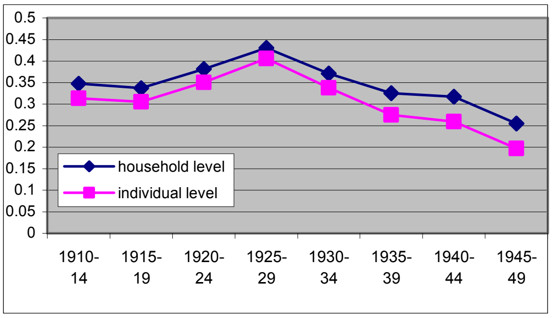
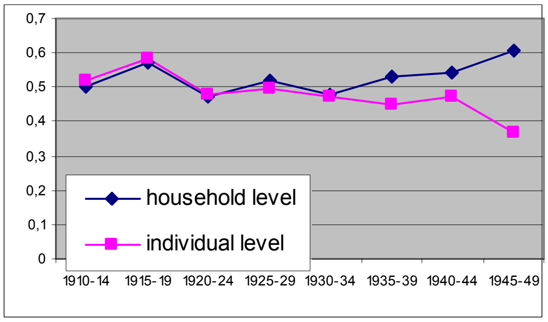


Figure 3. Estimated homeownership-cohort profiles at the household and at the individual level

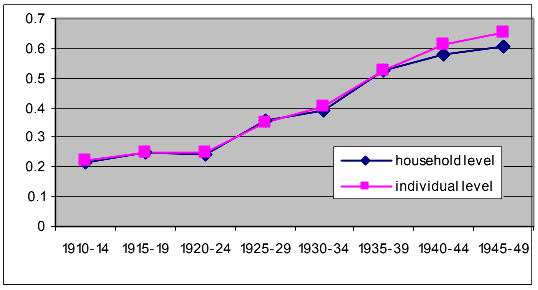
Germany



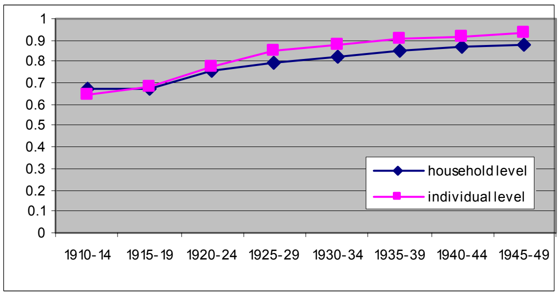
Denmark



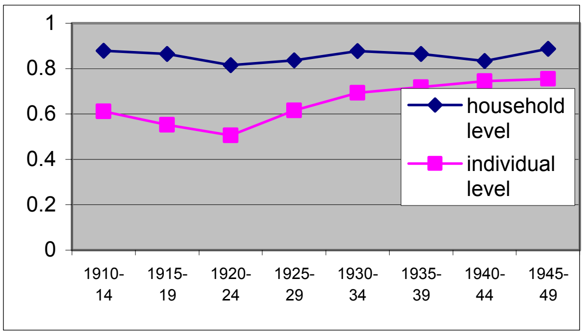
Netherlands



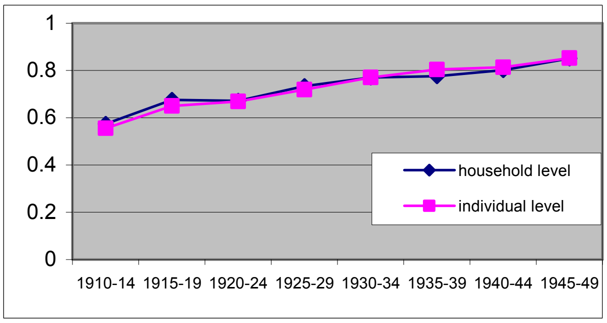
Bélgica



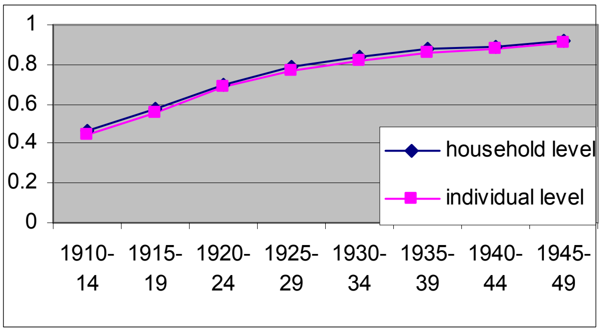
Luxembourg



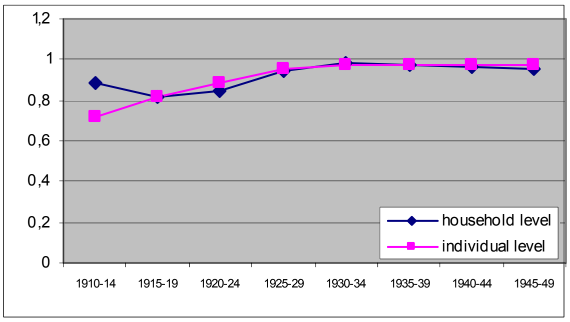
France



United Kingdom

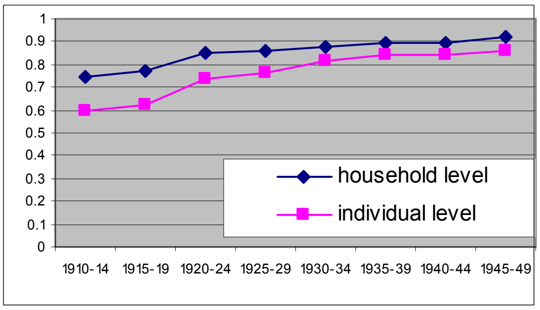


Ireland

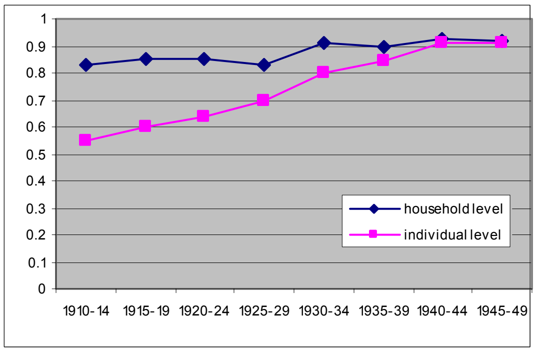


Italy

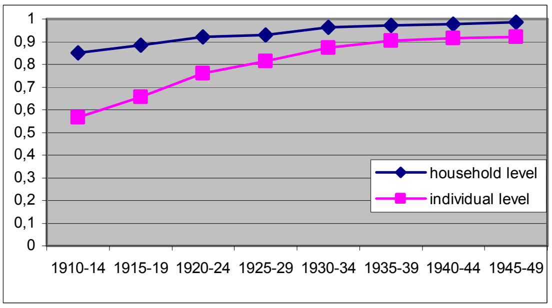
Greece



Spain



Portugal



Austria