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Individual Aspirations and Satisfaction: Quantifying the Importance of Homeownership

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Abstract

Residential satisfaction is often used as a barometer to assess the performance of public policy and programmes designed to raise individuals' well-being. However, the fact that responses elicited from residents might be biased by subjective, non-observable factors casts doubt on whether these responses can be taken as trustable indicators of the individuals' housing situation. Emotional factors such as aspirations or expectations might affect individuals' cognitions of their true residential situation. To disentangle this puzzle, we investigated whether identical residential attributes can be perceived differently depending on tenure status. Our results indicate that tenure status is crucial not only in determining the level of housing satisfaction, but also regarding how dwellers perceive their housing characteristics.

Keywords: Housing satisfaction, subjective well-being, homeownership.

JEL classification: D1, R2.

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1. Introduction

Self-reported satisfaction with various aspects of individuals' lives has been the focus of many psychological and sociological studies. Only recently has the subject entered the research agenda of economists. This interest stems from the fact that many individuals' economic decisions are aimed at maximising well-being,[1] which in turn is determined by the level of satisfaction in certain life domains (among other reasons).[2] Given this interest, there is a growing literature on the analysis of the determinants of subjective well-being (SWB) or happiness.[3] Using German data, Van Praag and Frijters (1999), Van Praag, Frijters and Ferrer-i-Carbonell (2003) and Ferrer-i-Carbonell and Frijters (2004) have studied the determinants of SWB, but with emphasis on measurement and econometric aspects. Van Praag, Frijters and Ferrer-i-Carbonell (2003) found that self-reported satisfaction in different domains (i.e. job, financial situation, housing, health, leisure and the environment) are important in explaining individuals' SWB.

Using US data, Easterlin (2006) found that life-cycle happiness is mostly determined by an individual's satisfaction in the main domains. He observed that satisfaction in each domain depends not only on objective conditions but also on individuals' goals and aspirations in each domain. Policy-makers therefore need a better understanding of how these aspirations affect the satisfaction level in each domain, and consequently the individuals' choice behaviour, in order to design successful policies aimed at improving individuals' well-being.

[1] Using Russian and German data, Frijters (2000) tested whether individuals try to maximise self-reported levels of satisfaction. His results provided only limited support for this hypothesis.

[2] Using EU data, Diaz-Serrano and Stoyanova (2008) found strong support for the causality between self-reported housing satisfaction and residential mobility. Using German and UK data in the context of the labour market, Clark et al. (1998) and Clark (2001) found evidence that job satisfaction is a good predictor of job quits.

[3] In the literature, the terms *subjective well-being*, *life satisfaction* and *self-reported happiness* are often interchangeable.

In this paper, we focus on one of the most important satisfaction domains: housing satisfaction.[4] In line with Easterlin's work, we analyse to what extent an individual's aspirations—such as the 'innate' preference for homeownership—may affect the perception of residential attributes and hence the individual's self-reported satisfaction in this domain. This analysis is important because residential satisfaction is often used as a barometer to assess the performance of housing programmes and policies.

One of the most interesting features of housing satisfaction is that this variable captures aspects of the housing situation that cannot be captured by other observable variables. Since residential satisfaction, like many other satisfaction variables, is the result of both objective and subjective factors, it is more complex than standard economic variables and requires more sophisticated analysis. Our hypothesis is that two individuals in identical housing situations will report different levels of residential satisfaction depending on their aspirations regarding housing. Galster and Hesser (1981) and Galster (1987) conceptualised housing satisfaction as a variable reflecting the gap between an individual's actual and desired housing situation. We find this definition of residential satisfaction very appropriate and use it in this study.

Homeownership is a very important way of accumulating wealth and sign of personal success. According to the conceptualisation of housing satisfaction introduced by Galster (1987), homeownership is a key factor in determining housing satisfaction and hence SWB. If we assume that homeownership is the type of housing tenure preferred by the average person, then it is plausible that a homeowner and a renter who prefers homeownership would value identical residential characteristics differently. In other words, the renter's perception of the residential characteristics might be biased by the gap between the current housing situation and the desired one, which in turn would have an impact on self-reported housing satisfaction.

[4] Van Praag, Frijters and Ferrer-i-Carbonell (2003) found that housing satisfaction positively and significantly affects SWB, though the effect is greater for job and financial satisfaction.

To test this hypothesis, we estimated the determinants of housing satisfaction separately by tenure status, which allowed us to decompose the gap between homeowners' and renters' predicted housing satisfaction into two components. The first component is determined by the characteristics of the dweller and the dwelling, and the second component measures to the extent to which the satisfaction gap is due to the fact that the renter and the homeowner perceive residential characteristics differently. This analysis is relevant for three reasons. Firstly, it allows us to quantify the degree of subjectivity in self-reported housing satisfaction. In other words, it measures the extent to which 'cognitions' are affected by 'emotions' in evaluating residential characteristics. Secondly, in economics research, psychometric indicators such as self-reported satisfaction are often the only proxy of an individual's utility. Thirdly, it provides meaningful insight into how those who express housing dissatisfaction could become satisfied through policy intervention.

The rest of the paper is organised as follows. Section 2 briefly describes the theoretical framework. Section 3 describes the econometric strategy used in this study. Section 4 describes the data used in the empirical analysis. Section 5 presents the results and discusses the main empirical findings. Finally, Section 6 presents a summary and concluding remarks.

2. Theoretical framework

The theoretical framework of this paper is simple. We follow the model of product differentiation presented in Rosen (1974) (i.e. goods are valued for their utility-bearing characteristics). In our case, we assume that the individual's utility, $U(\cdot)$, derived from a given residential situation j depends on a set of k residential attributes, w_{kj}, and a set of g individual characteristics, z_{gi}:

$$U(w_{ij}) = U(w_{kj}; z_{gi}); \qquad k = 1, 2, ..., K; \quad g = 1, 2, ..., G \tag{1}$$

The attributes of each residential situation *j* are objectively measured in such a way that users have the same attributes in each alternative and the scales of measurement are identical. However, individuals may differ in how they value these characteristics. We assume that there are only two alternative residential situations (i.e. being a homeowner (*j*=o) or a renter (*j*=r)), whose utility functions can be defined as:

$$U(w_{io}) = f(\gamma_{ok} w_{iok}; \delta_{og} z_{iog})$$
$$U(w_{ir}) = f(\gamma_{rk} w_{irk}; \delta_{rg} z_{irg}) \quad (2)$$

where γ_{jk} and δ_{jg} are the contribution of residential and individual characteristics to the individual's utility. Individual *i* is indifferent between the two alternative residential situations, *o* or *r*, if $U(w_{io}) = U(w_{ir})$. The utilities expressed in Equation (2) can be approached by a satisfaction function $S(w_{ij};z_{ik})$, for which $S(w_{iok};z_{iog})>S(w_{irk};z_{irg})$ only if $U(w_{iok};z_{iog})>U(w_{irk};z_{irg})$.

3. Empirical framework: new econometrics for an old question

Housing satisfaction is usually measured on an ordinal scale. Therefore, the propensity of an individual *i* to report a certain level of satisfaction is driven by the following linear relationship: $S_i^* = \beta' X_i + e_i$, where S_i^* is a latent outcome, X_i are the determinants of the outcome, and e_i is a random error term. The matrix X_i=[W_i, Z_i] contains the set of characteristics of the dwelling and the residential environment (W_i), as well as the set of individual and household characteristics (Z_i). We do not observe S_i^* but instead an indicator variable of the type S_i=*j* if $\mu_{j-1} < S_i^* \leq \mu_j$ (*j*=1, …, *J*). Based on this observability rule, we

obtain $P(S_i = j) = F(\mu_j - \beta' X_i) - F(\mu_{j-1} - \beta' X_i)$, where $F(\bullet)$ can be either the cumulative normal or cumulative logistic distribution.

Besides the objective characteristics contained in W_i and Z_i, there is a third group of variables, such as aspirations and emotions, which are important in determining individuals' utility but are subjective and non-observable. These factors are a major source of individual heterogeneity, which causes the utility function expressed in Equation (2) to vary across individuals. An additional shortcoming is the fact that, in ordinal scales, surveyed individuals may have different perceptions of the same scale. All this non-observable heterogeneity implies that the relationship between individuals' utility and self-reported satisfaction probably varies across individuals. As a result, cross-sectional estimates of the traditional ordered probit/logit models described above are likely to be biased.

In a panel-data framework, the relationship between the latent outcome and the set of covariates can be redefined as follows: $S_{it}^* = \beta' X_{it} + u_i + \varepsilon_{it}$, where u_i is a time-constant individual-specific effect. We expect this term to absorb some individual heterogeneity and therefore reduce potential bias in the estimated parameters.[5] Now, we obtain $P(S_{it} = j) = F(\mu_j - u_i - \beta' X_{it}) - F(\mu_{j-1} - u_i - \beta' X_{it})$. A natural candidate to model S_{it}^* is the random-effects ordered probit.[6] However, this model may lead to inconsistent estimates if the covariates X_{it} and the individual-specific effect u_i are correlated. The fixed-effects model can solve this problem, but the fixed-effects ordered model is computationally unfeasible. One way to deal with this shortcoming is to collapse our ordinal response into a binary outcome variable using an arbitrary barrier, *h*, which is the same for all individuals (Chamberlain, 1980). We find Chamberlain's solutions too restrictive, however, so we follow Ferrer-i-Carbonell and Frijters (2004). They show that using an individual-specific barrier h_i as a cut-

[5] This specification considers heterogeneity in the intercept but not in the slopes.
[6] The log-likelihood for this model can be generalised as specified by Butler and Moffit (1982). One difficulty of this model is the treatment of the individual-specific effect, u_i, which is handled by using the Gauss-Hermite quadrature to integrate out the joint density (see Frechette, 2001).

off point to collapse the ordinal outcome into a binary variable is a straightforward reformulation of the fixed-effects ordered logit model into a fixed-effects binomial logit model.[7] The use of h_i as a barrier instead of h also has the advantage of allowing a larger sample size, since we use all individuals whose ordinal score is not constant throughout the sample period.

Although the fixed-effects approach has the benefit of allowing correlation between individual-specific effects and covariates, it also introduces some important limitations. Firstly, the method only allows variables that vary over time to be used as covariates, which means that the effect of certain relevant time-invariant factors cannot be estimated. Secondly, only individuals whose satisfaction score changes over time can be used in the estimation, which in turn means that a considerable number of observations that might be important in determining the causal relationship are missed.[8] Thirdly, the fixed effects absorb the effect of those variables with little variation throughout the sample period, such as household size, marital status and most dwelling characteristics. In order to ensure the most robust results, the fixed-effects approach should therefore only be used if strictly necessary.

Frijters, Haisken-DeNew and Shields (2002) proposed a test of the explanatory power of the fixed-effects model as compared to the random-effects model. The null hypothesis of the test is $H_0 : \beta^{FE} = \alpha\hat{\beta}^{RE}$, where β^{FE} are the parameters of the fixed-effects logit model, $\hat{\beta}^{RE}$ is a vector containing the estimated parameters of the random-effects ordered probit model and α is a positive constant. The intuition behind this test is that if the individual fixed effects and the individual characteristics are not correlated, then the coefficients of the random-effects model should be the same as the coefficients of the fixed-effects model. Hence, the differences between the estimated parameters of the two models should be

[7] Das and Van Soest (1999) proposed a alternative approach to the fixed-effects ordered logit model.
[8] In our data, depending on the country, using the fixed-effects model means that we miss between 25 and 35 percent of the sample.

systematic and caused by the re-escalation of the parameters in the random-effects model, which is captured by α.[9]

4. Data and variables

The data used in this paper comes from the European Community Household Panel (ECHP), a yearly panel of the EU-15 countries that ran from 1994 to 2001.[10] In our analysis, we included the following countries: Denmark, the Netherlands, Belgium, France, Ireland, Italy, Spain, Portugal, Austria, Finland, Germany and the United Kingdom. For Austria and Finland, the available files only cover the periods 1995-2001 and 1996-2001, respectively. For Germany and the United Kingdom, the files only cover the period 1994-1996.[11] For the remaining countries, the available data covers the period 1994-2001. In our analysis, we focused on household heads and their partners because choices regarding housing tenure status and residential mobility are made by parents.

The ECHP contains information about households and all household members over age 16. The individual variables cover numerous characteristics, such as socio-economic and demographic information, health, migration, labour situation and income. The ECHP also includes information on certain satisfaction domains. For example, individuals are asked to rate their satisfaction with their housing situation on a six-point scale ranging from 'not satisfied at all' (1) to 'fully satisfied' (6). This is our outcome variable (S_{it}). The survey also provides detailed information on the dwelling and the neighbourhood, which is important for the present study. Our vector of explanatory variables (X_{it}) accounts for various types of

[9] The null hypothesis can be tested using a likelihood-ratio test. The main problem in this test is that α is unknown, although we can overcome this by using the estimation of α that maximises $L(\alpha\beta^{RE})$, where β^{RE} are the estimates of the random-effects model. See Frijters, Haisken-DeNew and Shields (2002) for further details.

[10] EU-15 refers to the fifteen EU countries prior to the 2004 enlargement.

[11] For the United Kingdom and Germany, the ECHP data is mixed with data from the British Household Panel Survey (BHPS) and the German Socio-Economic Panel (GSOEP), respectively. Since the answers in the ECHP are not compatible with the BHPS and GSOEP for some of the key variables, we only used ECHP data for these two countries.

determinants of housing satisfaction: individual characteristics (i.e. age, gender, education, employment situation and marital status); household characteristics (i.e. household income, household size and duration of residence in the current dwelling); dwelling characteristics (i.e. type of dwelling (flat or house), number of rooms, existence of indoor flushing toilet, hot running water, heating, terrace or garden, shortage of space, not enough light, inadequate heating facilities, leaky roof and damp walls or floors); and neighbourhood and environment (i.e. noise, pollution, environmental problems, and crime or vandalism in the neighbourhood). For renters, we also know the owner of the dwelling (i.e. private owner, employer or non-profit organisation). The estimated models also include a set of time and regional dummies. Table 1 shows summary statistics of the variables included in our analysis. There are no remarkable differences in housing characteristics between renters and homeowners.

Insert Table 1 about here

5. Empirical results

5.1. Raw differences in housing satisfaction between homeowners and renters

Table 2 shows average housing satisfaction by tenure status. We tested the hypothesis of equality in average housing satisfaction between homeowners and renters. We observed that average self-reported housing satisfaction is significantly lower for renters than for homeowners in all countries.

Insert Table 2 about here

The lowest level of housing satisfaction among homeowners was found in the Southern European countries, while the highest levels were observed in Austria, Denmark and the

Netherlands. The ranking is the same for renters as for homeowners. In Southern European countries, the level of housing satisfaction for renters is remarkably low (less than 4). The largest gap in average satisfaction between homeowners and renters is observed in Ireland. The large gap in this country is driven by the fact that satisfaction among homeowners is quite high (greater than 5).

The interpretation of the standard deviation of housing satisfaction offers some interesting insights. The distribution of housing satisfaction is more disperse for renters than for homeowners in all countries, which indicates that renters' housing satisfaction is more polarised than that of homeowners. There are two possible reasons for this. First, the rented stock may be polarised in terms of housing quality, though the descriptive analysis shown in Table 1 does not seem to support this conjecture. Second, all other things being equal, renters who prefer homeownership may be less satisfied with their housing situation than renters who are indifferent between owning or renting.

5.2. Determinants of housing satisfaction

Fixed-effects vs. random-effects model

First, we carried out a test to compare the performance of the fixed-effects logit model with that of the random-effects ordered probit model. In both models, the estimated values of $\hat{\alpha}$ in the equation $\beta^{FE} = \alpha\hat{\beta}^{RE}$ were positive and statistically significant. The values for $\hat{\alpha}$ ranged from 0.91 for homeowners in Ireland to 1.61 for homeowners in the Netherlands. The critical values of the test were determined by a chi-square with between 30 and 35 degrees of freedom, depending on the country. If we assess significance at five percent, the null hypothesis H_0:$\beta^{FE}=\alpha\beta^{RE}$ (i.e. the correlation between the covariates and the individual time-constant effect (u_i) is not different from zero) is only rejected in the Netherlands for both

homeowners and renters, in the United Kingdom for homeowners and in Denmark for renters. However, if we assess significance at one percent, we reject the null hypothesis only for the Dutch sample.[12] This indicates that the random-effects ordered probit model will provide consistent estimates for the rest of the countries. Since only two samples out of 24 are potentially inconsistent, we used the random-effects ordered probit model for all countries and tenure statuses.[13]

Random-effects ordered probit estimates

Table A1 shows the estimates of the random-effects ordered probit model. With the exception of age, none of the individual characteristics (gender, education and employment status) were found to be statistically significant in most of the countries. From previous studies, we know that older individuals and smaller, higher-income households tend to report higher levels of housing satisfaction. Our results confirm these findings for household size and age, but, surprisingly, not for income. A positive relationship between income and housing satisfaction was observed for homeowners in all countries except the Netherlands and Finland, where this variable was not found to be statistically significant. However, income was positively related to renters' housing satisfaction only in Southern European countries. This may be due to the fact that these countries—Spain, Portugal and Italy—have the smallest overall proportion of public housing among the EU-15 countries.[14] The Netherlands and Finland are the most surprising cases. In these two countries, the relationship between renters' housing satisfaction and income was statistically significant but negative,[15] which means that lower-income

[12] One possible explanation for this result (i.e. correlation between the covariates and the individual time-constant effect (u_i) is not different from zero) is the fact that most of the covariates used in the estimations do not refer to individuals, but rather to dwelling and neighborhood characteristics.

[13] Estimates of the fixed-effects ordered logit model are not reported here, but are available from the author upon request.

[14] In Spain, Portugal and Italy, public housing accounts for 2, 4 and 6 percent of the total housing stock, respectively, whereas in the United Kingdom, France and Denmark, they account for 22, 17 and 19 percent, respectively. These statistics are calculated based on the total number of rented and owned dwellings. Vacant dwellings are excluded.

[15] Fixed-effects estimates for the Netherlands provide similar results.

renters are more satisfied than their higher-income counterparts. This striking finding may be the result of effective public housing policies.[16]

Duration of residence is a variable that has traditionally shown ambiguous results. Kasarda and Janowitz (1974) found a positive relation between housing satisfaction and duration of residence in the United States. However, using Canadian data, Onibokun (1976) found the opposite effect. More recently, using US data, Lu (1999) observed that duration of residence is not statistically significant in determining housing satisfaction.[17] However, our results indicate that housing satisfaction is unambiguously u-shaped in duration of residence for both homeowners and renters in all countries.

According to the hedonic approach, dwelling and neighbourhood characteristics are expected to be important in determining housing satisfaction. We observed that housing deprivations such as shortage of space, rotting frames, leaky roofs, inadequate heating facilities and lack of sufficient light exerted a negative effect on housing satisfaction in all countries. However, we did not observe any systematic effect by county group or tenure status. Unfavourable neighbourhood characteristics (i.e. crime or vandalism, pollution or environmental problems, and noise) also exert a negative effect on housing satisfaction. The estimated effects of crime and vandalism are negative and tend to be statistically significant only for renters. This might be caused by a selection effect. According to a study conducted in the United States, house prices tend to be substantially higher in neighbourhoods where the proportion of homeowners is high (Edward, Hwang and Imai, 2002). Hence, higher prices act as a barrier to homeownership for low-income neighbours, some of whom may be conflictive. Finally, in all countries, individuals living in detached or semi-detached houses tend to report higher levels of housing satisfaction than those living in flats.

[16] In the Netherlands and Finland, public housing accounts for 76 and 53 percent of the total rented stock, respectively.

[17] These studies differ in their methodological frameworks. Kasarda and Janowitz (1974) and Onibokun (1976) used linear regression, while Lu (1999) used an ordered logit model. All of them use cross-section data.

5.3. Decomposition of the housing-satisfaction gap: the importance of homeownership

To analyse the difference in housing satisfaction between homeowners and renters, we used a Oaxaca-Blinder decomposition.[18] Specifically, we applied the decomposition proposed by Jones and Makepeace (1996)[19] to a panel-data framework. We found this analysis quite relevant, since it allowed us to quantify the importance of homeownership in the perception and valuation of the residential characteristics that determine residential satisfaction. This econometric technique allowed us to decompose the gap in housing satisfaction between homeowner and renters into two components. The first component, called the 'endowment' effect, picks up the share of the satisfaction gap that is due to residential characteristics (i.e. homeowners enjoy better housing characteristics than renters). The second component, which we call the 'treatment' effect,[20] refers to the share of the satisfaction gap that is due to the fact that individuals perceive and evaluate residential characteristics differently depending on their housing tenure status. We briefly describe the statistical methodology of the decomposition below.[21]

The time-average housing satisfaction of each individual *i* with a tenure status *j* is defined as $\overline{S}_j = \sum_s S \cdot \overline{f}_{js}$, where *S* represents each satisfaction level (i.e. *S*=1,..,6, $\overline{f}_{js}$ is the time average of the relative frequency in each satisfaction grade). Taking expectations over $\overline{S}_j$, we get $E(\overline{S}_j) \equiv \sum_s S \cdot P(S, \overline{X}_j, \beta_j)$, where $\overline{X}_j$ is the matrix containing the time average of the covariates and $P(S, \overline{X}_j, \beta_j)$ is the expected probability of the level of housing satisfaction

[18] See Oaxaca (1973) and Blinder (1973).
[19] The Oaxaca-Blinder method is usually used to decompose estimated differences in earnings between men and women into an 'explained' component due to individual and job characteristics and a residual 'unexplained' component that picks up the effect of discrimination in female earnings. Jones and Makepeace (1996) extended the Oaxaca-Blinder decomposition to an ordinal probit model. They used the decomposition to study discrimination against women in job promotion in the United Kingdom.
[20] As explained below, the 'treatment' effect refers to a 'homeownership' effect if a renter becomes a homeowner, and to a 'rent' effect if a homeowner becomes a renter.
[21] See Jones and Makepeace (1996) for further details.

S conditional on the time-average individual and dwelling characteristics $\overline{X}_j$ and the set of parameters β_j. A consistent estimate of $E(\overline{S}_j)$ can be obtained by replacing the set of parameters β_j with their maximum likelihood estimates $\hat{\beta}_j$. By replacing and rearranging, we obtain the following decomposition equations:

$$\hat{S}_o - \hat{S}_r = \sum_s S\left[P(S, \overline{X}_o, \hat{\beta}_o) - P(S, \overline{X}_r, \hat{\beta}_o)\right] + \sum_s S\left[P(S, \overline{X}_r, \hat{\beta}_o) - P(S, \overline{X}_r, \hat{\beta}_r)\right] \quad (3)$$

$$\hat{S}_o - \hat{S}_r = \sum_s S\left[P(S, \overline{X}_o, \hat{\beta}_r) - P(S, \overline{X}_r, \hat{\beta}_r)\right] + \sum_s S\left[P(S, \overline{X}_o, \hat{\beta}_o) - P(S, \overline{X}_o, \hat{\beta}_r)\right] \quad (4)$$

where the subscripts *o* and *r* indicate whether the individual is a homeowner or renter, respectively. In the first summation, the parameters are held constant and individual and dwelling characteristics are allowed to vary. In the second summation, the individual and dwelling characteristics are held constant and the parameters are allowed to vary. The first summation, i.e. the 'endowment' effect, measures to what extent the difference in estimated housing satisfaction between homeowners and renters can be explained by the different residential characteristics of the two types of tenure. The second summation is associated with the rise/fall in average satisfaction that a homeowner/renter experiences if she changes her housing tenure status. To be more specific, in Equation (3), the second summation refers to the change in average housing satisfaction if the average renter becomes the homeowner of the average rented dwelling. We call this the 'homeownership' effect. In Equation (4), the second summation refers to the change in average satisfaction that the average homeowner experiences if she becomes a renter of the average owned dwelling. We call this the 'rent' effect. We expect both effects to be positive. We conjecture that the larger the 'treatment' effect in a given country, the larger the preference for homeownership of its average dweller.

This would imply that, in countries with larger 'treatment' effects, renters and homeowners are more likely to value identical residential/housing characteristics differently.

Table 3 shows the results of the decomposition. The predictions of average housing satisfaction were quite close to the observed satisfaction for both homeowners and renters. This indicates that our econometric model fits well to the observed data. As we expected, in Equations (3) and (4), the 'homeownership' and 'rent' effects were positive and large. This reveals not only that the average renter would be more satisfied if she became a homeowner, but also that the housing satisfaction of the average homeowner would fall if she became a renter of the average owned dwelling.

The 'homeownership' effect is high in all countries (around 50 percent or higher), but more so in the Southern European countries, the Netherlands and Belgium. In these countries, tenure status explains more than 65 percent of the estimated housing satisfaction gap. The 'rent' effect was very large (above 65 percent) in the Southern European countries and the Netherlands. In the United Kingdom and Ireland, the reported values for the 'homeownership' effect were moderate, but the percentages for the 'rent' effect were higher than in any other country (above 90 percent). By combining the results of the two decompositions (Equations (3) and (4)), we can conclude that Spain, Portugal, Italy and the Netherlands are the countries where individuals are most likely to evaluate the characteristics and environment of their dwellings in a subjective manner.

Insert Table 3 about here

6. Summary and concluding remarks

We investigated to what extent the objective perception and valuation of residential characteristics are affected by tenure status by studying the determinants of housing

satisfaction in twelve EU countries using panel data from the period 1994-2001. We made separate estimates for homeowners and renters using the random-effects ordered probit model. We found that, in countries with higher levels of public housing as a percentage of total housing stock, income does not exert a significant effect on renters' self-reported satisfaction. In Finland and the Netherlands, the effect is negative.

We decomposed the gap in housing satisfaction between homeowners and renters into two components. We observed that tenure status might explain, depending on the country, between 41 and 97 percent of the housing-satisfaction gap between homeowners and renters, which indicates that the cognition of residential characteristics is affected by tenure status. This effect tends to be larger in countries with a higher tenure imbalance in favour of homeownership and a greater preference for homeownership.

This paper provides an analytical framework that links self-reported housing satisfaction with individuals' cognition of residential attributes. This link could be useful in predicting the results of housing programmes aimed at raising individuals' well-being. This type of analysis can be used not only to raise residents' satisfaction levels through policy intervention, but also to make public housing more appealing. More generally, we think that the empirical framework presented in this paper can also be used to analyse the degree of subjectivity in self-reported satisfaction in other domains.

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Table 1: Mean values determinants of housing satisfaction

	Germany		Denmark		The Netherlands		Belgium		France		UK	
	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters
log(income)	10,163	10,135	10,323	10,298	10,050	10,027	10,171	10,117	10,076	10,039	10,146	10,091
Household size	2,856	2,823	2,575	2,506	2,794	2,737	2,970	2,831	2,906	2,841	2,805	2,720
Year occupier	10,204	9,887	9,194	8,949	10,210	10,056	1,285	10,720	10,176	9,696	9,312	9,009
Age	45,723	45,784	45,745	46,946	45,917	46,876	46,399	48,769	46,389	47,639	47,385	48,740
female	0,523	0,526	0,515	0,518	0,532	0,535	0,533	0,542	0,526	0,530	0,528	0,533
Primary Ed.	0,258	0,265	0,299	0,288	0,605	0,601	0,347	0,357	0,489	0,504	0,467	0,478
Secondary Ed.	0,537	0,530	0,419	0,425	0,279	0,281	0,300	0,300	0,246	0,247	0,322	0,313
Higher Ed.	0,193	0,193	0,270	0,281	0,103	0,105	0,284	0,295	0,196	0,195	0,208	0,207
Unemployed	0,059	0,062	0,053	0,054	0,062	0,065	0,062	0,065	0,060	0,060	0,039	0,042
Type of dwelling (house)	0,409	0,368	0,684	0,666	0,720	0,708	0,814	0,793	0,669	0,624	0,868	0,852
Dwelling is Public or non-profit		0,209		0,175		0,367		0,068		0,165		0,229
Dwelling provided by employer		0,023		0,006		0,003		0,002		0,007		0,008
Number of rooms	3,747	3,625	4,054	3,986	4,940	4,896	4,413	4,315	4,127	4,029	4,423	4,333
Separate kitchen	0,992	0,992	0,977	0,976	0,712	0,713	0,961	0,958	0,909	0,906	0,994	0,994
Bath or shower	0,982	0,981	0,984	0,984	0,994	0,994	0,979	0,977	0,977	0,976	0,998	0,998
Indoor flushing toilet	0,979	0,978	0,992	0,992	0,995	0,994	0,981	0,979	0,980	0,980	0,998	0,998
Hot running water	0,971	0,969	0,995	0,995	0,997	0,997	0,977	0,974	0,985	0,985	0,999	0,999
Heating	0,880	0,871	0,988	0,987	0,902	0,900	0,806	0,797	0,916	0,914	0,886	0,879
Terrace or garden	0,860	0,840	0,911	0,905	0,979	0,979	0,918	0,909	0,688	0,649	0,964	0,958
Shortage of space	0,176	0,193	0,157	0,161	0,094	0,098	0,135	0,144	0,128	0,141	0,211	0,213
Noisy neighbourhood	0,273	0,278	0,143	0,147	0,286	0,294	0,242	0,253	0,227	0,241	0,219	0,227
Not enough light	0,052	0,058	0,031	0,032	0,051	0,053	0,091	0,093	0,093	0,096	0,084	0,085
Inadequate heating facilities	0,044	0,048	0,031	0,032	0,048	0,051	0,062	0,069	0,096	0,104	0,100	0,112
Leaky roof	0,041	0,044	0,037	0,037	0,037	0,038	0,049	0,051	0,053	0,054	0,041	0,043
Damp walls, floors, etc.	0,078	0,084	0,058	0,059	0,096	0,102	0,125	0,134	0,152	0,161	0,143	0,152
Rot in window frames or floor	0,050	0,057	0,055	0,056	0,080	0,084	0,075	0,082	0,090	0,101	0,133	0,139
Pollution or environmental problem	0,119	0,123	0,058	0,060	0,123	0,123	0,128	0,129	0,157	0,162	0,152	0,155
Crime or vandalism	0,101	0,108	0,099	0,103	0,166	0,170	0,187	0,194	0,204	0,212	0,291	0,295

Table 1 (continuation)

	Ireland		Italy		Spain		Portugal		Austria		Finland	
	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters
log(income)	10,075	9,971	9,760	9,695	9,599	9,498	9,130	9,055	10,247	10,152	10,100	10,052
Household size	3,991	3,683	3,425	3,208	3,595	3,232	3,433	3,168	3,382	2,970	2,910	2,750
Year occupier	13,774	12,863	13,226	12,492	13,000	12,210	13,650	13,277	14,384	13,471	10,080	9,324
Age	44,331	49,727	45,634	49,987	46,073	5,269	48,071	5,888	46,355	49,884	44,259	46,197
female	0,504	0,526	0,514	0,529	0,520	0,536	0,530	0,542	0,521	0,546	0,507	0,522
Primary Ed.	0,483	0,543	0,564	0,605	0,663	0,718	0,836	0,868	0,338	0,322	0,328	0,307
Secondary Ed.	0,333	0,309	0,322	0,278	0,176	0,129	0,101	0,071	0,591	0,601	0,394	0,392
Higher Ed.	0,133	0,138	0,070	0,069	0,161	0,153	0,051	0,051	0,059	0,068	0,275	0,299
Unemployed	0,048	0,047	0,070	0,045	0,083	0,063	0,036	0,034	0,026	0,028	0,068	0,070
Type of dwelling (house)	0,958	0,946	0,360	0,325	0,396	0,360	0,790	0,755	0,624	0,530	0,670	0,631
Public or non-profit owner		0,106		0,071		0,016		0,040		0,166		0,126
Employer owner		0,001		0,007		0,017		0,011		0,015		0,019
Number of rooms	4,950	4,842	3,698	3,555	4,277	4,169	3,935	3,766	4,467	4,160	3,744	3,593
Separate kitchen	0,965	0,965	0,855	0,849	0,989	0,987	0,970	0,969	0,962	0,958	0,936	0,929
Bath or shower	0,982	0,980	0,989	0,988	0,991	0,988	0,889	0,871	0,984	0,981	0,983	0,982
Indoor flushing toilet	0,986	0,985	0,990	0,990	0,994	0,992	0,887	0,872	0,973	0,966	0,988	0,988
Hot running water	0,976	0,973	0,981	0,980	0,981	0,976	0,847	0,829	0,986	0,985	0,987	0,987
Heating	0,851	0,831	0,813	0,809	0,378	0,365	0,086	0,082	0,866	0,856	0,975	0,977
Terrace or garden	0,974	0,967	0,901	0,891	0,744	0,725	0,785	0,763	0,859	0,814	0,947	0,940
Shortage of space	0,121	0,125	0,194	0,210	0,215	0,206	0,243	0,269	0,115	0,132	0,147	0,152
Noisy neighbourhood	0,088	0,101	0,313	0,329	0,305	0,311	0,168	0,184	0,191	0,210	0,200	0,215
Not enough light	0,029	0,033	0,106	0,110	0,151	0,157	0,132	0,156	0,046	0,054	0,049	0,050
Inadequate heating facilities	0,056	0,069	0,165	0,172	0,029	0,029	0,362	0,385	0,047	0,051	0,024	0,026
Leaky roof	0,033	0,034	0,051	0,055	0,094	0,096	0,152	0,167	0,031	0,030	0,021	0,021
Damp walls, floors, etc.	0,075	0,079	0,064	0,067	0,182	0,183	0,297	0,325	0,078	0,076	0,030	0,031
Rot in window frames or floor	0,053	0,059	0,046	0,054	0,056	0,059	0,209	0,238	0,041	0,040	0,023	0,024
Pollution or environmental problem	0,068	0,072	0,177	0,190	0,134	0,136	0,119	0,129	0,063	0,072	0,139	0,145
Crime or vandalism	0,103	0,116	0,158	0,171	0,176	0,183	0,112	0,126	0,050	0,063	0,189	0,203

Table 2 - Sample statistics and test for the equality of means on reported housing satisfaction between homeowners and renters

	Mean		**s. d.**		**Sample size**		**ΔMean**	**t-stat.**
	Owners	Renters	Owners	Renters	Owners	Renters		
Germany	5.15	4.29	0.92	1.27	10,755	11,508	0,86	57.85
Denmark	5.32	4.70	0.89	1.33	23,307	10,250	0,62	49.88
The Netherlands	5.22	4.44	0.80	1.14	38,716	25,486	0,78	62.83
Belgium	5.06	4.25	0.99	1.40	26,690	8,943	0,81	59.60
France	4.94	4.27	0.79	1.17	48,241	26,909	0,67	93.82
UK	4.88	4.16	1.14	1.52	14,769	5,393	0,72	35.75
Ireland	5.13	3.89	1.08	1.65	28,543	3,656	1,24	61.16
Italy	4.38	3.52	1.18	1.36	66,944	15,447	0,86	79.52
Spain	4.55	3.76	1.15	1.39	61,519	8,412	0,79	57.44
Portugal	4.21	3.37	1.01	1.14	43,787	11,424	0,84	76.83
Austria	5.42	4.78	0.82	1.29	20,325	10,308	0,64	53.01
Finland	5.00	4.32	0.94	1.19	24,344	7,998	0,68	52.42

Table 3 - Decomposition of the gap in housing satisfaction between owners and renters

	Equation (3)		Equation (4)		Estimated average satisfaction		
	Endowment	Treatment Homeownership	Endowment	Treatment Rent	Renters	Owners	Diff.
Germany	42,8%	57,2%	59,1%	40,9%	4.34	5.16	0.83
Denmark	53,0%	47,0%	58,5%	41,5%	4.83	5.37	0.54
The Netherlands	18,3%	81,7%	33,8%	66,2%	4.76	5.24	0.48
Belgium	26,4%	73,6%	53,8%	46,2%	4.32	5.07	0.75
France	41,8%	58,2%	56,1%	43,9%	4.37	4.96	0.59
UK	47,0%	53,0%	7,5%	92,5%	4.32	5.00	0.68
Ireland	45,0%	55,0%	3,0%	97,0%	3.94	5.15	1.21
Italy	21,2%	78,8%	26,0%	74,0%	3.48	4.38	0.90
Spain	25,9%	74,1%	29,8%	70,2%	3.79	4.55	0.76
Portugal	34,0%	66,0%	33,9%	66,1%	3.35	4.18	0.82
Austria	51,0%	49,0%	50,4%	49,6%	4.87	5.44	0.58
Finland	40,3%	59,7%	50,2%	49,8%	4.32	5.00	0.67

ANNEX

Table A1: Random-effects ordered probit estimates of the determinants of housing satisfaction.

	Germany						Denmark					
	Renters			Owners			Renters			Owners		
	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE
log(income)	0,005	0,20	0,001	0,124	5,29	0,048	-0,088	-2,75	-0,031	0,136	4,52	0,054
Household size	-0,143	-8,92	-0,029	-0,060	-3,20	-0,023	-0,126	-5,87	-0,044	-0,100	-6,63	-0,040
Year occupier	-0,102	-9,55	-0,021	-0,038	-2,43	-0,015	-0,047	-4,89	-0,016	-0,097	-13,47	-0,039
Year occupier squared	0,005	8,52	0,001	0,001	0,62	0,000	0,002	4,00	0,001	0,003	9,41	0,001
Type of dwelling (house)	0,100	2,17	0,020	0,192	4,41	0,074	0,166	3,89	0,058	0,272	5,67	0,108
Public or non-profit	-0,011	-0,35	-0,002				0,129	3,64	0,045			
Employer	0,007	0,09	0,001				0,154	1,37	0,054			
Number of rooms	0,172	9,04	0,035	0,118	7,51	0,045	0,144	7,42	0,050	0,171	12,90	0,068
Separate kitchen	0,046	0,33	0,009	0,072	0,25	0,028	0,186	2,96	0,065	-0,112	-0,86	-0,044
Bath or shower	0,304	3,18	0,061	1,052	3,80	0,403	0,272	2,78	0,095	0,530	3,37	0,211
Indoor flushing toilet	0,238	2,27	0,048	0,291	1,51	0,112	0,077	0,57	0,027	-0,112	-0,49	-0,045
Hot running water	0,125	2,23	0,025	0,148	1,39	0,057	0,174	1,02	0,061	0,063	0,24	0,025
Heating	0,241	5,28	0,049	0,509	6,18	0,195	0,161	1,39	0,056	0,217	2,02	0,087
Terrace or garden	0,268	7,70	0,054	0,246	2,54	0,094	0,132	3,48	0,046	0,119	1,80	0,047
Shortage of space	-0,798	-22,85	-0,161	-0,738	-12,02	-0,283	-1,083	-30,23	-0,378	-0,893	-27,50	-0,356
Noisy neighbourhood	-0,283	-9,99	-0,057	-0,217	-5,95	-0,083	-0,251	-7,42	-0,088	-0,204	-5,71	-0,081
Not enough light	-0,232	-5,01	-0,047	-0,193	-2,15	-0,074	-0,371	-6,68	-0,129	-0,221	-3,04	-0,088
Inadequate heating facilities	-0,311	-6,12	-0,063	-0,016	-0,14	-0,006	-0,502	-9,18	-0,175	-0,018	-0,24	-0,007
Leaky roof	-0,157	-2,84	-0,032	-0,037	-0,35	-0,014	-0,330	-4,84	-0,115	-0,330	-6,36	-0,131
Damp walls, floors, etc.	-0,334	-7,53	-0,067	-0,399	-5,56	-0,153	-0,306	-6,31	-0,107	-0,217	-4,25	-0,087
Rot in window frames or floor	-0,260	-5,60	-0,053	0,420	3,25	0,161	-0,350	-6,45	-0,122	-0,291	-6,15	-0,116
Pollution or environmental problem	-0,130	-3,59	-0,026	-0,161	-3,24	-0,062	-0,239	-4,77	-0,084	-0,102	-1,99	-0,041
Crime or vandalism	-0,176	-4,77	-0,035	0,022	0,39	0,009	-0,274	-7,06	-0,096	0,062	1,63	0,025
μ_1	-1,825	-6,85		0,711	1,55		-2,786	-8,12		-0,839	-2,16	
μ_2	-0,940	-3,54		1,214	2,66		-1,926	-5,64		-0,091	-0,24	
μ_3	0,008	0,03		1,865	4,09		-1,098	-3,22		0,704	1,83	
μ_4	0,958	3,61		2,724	5,96		-0,176	-0,52		1,813	4,71	
μ_5	2,428	9,11		4,476	9,78		1,065	3,12		3,465	8,99	
ρ	0,358	28,59		0,422	30,77		0,389	27,95		0,510	52,46	
(log-likelihood)		-15.598			-11.270			-12.320			-20.049	
Sample size		11.229			10.501			9.994			22.704	

Note: All the estimates include individuals characteristics (age, gender, education, employment situation and marital status), and dummies for time and region. The APE are computed for P(Y=6).

Table A1: Continuation

	The Netherlands						Belgium					
	Renters			Owners			Renters			Owners		
	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE
log(income)	-0,041	-2,34	-0,012	0,044	2,32	0,017	0,012	0,43	0,003	0,043	2,220	0,01
Household size	-0,006	-0,48	-0,002	-0,020	-1,86	-0,008	-0,127	-6,74	-0,030	-0,049	-3,560	-0,02
Year occupier	-0,074	-11,85	-0,022	-0,141	-24,78	-0,054	-0,064	-6,31	-0,015	-0,081	-11,850	-0,03
Year occupier squared	0,002	8,21	0,001	0,004	16,56	0,002	0,003	5,05	0,001	0,002	7,210	0,00
Type of dwelling (house)	0,208	6,99	0,063	0,145	3,80	0,056	0,012	0,27	0,003	0,064	1,110	0,02
Public or non-profit	-0,015	-0,42	-0,005				-0,011	-0,22	-0,003			
Employer	-0,036	-0,27	-0,011				-0,127	-0,84	-0,030			
Number of rooms	0,035	3,25	0,011	0,093	7,77	0,036	0,083	5,14	0,020	0,021	2,090	0,01
Separate kitchen	-0,066	-2,60	-0,020	0,046	2,27	0,018	-0,046	-0,73	-0,011	0,084	1,530	0,03
Bath or shower	0,159	1,24	0,048	-0,338	-2,06	-0,130	0,252	2,50	0,060	0,377	3,380	0,13
Indoor flushing toilet	-0,131	-0,96	-0,039	0,187	1,49	0,072	0,237	2,25	0,057	0,202	1,970	0,07
Hot running water	0,056	0,28	0,017	-0,642	-2,96	-0,247	0,278	2,81	0,066	0,259	3,010	0,09
Heating	0,139	3,88	0,042	0,225	4,89	0,087	0,208	5,02	0,050	0,205	5,820	0,07
Terrace or garden	0,133	2,53	0,040	0,248	2,39	0,096	0,289	6,91	0,069	0,336	5,910	0,12
Shortage of space	-1,036	-35,61	-0,311	-0,925	-29,46	-0,356	-0,681	-18,97	-0,162	-0,394	-11,990	-0,14
Noisy neighbourhood	-0,317	-16,28	-0,095	-0,254	-13,26	-0,098	-0,234	-7,31	-0,056	-0,216	-8,850	-0,08
Not enough light	-0,382	-10,83	-0,115	-0,315	-6,95	-0,121	-0,394	-8,88	-0,094	-0,371	-10,010	-0,13
Inadequate heating facilities	-0,355	-10,94	-0,107	-0,233	-4,42	-0,090	-0,398	-9,10	-0,095	-0,247	-5,170	-0,09
Leaky roof	0,000	-0,01	0,000	-0,178	-4,30	-0,069	-0,124	-2,23	-0,030	-0,090	-2,100	-0,03
Damp walls, floors, etc.	-0,232	-8,44	-0,070	-0,138	-3,88	-0,053	-0,288	-7,40	-0,069	-0,248	-7,830	-0,09
Rot in window frames or floor	-0,224	-7,70	-0,067	-0,186	-5,47	-0,072	-0,238	-5,34	-0,057	-0,251	-6,300	-0,09
Pollution or environmental problem	-0,082	-2,99	-0,025	-0,097	-3,85	-0,037	-0,145	-3,35	-0,035	-0,138	-4,690	-0,05
Crime or vandalism	-0,195	-8,74	-0,059	-0,071	-3,09	-0,027	0,050	1,37	0,012	-0,056	-2,150	-0,02
μ_1	-3,043	-13,54		-3,429	-13,40		-1,472	-4,89		-1,274	-4,890	
μ_2	-2,315	-10,35		-2,876	-11,36		-0,760	-2,53		-0,624	-2,410	
μ_3	-1,451	-6,50		-1,919	-7,62		0,165	0,55		0,345	1,330	
μ_4	-0,397	-1,78		-0,698	-2,78		1,115	3,71		1,412	5,460	
μ_5	1,169	5,24		1,275	5,07		2,241	7,44		2,994	11,560	
ρ	0,414	47,95		0,496	69,37		0,389	27,41		0,510	61,050	
(log-likelihood)		-28.760			-34.396			-11.852			-27.256	
Sample size		23.798			37.071			8.405			25.412	

Note: All the estimates include individuals characteristics (age, gender, education, employment situation and marital status), and dummies for time and region. The APE are computed for P(Y=6).

Table A1: Continuation

	France						UK					
	Renters			Owners			Renters			Owners		
	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE
log(income)	-0,002	-0,14	0,000	0,056	3,68	0,016	0,052	1,51	0,014	0,101	4,68	0,036
Household size	-0,078	-6,93	-0,010	-0,040	-3,42	-0,011	-0,130	-6,28	-0,035	-0,090	-5,70	-0,032
Year occupier	-0,095	-11,72	-0,012	-0,072	-9,01	-0,021	-0,087	-5,41	-0,023	-0,124	-10,02	-0,045
Year occupier squared	0,005	9,74	0,001	0,002	5,30	0,001	0,005	5,14	0,001	0,006	8,98	0,002
Type of dwelling (house)	-0,029	-0,82	-0,004	0,039	0,89	0,011	0,238	4,05	0,064	0,246	3,35	0,089
Public or non-profit	0,101	3,78	0,013				0,337	5,73	0,091			
Employer	0,309	3,73	0,039				0,045	0,36	0,012			
Number of rooms	0,111	7,84	0,014	0,145	11,52	0,042	-0,001	-0,05	0,000	0,170	10,21	0,061
Separate kitchen	0,008	0,24	0,001	0,135	3,11	0,039	-0,336	-1,75	-0,091	0,037	0,20	0,013
Bath or shower	0,053	0,55	0,007	0,221	2,19	0,064	0,709	2,06	0,191	-0,450	-1,47	-0,162
Indoor flushing toilet	0,354	3,66	0,045	0,331	3,21	0,096	-0,668	-1,99	-0,180	-0,242	-0,53	-0,087
Hot running water	0,118	1,10	0,015	0,122	1,00	0,035	-0,015	-0,03	-0,004	0,655	1,82	0,236
Heating	0,171	3,86	0,021	0,230	5,01	0,066	0,204	3,50	0,055	0,305	5,30	0,110
Terrace or garden	0,187	5,92	0,023	0,249	6,36	0,072	0,135	1,99	0,037	0,195	1,44	0,070
Shortage of space	-1,093	-39,95	-0,138	-0,891	-23,89	-0,257	-0,554	-11,87	-0,149	-0,705	-19,92	-0,254
Noisy neighbourhood	-0,296	-12,80	-0,037	-0,159	-6,04	-0,046	-0,355	-7,98	-0,096	-0,328	-9,94	-0,118
Not enough light	-0,355	-11,43	-0,045	-0,352	-9,15	-0,102	-0,128	-2,12	-0,035	-0,033	-0,69	-0,012
Inadequate heating facilities	-0,331	-11,85	-0,042	-0,322	-8,58	-0,093	-0,290	-5,51	-0,078	-0,374	-6,66	-0,135
Leaky roof	-0,247	-5,71	-0,031	-0,373	-8,53	-0,108	-0,115	-1,26	-0,031	-0,267	-4,19	-0,096
Damp walls, floors, etc.	-0,345	-12,63	-0,043	-0,364	-11,93	-0,105	-0,379	-8,03	-0,102	-0,260	-5,93	-0,094
Rot in window frames or floor	-0,397	-13,56	-0,050	-0,412	-9,60	-0,119	-0,325	-6,78	-0,088	-0,282	-6,54	-0,102
Pollution or environmental problem	-0,082	-2,94	-0,010	-0,024	-0,81	-0,007	-0,133	-2,52	-0,036	-0,165	-4,44	-0,060
Crime or vandalism	-0,092	-3,66	-0,012	-0,036	-1,50	-0,010	-0,191	-4,58	-0,051	-0,133	-4,46	-0,048
μ_1	-2,642	-13,82		-2,306	-10,87		-1,833	-3,01		-1,121	-1,83	
μ_2	-2,022	-10,62		-1,669	-7,98		-1,185	-1,94		-0,319	-0,52	
μ_3	-1,130	-5,95		-0,708	-3,41		-0,397	-0,65		0,593	0,97	
μ_4	0,006	0,03		0,571	2,75		0,448	0,74		1,712	2,80	
μ_5	1,918	10,09		2,898	13,90		1,473	2,41		3,261	5,34	
ρ	0,312	29,71		0,427	50,43		0,393	20,04		0,544	52,28	
(log-likelihood)		-20.985			-25.009			-8.033			-17.729	
Sample size		16.743			25.799			5.341			14.679	

Note: All the estimates include individuals characteristics (age, gender, education, employment situation and marital status), and dummies for time and region. The APE are computed for P(Y=6).

Table A1: Continuation

	Ireland						Italy					
	Renters			Owners			Renters			Owners		
	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE
log(income)	0,015	0,32	0,004	0,129	6,93	0,051	0,115	6,56	0,026	0,142	15,72	0,054
Household size	-0,053	-2,93	-0,013	-0,045	-5,27	-0,018	-0,027	-2,02	-0,006	-0,031	-4,28	-0,012
Year occupier	-0,075	-4,71	-0,019	-0,057	-7,69	-0,023	-0,071	-9,76	-0,016	-0,024	-5,80	-0,009
Year occupier squared	0,003	3,98	0,001	0,002	5,01	0,001	0,003	7,33	0,001	0,000	2,47	0,000
Type of dwelling (house)	-0,075	-0,91	-0,019	0,391	5,18	0,155	-0,080	-1,91	-0,018	0,145	7,52	0,055
Public or non-profit	0,666	8,37	0,168				0,183	5,51	0,041			
Employer	0,295	1,06	0,074				0,132	2,08	0,030			
Number of rooms	0,030	1,09	0,008	0,169	14,52	0,067	0,228	13,11	0,052	0,187	23,16	0,071
Separate kitchen	0,163	1,81	0,041	-0,083	-1,52	-0,033	0,091	2,82	0,021	0,034	2,19	0,013
Bath or shower	0,035	0,14	0,009	0,161	1,49	0,064	0,138	1,21	0,031	0,309	4,64	0,118
Indoor flushing toilet	-0,094	-0,28	-0,024	-0,072	-0,62	-0,028	-0,057	-0,49	-0,013	0,092	1,52	0,035
Hot running water	0,266	2,10	0,067	0,462	5,45	0,183	0,180	2,07	0,041	0,068	1,45	0,026
Heating	0,193	3,44	0,049	0,363	10,22	0,144	0,127	3,45	0,029	0,132	6,62	0,050
Terrace or garden	0,167	2,06	0,042	-0,113	-1,75	-0,045	0,308	8,93	0,070	0,258	12,23	0,099
Shortage of space	-0,511	-8,85	-0,129	-0,464	-15,34	-0,184	-0,508	-18,13	-0,115	-0,529	-32,72	-0,202
Noisy neighbourhood	-0,172	-3,00	-0,044	-0,051	-1,48	-0,020	-0,047	-1,89	-0,011	0,011	0,84	0,004
Not enough light	-0,129	-1,48	-0,033	0,001	0,01	0,000	-0,108	-3,25	-0,025	-0,139	-7,50	-0,053
Inadequate heating facilities	-0,257	-3,87	-0,065	-0,302	-6,64	-0,120	-0,206	-6,34	-0,047	-0,157	-8,14	-0,060
Leaky roof	-0,093	-0,89	-0,024	-0,291	-5,91	-0,115	-0,201	-4,54	-0,046	-0,113	-4,00	-0,043
Damp walls, floors, etc.	-0,472	-6,37	-0,119	-0,436	-11,34	-0,173	-0,253	-6,17	-0,057	-0,092	-3,71	-0,035
Rot in window frames or floor	-0,411	-5,46	-0,104	-0,291	-6,56	-0,115	-0,381	-9,58	-0,086	-0,291	-9,59	-0,111
Pollution or environmental problem	-0,002	-0,03	-0,001	-0,045	-1,19	-0,018	-0,059	-2,08	-0,013	-0,056	-3,54	-0,021
Crime or vandalism	-0,192	-3,35	-0,048	-0,076	-2,52	-0,030	-0,049	-1,69	-0,011	0,021	1,24	0,008
μ_1	-0,735	-1,47		0,162	0,74		-0,258	-1,17		-0,911	-7,35	
μ_2	-0,188	-0,38		0,755	3,47		0,698	3,16		0,006	0,05	
μ_3	0,477	0,95		1,445	6,64		1,734	7,84		1,069	8,66	
μ_4	1,195	2,39		2,316	10,63		2,780	12,55		2,214	17,94	
μ_5	2,018	4,03		3,569	16,34		3,897	17,52		3,567	28,87	
ρ	0,296	12,90		0,408	47,50		0,365	34,75		0,408	79,82	
(log-likelihood)		-5365			-30336			-21176			-84286	
Sample size		3.436			27.365			14.475			64.017	

Note: All the estimates include individuals characteristics (age, gender, education, employment situation and marital status), and dummies for time and region. The APE are computed for P(Y=6).

Table A1: Continuation

	Spain						Portugal					
	Renters			Owners			Renters			Owners		
	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE
log(income)	0,040	2,21	0,005	0,088	11,78	0,022	0,049	2,17	0,012	0,119	10,62	0,014
Household size	-0,082	-6,08	-0,009	-0,047	-9,13	-0,012	-0,083	-5,39	-0,020	-0,073	-9,04	-0,008
Year occupier	-0,045	-5,01	-0,005	-0,033	-8,87	-0,008	-0,015	-1,55	-0,004	-0,051	-9,67	-0,006
Year occupier squared	0,001	3,05	0,000	0,001	3,41	0,000	0,000	0,21	0,000	0,001	4,72	0,000
Type of dwelling (house)	0,080	1,71	0,009	0,003	0,20	0,001	-0,222	-5,04	-0,054	0,165	4,90	0,019
Public or non-profit	0,222	4,15	0,026				0,335	6,45	0,082			
Employer	0,216	4,21	0,025				0,312	5,01	0,076			
Number of rooms	0,137	8,21	0,016	0,159	25,19	0,040	0,171	9,12	0,042	0,194	20,21	0,023
Separate kitchen	-0,189	-2,01	-0,022	0,142	2,83	0,035	-0,073	-0,95	-0,018	0,106	2,56	0,012
Bath or shower	0,186	1,74	0,022	0,383	5,28	0,095	0,366	5,64	0,090	0,251	5,65	0,029
Indoor flushing toilet	0,361	2,90	0,042	0,060	0,78	0,015	0,204	3,45	0,050	0,192	4,70	0,022
Hot running water	0,506	6,39	0,059	0,286	6,43	0,071	0,116	2,29	0,028	0,323	10,51	0,037
Heating	0,299	7,34	0,035	0,261	19,05	0,065	0,117	2,10	0,029	0,198	7,81	0,023
Terrace or garden	0,080	2,72	0,009	0,086	6,99	0,021	0,112	3,51	0,027	0,127	5,85	0,015
Shortage of space	-0,565	-15,71	-0,065	-0,538	-36,81	-0,134	-0,479	-14,21	-0,117	-0,415	-19,41	-0,048
Noisy neighbourhood	-0,040	-1,33	-0,005	-0,054	-4,49	-0,013	-0,066	-2,05	-0,016	0,044	1,97	0,005
Not enough light	-0,260	-8,06	-0,030	-0,112	-7,94	-0,028	-0,384	-10,66	-0,094	-0,289	-11,03	-0,034
Inadequate heating facilities	0,025	0,33	0,003	-0,077	-2,72	-0,019	-0,113	-3,55	-0,028	-0,161	-9,20	-0,019
Leaky roof	-0,226	-5,06	-0,026	-0,218	-11,02	-0,054	-0,296	-7,93	-0,072	-0,209	-8,16	-0,024
Damp walls, floors, etc.	-0,357	-9,76	-0,041	-0,260	-16,63	-0,065	-0,219	-6,50	-0,054	-0,261	-12,54	-0,030
Rot in window frames or floor	-0,482	-10,52	-0,056	-0,485	-19,73	-0,120	-0,201	-5,68	-0,049	-0,307	-12,98	-0,036
Pollution or environmental problem	-0,078	-2,05	-0,009	-0,052	-3,28	-0,013	-0,104	-2,77	-0,026	-0,083	-3,26	-0,010
Crime or vandalism	-0,081	-2,31	-0,009	-0,014	-1,01	-0,003	0,043	1,19	0,011	0,072	2,81	0,008
μ_1	-0,600	-2,50		-0,551	-4,86		-1,821	-7,62		-1,872	-14,45	
μ_2	0,182	0,76		0,178	1,57		-0,642	-2,69		-0,855	-6,66	
μ_3	1,034	4,30		0,978	8,63		0,524	2,20		0,294	2,29	
μ_4	1,931	8,01		1,868	16,49		2,286	9,57		2,273	17,70	
μ_5	3,178	13,10		3,233	28,49		3,529	14,65		3,796	29,46	
ρ	0,258	18,08		0,195	40,11		0,378	29,93		0,427	67,04	
(log-likelihood)		-12.376			-81.630			-13.726			-46.928	
Sample size		8.271			60.801			11.028			42.338	

Note: All the estimates include individuals characteristics (age, gender, education, employment situation and marital status), and dummies for time and region. The APE are computed for P(Y=6).

Table A1: Continuation

	Austria						Finland					
	Renters			Owners			Renters			Owners		
	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE	Coef.	z-stat	APE
log(income)	0,107	3,55	0,037	0,238	10,030	0,093	-0,088	-3,12	-0,018	0,044	1,53	0,016
Household size	-0,153	-8,11	-0,053	-0,114	-8,670	-0,045	-0,143	-6,27	-0,030	-0,065	-4,62	-0,023
Year occupier	-0,073	-7,47	-0,025	-0,032	-3,020	-0,013	-0,087	-7,35	-0,018	-0,123	-16,65	-0,044
Year occupier squared	0,003	7,13	0,001	0,000	0,000	0,000	0,004	5,33	0,001	0,004	10,72	0,001
Type of dwelling (house)	-0,163	-2,31	-0,056	0,179	3,720	0,070	0,093	2,06	0,019	0,270	6,38	0,095
Public or non-profit	0,211	5,38	0,072				-0,009	-0,27	-0,002			
Employer	0,193	2,34	0,066				-0,063	-0,93	-0,013			
Number of rooms	0,222	11,74	0,076	0,132	9,380	0,052	0,183	7,62	0,038	0,175	13,77	0,062
Separate kitchen	-0,056	-0,96	-0,019	-0,280	-4,080	-0,110	-0,024	-0,55	-0,005	0,077	1,22	0,027
Bath or shower	0,203	1,84	0,070	0,174	1,180	0,069	0,671	5,20	0,139	0,198	1,86	0,070
Indoor flushing toilet	0,156	2,05	0,053	0,157	1,430	0,062	-0,350	-1,08	-0,073	0,646	3,52	0,228
Hot running water	0,184	1,35	0,063	0,246	2,070	0,097	0,416	1,24	0,086	0,176	1,09	0,062
Heating	0,289	6,48	0,099	0,475	9,120	0,187	0,108	0,51	0,022	0,316	3,98	0,112
Terrace or garden	0,243	6,42	0,083	0,326	5,520	0,128	0,220	4,70	0,046	-0,008	-0,09	-0,003
Shortage of space	-0,927	-23,67	-0,317	-0,761	-17,070	-0,299	-0,902	-23,56	-0,187	-0,824	-24,82	-0,291
Noisy neighbourhood	-0,251	-7,35	-0,086	-0,167	-4,820	-0,066	-0,282	-8,57	-0,058	-0,123	-4,26	-0,043
Not enough light	-0,351	-7,14	-0,120	-0,218	-3,030	-0,085	-0,385	-5,97	-0,080	-0,110	-2,42	-0,039
Inadequate heating facilities	-0,150	-2,61	-0,051	-0,324	-4,810	-0,127	-0,187	-2,96	-0,039	-0,055	-0,73	-0,020
Leaky roof	-0,056	-0,66	-0,019	-0,307	-4,620	-0,121	-0,319	-3,07	-0,066	-0,181	-2,72	-0,064
Damp walls, floors, etc.	-0,456	-8,63	-0,156	-0,379	-7,360	-0,149	-0,320	-4,33	-0,066	-0,361	-5,72	-0,128
Rot in window frames or floor	-0,168	-2,71	-0,058	-0,284	-4,050	-0,112	-0,251	-3,22	-0,052	-0,452	-6,02	-0,160
Pollution or environmental problem	-0,092	-1,98	-0,031	-0,244	-4,910	-0,096	0,063	1,57	0,013	-0,079	-2,50	-0,028
Crime or vandalism	-0,095	-2,09	-0,033	-0,060	-0,940	-0,024	-0,123	-3,75	-0,026	-0,089	-3,24	-0,031
μ_1	-0,864	-2,67		-0,794	-2,660		-3,528	-5,39		-0,104	-0,12	
μ_2	-0,275	-0,85		-0,010	-0,040		-2,536	-3,88		0,817	0,97	
μ_3	0,380	1,18		0,625	2,140		-1,609	-2,46		1,860	2,22	
μ_4	1,349	4,18		1,690	5,790		-0,492	-0,75		3,149	3,76	
μ_5	2,766	8,55		3,367	11,520		0,886	1,36		4,966	5,92	
ρ	0,388	27,98		0,479	44,450		0,371	24,59		0,546	68,11	
(log-likelihood)		-11.720			-16.150			-10.586			-24.715	
Sample size		9.727			19.390			7.723			23.301	

Note: All the estimates include individuals characteristics (age, gender, education, employment situation and marital status), and dummies for time and region. The APE are computed for P(Y=6).