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ABSTRACT

Housing Satisfaction, Homeownership and Housing Mobility: A Panel Data Analysis for Twelve EU Countries*

We investigate the determinants of housing satisfaction in twelve EU countries. To do so, we use panel data covering the period 1994-2001, which allows us to control for individual heterogeneity. We carry out separate estimates on the determinants of housing satisfaction for homeowners and for renters and observe that: i) the tenure status is critical in determining the level of housing satisfaction; ii) housing satisfaction acts as trigger event of housing mobility, and; iii) dissatisfied renters are more likely to move than their homeowners counterparts. Our results also allow us to conclude that self-reported housing satisfaction is a meaningful variable able to explain individual's objective economic behavior, since it is able to anticipate movements in the households' demand for housing.

JEL Classification: D1, R0, J0

Keywords: housing satisfaction, random-effects, fixed-effects, housing mobility, homeownership

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1. Introduction

Self-reported satisfaction with various aspects of individual's life has traditionally been in the focus of many psychological and sociological studies. Only recently the subject has entered the research agenda of the economists. From a more general perspective, there exist a vast literature focused on the analysis of the determinants of the so called "life satisfaction". Van Praag and Frijters (1999), Van Praag, Frijters and Ferrer-i-Carbonell (2002) and Ferrer-i-Carbonell and Frijters (2004) study the determinants of "life satisfaction" but emphasizing on the economic and econometric aspects. The topics related to the satisfaction with more aspects of the individuals' life, such as job and residential satisfaction, have also received considerable attention. Clark and Oswald (1996), Clark (1997) and Bryson, Capellari and Lucifora (2004) are some examples of economic analyses of the determinants of job satisfaction.

Between the late 1970s and early 1990s residential satisfaction has been widely studied by sociologists.[1] Only recently this topic has attracted the attention of the economists. Housing satisfaction as one of the main triggering events of housing mobility has been studied for specific population groups in the US.[2] The interest in the relationship between housing satisfaction and housing mobility can be explained not only by the fact that this variable is crucial in determining housing mobility, but also by the conjecture that this variable is capturing dimensions of the housing situation that cannot be captured by other more objective variables. For instance, Galster (1987) conceptualize housing satisfaction as a variable reflecting the gap between household's actual and desired housing situation. Following this conceptualization we consider housing satisfaction a good predictor of housing mobility and of changes in housing

[1] In this literature the term refers to housing, residential or neighborhood satisfaction. We consider all of them interchangeable terms, since their determinants and consequences are expected to be same.
[2] In the next section we offer a brief overview of the literature regarding this issue.

demand, e.g. transitions from renting to owning. If we assume that housing satisfaction is important for explaining objective individual's economic behavior, then a more accurate analysis of the determinants of housing satisfaction and its importance on housing mobility is needed.

As it is well known homeownership is not only one of the most important ways of wealth accumulation, but also one the most important signals of personal success. In this context, the "aspirational" conceptualization of housing satisfaction introduced by Galster (1987) leads us not only to consider homeownership as the key factor in determining housing satisfaction, but also to expect that homeowners and renters behave differently in unsatisfactory housing situations. Moreover, many researchers consider that variables containing information provided by subjective measures, e.g. housing satisfaction, cannot be used as indicators of individuals' actions. The main critique is that what individuals say is not necessarily what individuals do. According to this, the main objective of this study is threefold. Firstly, we provide new evidence on the determinants of housing satisfaction using European panel data. Secondly, we analyze how important is homeownership for housing satisfaction. And thirdly, we test whether housing satisfaction is really triggering housing mobility.

In analyzing the importance of homeownership for being or not satisfied with one's dwelling circumstances, we assume that homeownership is the desired or aspired housing situation. Hence, we expect renters evaluate the same dwelling or neighborhood characteristics than homeowners do. For this reason, we carry out separate estimates of the determinants of housing satisfaction for homeowners and renters, and decompose the difference in the predicted housing satisfaction between homeowners and renters into an explained and an unexplained component. This decomposition allows us to state

what percentage of the gap in housing satisfaction between homeowners and renters is exclusively due to their tenure status and what proportion is due to other variables such as household's characteristics and dwelling's conditions.[3] Next we use the predicted values of individuals' housing satisfaction as an explanatory variable in a model estimating the determinants of housing mobility. Following this strategy we do not incur in potential endogeneity problems that might arise from directly using self-reported housing satisfaction in the equation for the probability of moving. Thus it is crucial to correctly predict housing satisfaction, especially given that to our knowledge housing satisfaction as a dependent variable has not received the adequate econometric treatment in the previous empirical literature. One of the advantages of our study is the use of panel data models. These models allow us to control for the presence of specific unobserved individual/household effects –heterogeneity-, which cannot be accounted for by means of cross-section data. Additionally, the cross-country analysis we conduct is of significance if we aim at providing a wider perspective of the phenomenon. Given the considerable number of peculiarities in each of the European housing markets and the idiosyncrasy of their citizens, we expect to find marked inter-country differences in the attitudes towards homeownership and housing mobility.[4]

The outline of the remaining of the paper is as follows. In section 2 we offer a brief overview of the literature regarding housing satisfaction and housing mobility. Section 3 describes our econometric strategy. The data used in the empirical analysis is described in section 4. In section 5 we present the results and discuss the main empirical findings. Finally, section 6 summarizes and concludes.

[3] One may think that some of the variability not collected by the covariates due to omitted variables may bias the analysis. However, given the panel nature of our data and the large number of factors that we control for, we consider that it is very unlikely that we can incur in this problem.

[4] Diaz-Serrano (2005) and Diaz-Serrano (2006) offers an overview of the housing markets in the EU countries before the 2004 EU enlargement.

2. Overview of the literature

2.1. Previous evidence

Galster and Hesser (1981) and Galster (1987) were the first to conceptualize residential satisfaction as the gap between the actual and the desired housing situation. Most of the research that followed was focused on explaining the effect of housing, neighborhood or household's characteristics on residential satisfaction for different population groups. Examples of studies of residential satisfaction in the US include: Miller et al. (1980) for urban dwellers; Bruin and Cook (1997) for single-parent families; Jagun et al. (1990) for urban black adults; Johnson et al. (1993) for elderly residents in subsidized housing; Varady and Carrozza (2000) for dwellers in public housing in Cincinnati, and; Vrbka and Combs (1993) for rural residents. These studies reveal that age, income and homeownership exert an unequivocal positive effect on residential satisfaction,[5] while family size and being a renter are found to contribute negatively on housing satisfaction (see e.g. Galster and Hesser 1981; Rogers and Nikkel 1979 or Rohe and Basolo 1997).[6]

As mentioned previously, almost all the existing literature on housing satisfaction focuses on the US. There are few studies that provide a more international view on this topic: Chin-Chun (1985) studies housing satisfaction for urban dwellers in Taiwan; Amerigo and Aragoneses (1990) analyze residential satisfaction among council residents in Spain; Nathan (1995) investigates the housing satisfaction of the participants in the World Bank sponsored projects in India, and; Parkes, Kearns and Atkinson (2002) examine the situation in England.

[5] As we will see later the positive effect of income on residential satisfaction only holds for homeowners. We observe that for renters the effect of income exerts a positive effect only in the Southern European countries.

[6] Lu (1999) offers a quite extensive overview of the literature.

The literature regarding the effect of housing satisfaction on mobility decisions is much more recent. Barcus (2004) uses US data to study the determinants of the changes in residential satisfaction of urban-rural migrants. The author uses a dichotomous logit model and finds that the transition from owning to renting exerts a negative effect on residential satisfaction and that individual characteristics are poor predictors of residential satisfaction. Lu (2002) analyzes the residential consequences of migration in the US and finds similar results. The author also observes that individuals that experienced a residential migration also tended to experience an improvement in their perceived residential satisfaction. Kearns and Parkes (2003) find a significant and negative relationship between residential satisfaction and housing mobility in poor neighborhoods in the UK.

2.2. The econometric treatment of housing satisfaction in the previous literature

As we mentioned in the introduction, studies on residential satisfaction have traditionally employed inadequate econometric techniques. Most of the analyses employ linear regression models, where residential satisfaction is regressed on a set of explanatory variables. However, given that residential satisfaction is usually measured on an ordinal scale, the use of linear regression models is not appropriate. When the outcome variable is an ordinal scale, we assume that the propensity of individual *i* to report a certain level of satisfaction is driven by the following structure:

$$S_i^* = \beta' X_i + e_i \qquad i = 1, ..., N \tag{1}$$

where S_i^* is the latent outcome, X_i are the determinants of the outcome, and e_i is the random error term. Traditionally, the determinants of residential satisfaction are studied

by estimating the linear relationship defined in equation (1) by simple ordinary least squares. However, given that the dependent variable has a finite number of possible outcomes with an ordering structure, this way to estimate model (1) is not appropriate.[7] Note that we do not observe S_i^*, but observe an indicator variable of the type:

$$S_i = \begin{cases} 1 \;\; if \;\; S_i^* \le \mu_0 \\ j \;\; if \;\; \mu_{j-1} < S_i^* \le \mu_j, \qquad j = 1,...,J-1 \\ J \;\; if \;\; S_i^* > \mu_{J-1} \end{cases} \tag{2}$$

According to the observability rule defined in (2), the conditional probability of observing S_i=j is:

$$\begin{aligned} P(S_i = j \mid X_i) &= P(\mu_{j-1} \le S_i^* \le \mu_j) = \\ &= P(\mu_{j-1} \le \beta' X + e_i \le \mu_j) = \\ &= P(\mu_{j-1} - \beta' X \le e_i \le \mu_j - \beta' X) = \\ &= P(e_i \le \mu_j - \beta' X) - P(e_i \le \mu_{j-1} - \beta' X) \end{aligned} \tag{3}$$

If we assume that e_i follows a standard normal distribution, the probability expressed in equation (3) can be estimated using the ordered probit model, whereas the ordered logit model is to be used if we assume a logistic distribution. Both models can be applied to cross-section data in studies regarding housing satisfaction. Using US data, Lu (1999) studies the determinants of residential satisfaction and compares the use of the ordered logit model vs. the traditional linear regression model. He concludes that in spite of the few shortcomings the ordered logit model is more appropriate than the linear regression model. Interestingly, the author finds out that the significant differences between the

[7] One possibility to avoid this problem would be to rescale S_i according to a symmetric probability distribution, such as the standard normal. This procedure yields a continuous variable that can be used as independent variable in linear regression analysis.

two models do not condition the results, i.e. the conclusions drawn from the linear regression are the same as the ones derived from the ordinal logit model.

The level of residential satisfaction is determined by three groups of factors:[8] i) objective characteristics of the individual or household, i.e. personal and socio-economic characteristics; ii) objective characteristics of the environment, i.e. dwelling and neighborhood characteristics, and; iii) individual's subjective perceptions, valuations and aspirations. While, the two first groups of variables have been widely treated in the existing literature, variables belonging to the third group have been almost completely ignored. There are various reasons for that. On the one hand, suitable panel data to carry out such analysis is rarely available. On the other hand, the nature of this type of variables, generally not observable, requires the use of quite sophisticated econometric techniques. We think that cross section data and the common ordinal logit/probit models are not able to capture the effect of individual's specific effects and the individual heterogeneity that characterizes the individuals' cognitive perceptions.

In order to improve the analysis of the causal relationship between residential satisfaction and its determinants, more refined statistical techniques have been used. For instance, Mollin and Timmermans (2003) use the hierarchical information integration theory (HII) to study the causal structure of residential housing satisfaction. To do so the authors specify a structural equation model that do not allow them to reject the HII hypothesis in the formation of housing preferences and satisfaction. They conclude that residential satisfaction is directly influenced only by the housing and location evaluations. Although this approach is quite novel, it fails to capture the effect of the third group of variables, i.e. residential aspirations and unobserved heterogeneity across

[8] See Galster (1987) for discussion and references.

individual preferences. Another example of the use of structural equations models and factor analysis can be found in Joong-Hwan (2003). The author analyzes the combined effect of social bonds and residential satisfaction on the mobility intentions of elderly residents in Chicago. He finds out that social bonds exert a significant positive effect on residential satisfaction, which in turn reduces the intention to move. However, this study also omits the effect of unobserved heterogeneity across individual preferences.

3. Empirical strategy

3.1. Determinants of housing satisfaction: new econometrics for an old question

The main problem with ordinal scales is that surveyed individuals may have different perceptions of the same scale. It is plausible to assume that unobservables, varying across individuals, such as emotional state, preferences or aspirations, are also relevant for the outcome. As we mention above, an unattractive feature of the cross-section models (ordered probit/logit) used in the existing literature on housing satisfaction is that they are unable to capture the effect of this heterogeneity across individuals. Given that panel data models allows us to handle this problem, the use of, for example, random-effects ordered probit seems more appropriate. However, this model also has some limitations. If the explanatory variables and the individual specific effects are correlated, the random-effects model may lead to inconsistent estimates. To overcome this problem, one should use fixed-effects models. Unfortunately, due to computational difficulties, the fixed-effects ordered logit/probit model has not been formulated yet. Nevertheless, we can approach the fixed-effects ordered logit model by manipulating the conditional logit model formulated in Chamberlain (1980). Both the random-effects and the fixed-effects model are described bellow.

3.1.1 The random-effects ordered probit

Equation (1) can be rewritten as:

$$S_{it}^{*} = \beta' X_{it} + u_i + \varepsilon_{it} \qquad i = 1,...,N \quad t = 1,...,T$$
$$S_{it} = j \quad if \quad \mu_{j-1} \le S_{it}^{*} \le \mu_j \tag{4}$$

where S_{it}^{*} is the latent outcome for individual *i* at period *t*, X_{it} are the determinants of the outcome variable, u_i picks up the individual's time-constant specific effect, which is assumed to be normally distributed with zero mean and variance σ_u, and ε_{it} is a time-varying error term distributed as $N(0,1)$. If we define $v_{it} = \varepsilon_{it} + u_i$, then $var(v_{it}) = \sigma_\varepsilon^2 + \sigma_u^2 = 1 + \sigma_u^2$ and $\rho_v = \dfrac{\sigma_u^2}{1+\sigma_u^2}$. The log-likelihood function reads:

$$LogL = \sum_{i=1}^{N} log\, P(S_{i1},...,S_{iT}) \tag{5}$$

Defining $a_{it} = \mu_{j-1} - \beta' X_{it}$ and $b_{it} = \mu_j - \beta' X_{it}$ we can rewrite (3) as follows:

$$\begin{aligned} P(S_{i1},...,S_{iT}) &= \int_{a_{i1}}^{b_{i1}} ... \int_{a_{iT}}^{b_{iT}} \phi(v_{i1},...,v_{iT})\, dv_{i1}...dv_{iT} = \\ &= \int_{a_{i1}}^{b_{i1}} ... \int_{a_{iT}}^{b_{iT}} \int_{-\infty}^{+\infty} \phi(\varepsilon_{it} \mid u_i)\phi(u_i)\, du_i\, d\varepsilon_{iT}...d\varepsilon_{i1} = \\ &= \int_{-\infty}^{+\infty} \phi(u_i) \prod_{t=1}^{T} \left[\Phi(b_{it} \mid u_i) - \Phi(a_{it} \mid u_i)\right] du_i \end{aligned} \tag{6}$$

where ϕ and Φ denote the density function and the cumulative distribution function of the normal distribution, respectively. The log-likelihood for this model can be generalized following Butler and Moffit (1982). One of the difficulties of this model is

the treatment of the individual heterogeneity, u_i, which is handled by using the Gauss-Hermite quadrature to integrate out the joint density (see Frechette 2001, for further details).

3.1.2. The fixed-effects ordered logit

As it has been mentioned earlier, the random-effects ordered probit possesses the attractive feature of allowing us to control for individual heterogeneity. However, it does not take into account the spurious correlation that might arise between the explanatory variables and the individual specific effects determining the level of housing satisfaction. If this correlation is significantly different from zero, the random-effects probit estimates may be inconsistent. In this case, the fixed-effects approach is more suitable. In the literature we can find two ways of approaching the fixed-effects model. These are the estimators proposed by Das and Van Soest (1999) and by Ferrer-i-Carbonell and Frijters (2004). Both methods extend the original conditional logit model (Chamberlain, 1980) to a fixed-effects ordered logit framework. We only introduce the most recent method to estimate the fixed-effect ordered logit, i.e. the Ferrer-i-Carbonell and Frijters estimator, as this is the model used here.

The Chamberlain's (1980) estimator applied to our equation (4) gives the following expression:

$$P\left(S_{i1},...,S_{iT} \mid \sum_t S_{it}, \beta, u_i, X_{it} \right) = \frac{\exp\left\{ \sum_t S_{it} \beta' X_{it} \right\}}{\sum_{S \in S\left(\sum_t Sit\right)} \exp\left\{ \sum_{t-1}^{T} I(S_{it} > j_i) \beta' X_{it} \right\}} \qquad (7)$$

Equation (7) represents the probability of observing S_{i1}, …, S_{iT} conditional not only on the covariates X_{it}, the set of parameters β and the individual fixed-effect u_i, but also on their sum $\sum_t S_{it}$, where $S(\sum_t S_{it})$ denotes the set of all possible combinations of S_{i1}, …, S_{iT} that sum up to $\sum_t S_{it}$. The model expressed in equation (7) is set to a dichotomous outcome variable S_{it} such that $S_{it} = I(S_{it}^* > 0)$.

The Ferrer-i-Carbonell and Frijters (2004) estimator adapts Chamberlain's model to the ordered setting expressed in equation (4). Their fixed-effects ordered logit estimator is based on the following conditional probability:

$$P\left(I(S_{i1} > j_i),...,I(S_{iT} > j_i) \,|\, \sum_t I(S_{it} > j_i) = g \right) = \frac{\exp\left\{ \sum_{t=1}^{T} I(S_{it} > j_i)\beta' X_{it} \right\}}{\sum_{S \in S(j_i, g)} \exp\left\{ \sum_{t=1}^{T} I(S_{it} > j_i)\beta' X_{it} \right\}} \quad (8)$$

where $0<g<T$, $S(j_i, g)$ denotes the set of all possible combinations of S_{i1}, …, S_{iT} for which $\sum_{t=1}^{T} I(S_{it} > j_i)$ is equal to the number of times that housing satisfaction is above the barrier j_i.[9] The two estimators (7) and (8) are similar in the sense that both are collapsed to binary variables. However, while the Chamberlain (1980) estimator only uses the observations for which $\sum_t S_{it}$ =1, which in turn may lead a dramatic loss of observations, the Ferrer-i-Carbonell and Frijters (2004) expressed in equation (8) allows us to use all the observations that experience a change in S_{it} throughout the sample period T.

[9] The model expressed in (8) is estimated by maximum likelihood (see Ferrer-i-Carbonell and Frijters 2004 for further details).

3.1.3. Random-effects vs. fixed-effects

As we mentioned earlier, the fixed-effects approach has the attractive feature that allows to avoid the restrictions introduced by the random-effects approach, i.e. the individual specific effects and the observables are uncorrelated. However, the use of the fixed-effects model also carries some important limitations. Firstly, the method only allows to use as covariates variables that vary across time, which implies that the effect of some relevant time-invariant factors cannot be tested. Secondly, only individuals whose satisfaction score change across time can be used in the calculations, which means that a considerable number of observations that might be important in determining the causal relationship are lost. And 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 of the dwelling characteristics. In this context, the best way to proceed is to use the fixed-effects approach only if it is strictly necessary in order to avoid inconsistent estimates. Fritjters, Haisken-DeNew and Shields (2002) propose a test on the explanatory power of the fixed-effects model compared to the random-effects model. The null hypothesis of the test is the following:

$$H_0 : \beta^{FE} = \alpha \hat{\beta}^{RE}, \tag{9}$$

where $\hat{\beta}^{RE}$ are the estimated parameters of the random-effects ordered probit model and α is a positive constant collecting the difference in the normalization between the random and the fixed-effects models. The intuition behind this test is that if the individual fixed-effects and the individual characteristics are not coelated, then the coefficients of the random-effects model should not be different from the coefficients of

the fixed-effects model. Hence, only differences between the random and the fixed-effects approaches should be systematic and caused by the re-escalation of the parameters in the random-effects model, which is captured by the term α in equation (9). The null hypothesis expressed in (9) can be tested using the following likelihood ratio-test:

$$2L(\hat{\beta}_{ML}^{FE}) - 2L(\alpha\hat{\beta}^{RE}) \quad \sim \quad \chi_k^2 \tag{10}$$

where $\hat{\beta}_{ML}^{FE}$ is the maximum likelihood estimates of the fixed-effects model, $L(\alpha\hat{\beta}^{RE})$ is the likelihood of the fixed-effect model when $\hat{\beta}_{ML}^{FE} = \alpha\hat{\beta}^{RE}$, and *k* denotes the number of restricted parameters, i.e. the number of parameters estimated by the random and the fixed-effects models. The main problem with this test is that α is unknown, although we can overcome the problem by using the $\hat{\alpha}$ that maximizes $L(\alpha\hat{\beta}^{RE})$.

3.2. Determinants of housing mobility: can housing satisfaction predict the household's moving propensities?

One of the most persistent discussions in economic research refers to whether subjective questions may contribute to explain individuals' objective economic behavior. As we mentioned earlier, if there is no concurrence between what individuals say and what individuals do, then it seems plausible to believe that individual's answers to subjective questions, such as the level of housing satisfaction, are meaningless for economic analysis. To some extent, estimating the effect of housing satisfaction on the individuals' moving decisions can be a good test for the convenience of using such

questions in applied housing economics research. In addition, one of the most interesting features of our analysis regarding housing mobility is the fact that we use panel data. It not only allow us to infer the relationship between housing mobility in a given year and the level of housing satisfaction previous to the moving decision, but also to check whether individuals experience an increase in their level of housing satisfaction after a move.

Lets us define the moving decisions as the observed binary variable, y_{it}, that takes the value one if the household *i* has moved in period *t*, and zero otherwise. It is important to remark that the endogenous variable equals one only during the period when the household moves and that it equals zero during the periods following the move. This definition of the endogenous variable is very appropriate if we want to observer the effect of the covariates when the residential change is made. In this context, y_{it} is the realization of the unobserved propensity to move for household *i* at period *t*, y_{it}^{*}. Hence, the econometric specification can be written as:

$$y_{it} = I(y_{it}^{*} > 0) = I(Z_{it}^{'}\gamma + \delta_i + e_{it} > 0) \qquad (i = 1,...,N; t = 1,...,T), \tag{11}$$

where Z_{it} is a matrix containing the observable determinants of housing mobility, δ_i, is a household specific component, which is time-invariant and normally distributed with zero-mean and variance σ_{δ}^{2}, and e_{it} is a time-varying white noise error term, which is independent of both δ_i and Z_{it}. If we define Z_{it}=[X_{it}, O_{it}, O_{it-1}, S_{it}, S_{it-1}], then equation (11) becomes:

$$y_{it} = I(y_{it}^{*} > 0) = I(W_{it}^{'}\lambda_1 + O_{it-1}^{'}\lambda_2 + O_{it}^{'}\lambda_3 + S_{it-1}^{'}\lambda_4 + S_{it}^{'}\lambda_5 + \delta_i + e_{it} > 0) \tag{12}$$

where O_{it} is a dummy variable that takes the value 1 if the household becomes a homeowner after moving, O_{it-1} takes the value 1 if the household was a homeowner the year before moving, S_{it} is the level of housing satisfaction reported by the household head after moving, S_{it-1} is the level of housing satisfaction reported by the household head the year before moving, and W_{it} is a set of covariates that does not necessarily need to contain the same variables as the linear relationship specified in equation (1). The specification used in equation (12) allows us to test a number of hypothesis by means of the contemporaneous and lagged values of the variables O_{it} and S_{it}. The hypothesis are the following:

H_1: Housing dissatisfaction acts as a trigger event of housing mobility, i.e. $\lambda_4<0$.

H_2: Dissatisfied movers tend to report higher levels of housing satisfaction after a move and $\lambda_5>0$.

H_3: Dissatisfied homeowners are less likely to move, i.e. $\lambda_4<0$ and $\lambda_2<0$.

H_4: Dissatisfied renters are more likely to improve their housing satisfaction by becoming homeowners, i.e. $\lambda_4<0$, $\lambda_2<0$ and $\lambda_3>0$.

If H_1 cannot be rejected, then housing satisfaction seems to be triggering housing mobility. Hence, housing satisfaction would be a meaningful variable able to explain individuals' economic behavior regarding their housing decisions. If $\lambda_4<0$, then dissatisfied households with their housing situation are more prone to move. If H_2 is true, i.e. $\lambda_5>0$, it means that the movement has effectively led the household to a more satisfactory status regarding their housing situation. According to H_3, dissatisfied homeowners are less likely to move. This result could be explained by the fact that

homeownership implies quite high search and transaction costs. Finally, if H_3 is true, then H_4 implies that the most likely transition for dissatisfied households is renter-homeowner.

To consistently estimate equation (12), we have to take into account the fact that housing satisfaction (S_{it}) is endogenous. Clearly, if housing satisfaction triggers housing mobility -H_1 is not rejected- then it would be also expected that movers experience an increase in their level of housing satisfaction -H_2-. Although this econometric problem seems quite obvious the potential endogeneity problem of housing satisfaction has never been accounted for in the existing literature. In order to avoid the potentially inconsistent estimates of the parameters in equation (12), we adopt the strategy of replacing S_{it} by its econometric estimates ($\hat{S}_{it}$) according to equation (4).[10]

4. Data and variables

The data used in this paper comes from the European Community Household Panel (ECHP). This is a yearly panel of the EU-15 countries carried out by the Statistical Office of the European Union (Eurostat) in cooperation with the National Statistical Offices of each country.[11] The data collection started in 1994 and was conducted over eight consecutive years. We use all the waves of the ECHP, covering the 1994-2001 period for eight of the EU-15 countries (Denmark, the Netherlands, Belgium, France, Ireland, Italy, Spain and Portugal). For Austria and Finland the available files only cover the period 1995-2001 and 1996-2001, respectively. During the

[10] This method is the well-known two-step regression, which allows us to get consistent estimates. In an ordinary least squares framework with small samples standard errors in the second-step regression are expected to be potentially incorrect. Murphy and Topel (1985) and Baltagi (1998) propose a correction for the standard errors of the estimated parameters. However, Diaz-Serrano and Hartog (2006) show that with big samples, as the ones used here, the effect of such a correction is negligible.

[11] We refer to EU-15 as the fifteen EU countries before the 2004 EU enlargement.

period 1994-1996 the data for Germany comes from two different sources. The original German ECHP files are mixed with the German Socioeconomic Panel (GSOEP), whereas for the remaining waves covering the period 1997-2001 all the data comes exclusively from the ECHP files. However, the ECHP files for Germany do not provide valid answers about the question on housing satisfaction, whereas the GSOEP does. Therefore, for this country we can only use the information covering the period 1994-1996. For the UK the data also comes from two different sources, the ECHP for the period 1994-2001 and the British Household Panel Survey (BHPS) for the period 1994-1996. We opted to use the waves coming from the BHPS, since the BHPS provides better information about housing satisfaction and its determinants. Finally, the Swedish ECHP files do not provide information on housing satisfaction in any wave. Therefore, this country is excluded from our analysis. Additionally, we also omit from our analysis Luxembourg and Greece. In the case of Luxembourg valid answers on housing satisfaction are only available during three waves, which left us with a sample that was too small to obtain meaningful results. In the case of Greece the use of the ECHP files carries several problems regarding incomplete information and other econometric shortcomings.[12] To carry out our analysis, we select household heads. We focus on this group of individuals because of two reasons. Firstly, one might expect sons/daughters to have different housing aspirations compared to their parents and thus evaluate differently the households current housing situation. Secondly, in the event of a high degree of dissatisfaction, we consider that household heads play the most important role in the decision to move.

[12] These problems with the Greek sample are detected in Diaz-Serrano (2005) in a study on EU mortgage markets.

4.1. Selected variables

The ECHP contains data on the households and on multiple individual characteristics such as socio-demographic situation, health status, migration patterns, labor and income information. Besides, the ECHP includes variables related to the level of satisfaction with different aspects of the household's housing situation. The individuals are asked to report on a six-point scale how satisfied they feel with their housing situation. The lowest level of the scale stands for individuals who were not satisfied at all (1), whereas the highest stands for fully satisfied individuals (6). This is our endogenous variable (S_{it}). Important for the purposes of the present study, the survey provides detailed information regarding household's dwelling, neighborhood characteristics and housing mobility.

Our vector of explanatory variables (X_{it}) accounts for various types of determinants of housing satisfaction. These include individual characteristics, i.e. age, gender, education, employment situation and marital status; household characteristics, i.e. household income, number of household members 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; neighborhood environment, i.e. noise, pollution and environmental problems, and existence of crime or vandalism in the neighborhood. Additionally, for individuals who are renters, we also include a set of dummies related to the property owner, i.e. private, employer or non-profit organization. All the estimated models include a set of time dummies. Whenever it is possible we also include a set of regional dummies. Finally, as we mentioned in section 3, the effect of

the subjective factors is collected by the individual specific-effect (u_i) reflecting individual heterogeneity in the perception of the residential satisfaction.

The matrix W_{it} in equation (12), regarding the housing mobility propensities, contains the following variables: the logarithm of the household's income lagged one period, household's size, residence duration lagged one period; marital status, a squared polynomial on age, gender of the household head, and; a set of time and regional dummies.

4.2. Raw differences in housing satisfaction between homeowners and renters

Table 1 contains the sample mean values of housing satisfaction by tenure status. We also include the results from the test of the hypothesis of equality in the average housing satisfaction between homeowners and renters. We observe that the mean level of housing satisfaction is lower for renters as compared to the one reported by homeowners in all the countries under analysis.

Insert Table 1 about here

The lowest levels of housing satisfaction among homeowners are reported by the citizens of the Southern European countries, while the highest levels are observed in Austria, Denmark and the Netherlands. For renters, the rankings of housing satisfaction in the top and bottom are exactly the same as for homeowners. Indeed in the case of the Southern European countries, the levels of housing satisfaction are remarkably low with an average satisfaction bellow 4. The largest gap in average satisfaction between homeowners and renters is observed in Ireland, Portugal and Germany. Interestingly, in Germany and Ireland average housing satisfaction for renters is not especially low,

above 4. The larger gap in these countries is driven by the fact that satisfaction among homeowners is quite high, above 5.

The interpretation of the standard deviation of the level of housing satisfaction also offers some interesting insights. The distribution of housing satisfaction turned out to be more disperse for renters than for homeowners in all countries. This means that the level of housing satisfaction is more polarized among renters than among homeowners. This is probably due to segmentation, e.g. in terms of housing quality of the rented stock, or even in the disutility that the housing situation causes to renters.

5. Empirical results

5.1. The determinants of housing satisfaction

5.1.1. Fixed-effects vs. random-effects model

First of all we performed the test comparing the performance of the the fixed-effects ordered logit and the random-effects ordered probit model. As previously discussed, the fixed-effects model would be necessary if there exist a significant correlation between the individual specific-effects and the covariates. On the contrary, if the correlation is null, then the random-effects model would be the preferred option. In all cases, the estimated values of $\hat{\alpha}$ in the equation $\beta^{FE} = \alpha\hat{\beta}^{RE}$ are positive and statistically significant. The values for $\hat{\alpha}$ range from 0.91 in the case of homeowners in Ireland to 1.61 for homeowners in the Netherlands. The critical values for the test are determined by a chi-squared with between 30 and 35 degrees of freedom, depending on the country and the tenure status. Taking a significance level of 5 percent, the null hypothesis expressed in equation (9), i.e. fixed-effects model is not better than the

random-effects model, is only rejected in the Netherlands for both homeowners and renters, in the UK for homeowners and in Denmark for renters. However, if we assume a significance level of 1 percent, the rejection of the null hypothesis only holds for the Dutch homeowners and renters. This evidence suggests that the use of the fixed-effects model is necessary only when the Dutch sample is used.

Given that only two samples out of 24 require the use of the fixed-effects model, we adopt the strategy of using the random-effects ordered probit model for all countries and tenure status.[13] Recall that the random-effects model has the advantage that uses all the observations and variables, independently of whether individuals experience or not a change in their self-reported housing satisfaction and its determinants.[14]

5.1.2. Random-effects ordered probit estimates

Table A1 contains the estimates of the random-effects ordered probit model. From the previous studies we know that age,[15] smaller household size and higher income exert positive effect on housing satisfaction (e.g. Galster and Hesser 1981 or Lu 1999). Our results confirm these findings only for household size and age, but surprisingly, not for income. We observe a positive relation between income and housing satisfaction only for homeowners in all countries, while income affects positively renters' housing satisfaction only in the Southern European countries. This

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

[14] In our dataset between 20 and 35 percent of the individuals have not reported any change in their self-reported housing satisfaction throughout the sample period, 1994-2001. The fixed-effects model will omit all these observations from the estimation.

[15] In order to test whether housing satisfaction is u-shaped in age, we have also experimented with a squared polynomial on age, but the results were not satisfactory at all, since in most of the cases only the positive slope turned out to be significant. In some other cases the squared polynomial specification on age led this variable to be statistically non significant.

result may be explained by the fact that these countries –Spain, Portugal and Italy- share the common feature, apart from the geographical location, of being the three countries with the smallest proportion of social rents overall housing stock.[16] The case of the Netherlands is the most surprising one. For the Dutch renters the relationship between housing satisfaction and income turned out to be statistically significant but negative. In the Netherlands the proportion of social rents overall housing stock is the highest in the European Union, 35 percent. This result might indicate that in relative terms, once we standardize by income, the quality of the privately rented stock in the Netherlands is worse than the dwelling stock devoted to social rents.

One variable that have shown ambiguous results in the previous literature is the duration of residence. Kasarda and Janowitz (1974) find a positive relation between housing satisfaction and residence duration in the US. However, using Canadian data Onibokun (1976) finds the opposite effect. More recently, using US data Lu (1999) observes that duration of residence is not statistically significant in determining housing satisfaction.[17] Our results suggest that housing satisfaction is unambiguously u-shaped in duration of residence. This result persists in all countries for both homeowners and renters.

According to the hedonic approach, dwelling and neighborhood characteristics are expected to exert important effects on housing satisfaction. We observe that all dwelling deficiencies such as shortage of space, rot in the frames, leaky roofs, inadequate heating facilities or lack of sufficient light exert negative effect on housing

[16] In Spain, Portugal and Italy the proportion of social rents overall housing stock is 2, 4 and 6 percent, respectively, in contrast to the UK, France or Denmark, with a 22, 17 and 19 percent, respectively. These statistics are calculated overall rented and owned dwellings. Vacant dwellings are excluded.

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

satisfaction in practically all countries analyzed. We do not observe any systematic effect by groups of countries or tenure status. Unfavorable neighborhood characteristics of the, i.e. crime or vandalism, pollution or environmental problems and noises, also exert negative effects on housing satisfaction. In the case of crime and vandalism the estimated effects are negative and statistically significant only for renters in most of the countries. This result might be caused by a selection effect. According to the US evidence in neighborhoods where the share of homeowners is predominant house prices are substantially higher (Edward, Hwang and Imai, 2002). Hence, higher prices restrict the access of low-income neighbors, some of them potentially conflictive, to homeownership. Finally, individuals living in detached or semi-detached houses, instead of flats, also tend to report higher levels of housing satisfaction in all the studied countries.

5.1.3. Variance decomposition: the importance of homeownership

In order to analyze the difference in housing satisfaction between homeowners and renters, we employ a Oaxaca type decomposition.[18] In particular, we extend the decomposition proposed by Jones and Makepeace (1996) to panel data.[19] We find this analysis quite relevant because of the following two reasons. On the one hand, it allow us to understand how important is homeownership in the formation of the subjective perceptions that determine housing satisfaction. One the other hand, our cross-country analysis makes possible to detect potential differences in the effect of homeownership

[18] See Oaxaca (1973).

[19] The Oaxaca's method is usually used to decompose estimated earnings differences between men and women into a "explained" component due to individual and job characteristics and a residual "unexplained" component. Jones and Makepeace (1996) used this method to study female discrimination in job promotion in the UK.

on housing satisfaction across countries. The statistical methodology of the decomposition is described bellow.

Define the average housing satisfaction of each individual *i* during a given period *t* in any country as[20]

$$\bar{S}_r = \sum_s S \cdot f_{rs}; \quad \bar{S}_o = \sum_s S \cdot f_{os} \tag{11}$$

where *S* represents each satisfaction level, i.e. *S*=1,..,6, f_s is the relative frequency in each satisfaction grade, and the subscripts *o* and *r* indicate whether the individual is an homeowner or a renter, respectively. Taking expectations over equation (11) we get

$$E(\bar{S}_r) \equiv \sum_s S \cdot P(S, X_r, \beta_r); \quad E(\bar{S}_o) \equiv \sum_s S \cdot P(S, X_o, \beta_o) \tag{12}$$

where X_r is the matrix of covariates for the sample of renters, X_o is the corresponding matrix for the sample of homeowners, $P(s, X_j, \beta_j)$ is the expected probability for the level of housing satisfaction *S* conditional on the individual and dwelling characteristics X_j and the set of parameters β_j, with *j*=*r* or *j*. A consistent estimate of the expectations expressed in equation (12) can be obtained by replacing the set of parameters β_r and β_o by their respective maximum likelihood estimates $\hat{\beta}_r$ and $\hat{\beta}_o$:

$$\hat{S}_r = \sum_S S \cdot P(S, X_r, \hat{\beta}_r); \qquad \hat{S}_o = \sum_S S \cdot P(s, X_o, \hat{\beta}_o) \tag{13}$$

From equation (13), we can obtain the following decompositions

[20] For the sake of simplicity, we omit the subscripts *i* and *t*.

$$\hat{S}_o - \hat{S}_r = \sum_s S\left[P(S, X_o, \hat{\beta}_o) - P(S, X_r, \hat{\beta}_o)\right] + \\ + \sum_s S\left[P(S, X_r, \hat{\beta}_o) - P(S, X_r, \hat{\beta}_r)\right] \tag{14}$$

and

$$\hat{S}_o - \hat{S}_r = \sum_s S\left[P(s, X_o, \hat{\beta}_r) - P(S, X_r, \hat{\beta}_r)\right] + \\ + \sum_s S\left[P(S, X_o, \hat{\beta}_o) - P(S, X_o, \hat{\beta}_r)\right] \tag{15}$$

In both equations (14) and (15), in the first summation we hold the parameters constant and allow individual and dwelling characteristics to vary. In the second summation we hold the individual and dwelling characteristics constant and allow the parameters to vary. The first summation measures to what extent the difference in estimated housing satisfaction between homeowners and renters can be "explained" by individual and dwelling characteristics. The second summation collects the "unexplained" variation, which can be attributed to the different perception that individuals with the same characteristics and living in an identical dwelling, and only differing in their tenure status, may have of the same dwelling characteristics.

Results of the variance decomposition are presented in Table 2. First at all, it is worth noting that the predicted average housing satisfaction is quite accurate, since both for homeowners and renters these predictions are quite closed to the observed ones. This circumstance indicates that the fit of our econometric model to the observed data is good. To illustrate the interpretation of the results reported in table 2 we use the Spanish sample. The average housing satisfaction for Spanish homeowners is 4.55, around 20 percent higher than for renters. According to our estimates, between 27 and 31 percent of the difference in the estimated housing satisfaction between homeowners

and renters can be explained by the individual and dwelling characteristics. The tenure status explains the remaining 69 percent. In Denmark, Austria and Germany, individual and dwelling characteristics explain most of the variation in the estimated gap in housing satisfaction between homeowners and renters, with a maximum "explained" variation of 59, 58 and 54 percent, respectively. On the contrary, in the Netherlands, Italy, Spain and Portugal, individual and dwelling characteristics explain only 32, 28, 31 and 38 percent, respectively, of the gap in housing satisfaction between homeowners and renters. In Belgium, France, UK, Ireland and Finland individual and dwelling characteristics explain between 45 and 49 percent of the gap.

Except for the Dutch results, the findings for the rest of the countries seem quite plausible. There is a negative correlation between the explanatory power of the individual and dwelling characteristics and the share of owned dwellings overall dwelling stock. This result is in accordance with the conceptualization of housing satisfaction as the difference between the actual and the aspired housing situations. It seems obvious that in countries where there exist an important tenure status imbalance in favor of homeownership, like the Southern European countries, being homeowner is what dwellers aspire to. This circumstance makes that, *ceteris paribus*, in these countries homeowners value more positively identical housing characteristics than renters. On the contrary, in countries with more mature rent markets, i.e. Austria, Germany or Denmark, where dwellers may enjoy a more balanced housing supply, being renters do not make dwellers feel "frustrated" with their housing situation as in the Southern European countries. The explanation lies in the fact that a mature rental market implies the existence of more affordable rents and higher quality standards than in a housing market with a high tenure imbalance. Hence, individual and dwelling

characteristics are as important in the perceived housing satisfaction as the tenure status.

Insert Table 2 about here

5.2. The determinants of housing mobility

In this section we report the estimates of equation (12), which specifies the determinants of the moving propensities. Results are shown in table A2 in the annex.[21] We cannot reject the first hypothesis (H_1). In all countries housing satisfaction in the period previous to the move (S_{it-1}) exert a negative and statistically significant effect on the moving propensities. Thus confirming that housing dissatisfaction acts as a trigger event of housing mobility. Since we observe that movers tend to report higher levels of housing satisfaction after a move, we cannot reject H_2. With the exception of the UK, the third hypothesis (H_3) cannot be rejected for any of the remaining countries, i.e. homeowners are generally less likely to move, since the dummy variable reflecting homeownership status in the period previous to the move (O_{t-1}) turned out to exert a negative and statistically significant effect. In the case of the UK, dissatisfied homeowners show the same propensity as their renters counterparts to experience a move. However, the fourth hypothesis (H_4) only holds in some cases. Recall that the variable O_t is a dummy variable reflecting whether the household is homeowner after the move. Given that H_2 and H_3 are not rejected, the estimated coefficient of O_t may suggest one of the three following situations. Movers, who are primarily renters, improve their housing situation by: i) becoming homeowners, i.e. $\lambda_3>0$; ii) indistinctly becoming either homeowners or renters, i.e. $\lambda_3=0$, and; iii) renting again a new

[21] Since we are only interested in the direction of the effect, but not in its magnitude, we present the estimated coefficients and not the marginal effects.

dwelling, i.e. $\lambda_3<0$. We observe that situation i) is the most extended behavior across the studied countries. Movers tend to improve their housing situation by becoming homeowners in Germany, the Netherlands, Belgium, France, Italy, Spain, Portugal and Austria, whereas in Denmark, Ireland and Finland movers tend to continue in the rental market after a move, i.e. situation iii). For the UK the latter conclusion can only be achieved if we relax the statistical significance at 10 percent level.

The results concerning the effect of income on the moving propensities differs across countries. In Germany, Denmark and Belgium income does not significantly affect housing mobility. The income effect turned out to be statistically significant and positive in the rest of the countries. The probability of moving is unambiguously u-shaped in age for all countries, i.e. the probability of moving is negative up to a certain age but increases afterwards. To sum up, the four hypotheses regarding housing mobility are generally confirmed in most of the countries. However, given that the discrepancies across countries regarding the effect of other variables are not systematic, we find hard to explain inter-country differences in the moving behavior.

Finally, to illustrate how important is homeownership and housing satisfaction in determining the moving propensities and how it varies across countries, we report in table 3 the probability of moving in each country broken by tenure status and by the level of housing satisfaction in the period previous to the move. We observe that the probability of moving significantly decreases with housing satisfaction. In general, we observe that in the lowest levels of housing satisfaction the moving propensities tend to be markedly higher. This finding holds for both renters and homeowners. For instance, for the level of housing satisfaction 1 -not satisfied at all-, we observe than the probability of moving is markedly higher in Western Continental Europe, i.e. Germany,

Denmark, the Netherlands, Belgium and France than in the Southern European countries and the islands, i.e. Spain, Portugal, Italy, UK and Ireland. We also observe quite marked differences regarding the rate at which the moving probabilities decrease with housing satisfaction. For instance, in the Netherlands the probability of moving for a non-satisfied household is almost seven times higher than for a fully satisfied household, whereas in Spain this probability is just twice higher. This result holds for both homeowners and renters.

6. Summary and concluding remarks

We investigate the determinants of housing satisfaction for twelve EU countries. To do so we use panel data over the period 1994-2001, which allows us to control for individual heterogeneity. Given the nature of our endogenous variable, i.e. an ordinal scale collecting a satisfaction/dissatisfaction status, makes that controlling for individual heterogeneity not captured by the explanatory variables is very important. In this context, the random-effects ordered probit model provides us a suitable econometric framework. We carry out separate estimates on the determinants of housing satisfaction for homeowners and renters and observe that the tenure status is crucial in determining their level of satisfaction. The estimates suggest that depending on the country, tenure status might explain from 41 to 72 percent of the gap in the average housing satisfaction between homeowners and renters. This variable turned out to be more important in the Southern European than in the Central and Northern European countries. The result coincides with the fact that in the Southern European countries the proportion of homeowners is markedly higher than in the Central and Northern European countries.

In accordance with the previous empirical literature, our results also indicate that income positively influences housing satisfaction in all countries. However, we observe that this result only holds for homeowners. For renters income is positive and statistically significant only in the Southern European countries. We consider this finding quite revealing. To some extent, these results could be interpreted as an indicator of whether social housing policies are efficient or not. The fact that in most of the EU-15 countries lower-income dwellers feel as satisfied as their higher income counterparts suggests that in these countries governments -central, regional or local- are succeeding in their social housing policies, since they are able to remove differentials between the private and the social rents. This might be reached in three ways. Firstly, by giving an incentive to private homeowners to offer their flats in the rental market, which in turn implies a larger supply of dwellings for rent, and hence lower rents. This is the case of Germany. Secondly, by providing generous housing allowances to lower-income renters. This is the case of Belgium, France and Finland. And thirdly, by being the public sector –central, regional or local government- the most important supplier in the rental market, like in the Netherlands, Denmark, UK or Ireland. On the contrary, in the Southern European countries the private rental sector is very small and social rents are practically inexistent.

Additionally, we also study how important are both housing satisfaction and homeownership -among other determinants- for the moving propensities of the European households. In order to avoid the potential problems of endogeneity that might arise from directly using self-reported housing satisfaction, we use its estimates from the random-effects ordered probit model. The panel data estimates reveal that both variables exert statistically significant and negative effects on the probability of moving.

The results also allow us to conclude that housing satisfaction not only triggers housing mobility, but also that movers indeed experience an improve in their housing situation after the move in all the countries. Thus we claim that a subjective variable as self-reported housing satisfaction is a meaningful variable capable to explain individual's objective economic behavior, since it is able to anticipate movements in the households' demand for housing. We think our findings are a good contribution to the debate whether such a type of subjective variables are or not meaningless in economic analysis.

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Table 1 - Sample statistics and test for the equality of means on reported housing satisfaction between homeowners and renters

	Sample size		**Mean**		**s. d.**		**ΔMean**	**t-stat.**
	Owners	Renters	Owners	Renters	Owners	Renters		
Germany	4,131	4,863	5.137	4.336	1.559	1.689	0.876	25.564
Denmark	13,735	7,965	5.304	4.726	0.892	1.321	0.578	34.742
The Netherlands	22,072	18,284	5.209	4.726	0.790	1.146	0.483	48.310
Belgium	15,945	7,228	5.044	4.330	0.987	1.386	0.715	39.534
France	28,007	20,529	4.926	4.318	0.776	1.134	0.609	66.343
UK	19,796	8,691	4.659	4.130	2.690	2.645	0.529	15.467
Ireland	17,181	2,974	5.109	4.016	1.090	1.622	1.092	35.355
Italy	39,469	13,071	4.359	3.620	1.188	1.379	0.739	54.925
Spain	37,671	8,238	4.524	3.904	1.149	1.392	0.620	37.730
Portugal	26,552	11,424	4.165	3.362	1.019	1.183	0.803	63.220
Austria	12,381	8,372	5.394	4.856	0.829	1.249	0.538	34.597
Finland	14,660	6,238	4.982	4.332	0.967	1.204	0.649	37.733

Table 2: Variance decomposition

	Variance decomposition				Estimated mean satisfaction		
	Explained		Unexplained				
	Min	Max	Min	Max	Renters	Owners	Diff.
Germany	42%	54%	46%	58%	4.34	5.16	0.83
Denmark	46%	59%	41%	54%	4.83	5.37	0.54
The Netherlands	24%	32%	68%	76%	4.76	5.24	0.48
Belgium	26%	45%	55%	74%	4.32	5.07	0.75
France	42%	49%	51%	58%	4.37	4.96	0.59
UK	11%	45%	55%	89%	4.32	5.00	0.68
Ireland	14%	47%	53%	86%	3.94	5.15	1.21
Italy	27%	28%	72%	73%	3.48	4.38	0.90
Spain	27%	31%	69%	73%	3.79	4.55	0.76
Portugal	35%	38%	62%	65%	3.35	4.18	0.82
Austria	48%	58%	42%	52%	4.87	5.44	0.58
Finland	32%	48%	52%	68%	4.32	5.00	0.67

Table 3: Estimated probability of moving according to the level of housing satisfaction and tenure status in the period previous to the move

		Germany		Denmark		The Netherlands		Belgium		France		UK	
		Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner
Not satisfied	1	0,284	0,130	0,448	0,323	0,350	0,245	0,349	0,151	0,344	0,176	0,157	0,108
	2	0,212	0,095	0,375	0,245	0,320	0,177	0,294	0,102	0,280	0,128	0,127	0,071
	3	0,149	0,052	0,315	0,196	0,222	0,126	0,249	0,078	0,248	0,120	0,082	0,050
	4	0,110	0,036	0,248	0,130	0,147	0,089	0,192	0,057	0,199	0,114	0,059	0,037
	5	0,078	0,023	0,190	0,087	0,095	0,059	0,142	0,041	0,158	0,087	0,038	0,026
Fully satisfied	6	0,055	0,015	0,109	0,050	0,054	0,040	0,097	0,027	0,124	0,061	0,020	0,013

Note: Estimates based on equation (12)

Table 3 (Continuation)

		Ireland		Italy		Spain		Portugal		Austria		Finland	
		Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner
Not satisfied	1	0,136	0,043	0,131	0,047	0,149	0,035	0,096	0,047	0,136	0,043	0,131	0,047
	2	0,165	0,036	0,122	0,048	0,127	0,030	0,093	0,041	0,165	0,036	0,122	0,048
	3	0,161	0,034	0,110	0,046	0,124	0,027	0,091	0,037	0,161	0,034	0,110	0,046
	4	0,141	0,031	0,098	0,040	0,109	0,023	0,078	0,032	0,141	0,031	0,098	0,040
	5	0,116	0,025	0,083	0,033	0,095	0,019	0,070	0,034	0,116	0,025	0,083	0,033
Fully satisfied	6	0,109	0,025	0,074	0,029	0,077	0,016	0,064	0,030	0,109	0,025	0,074	0,029

ANNEX

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

	Germany				Denmark				The Netherlands			
	Renters		Owner		Renters		Owner		Renters		Owner	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
log(income)	-0.002	-0.08	0.134	4.41	-0.045	-1.28	0.111	2.96	-0.052	-2.73	0.035	1.44
Household size	-0.144	-6.65	-0.064	-2.50	-0.111	-4.18	-0.058	-2.89	0.008	0.44	-0.018	-1.19
Year occupier	-0.067	-6.40	-0.042	-2.68	-0.030	-2.91	-0.099	-11.43	-0.059	-8.83	-0.138	-19.22
Year occupier squared	0.003	5.74	0.001	1.31	0.001	2.07	0.003	8.60	0.002	7.06	0.004	15.31
Married	-0.004	-0.29	-0.038	-1.68	0.019	1.16	-0.041	-3.11	-0.003	-0.27	-0.020	-1.68
Age	0.011	7.02	0.013	5.52	0.019	12.48	0.036	18.98	0.017	16.04	0.026	16.30
Women	0.140	3.28	0.256	3.84	0.199	4.24	0.199	3.91	0.125	3.65	0.250	5.96
Flat	-0.045	-0.85	-0.124	-2.15	-0.162	-3.76	-0.141	-2.08	-0.142	-4.36	-0.304	-5.01
Public or non-profit	0.011	0.28			0.117	2.93			0.005	0.13		
Employer	0.073	0.76			0.066	0.51			0.036	0.22		
Number of rooms	0.180	7.93	0.109	5.47	0.155	7.22	0.161	9.57	0.033	2.93	0.085	5.47
Indoor flushing toilet	0.385	3.47	0.419	2.00	0.314	2.70	0.108	0.44	-0.068	-0.48	-0.044	-0.28
Hot running water	0.131	1.99	0.073	0.58	0.320	1.82	0.241	0.82	0.034	0.18	-0.819	-3.45
Heating	0.215	3.94	0.534	5.27	0.130	1.02	0.352	2.67	0.158	3.97	0.180	3.10
Terrace or garden	0.254	6.19	0.297	2.57	0.147	3.51	0.139	1.85	0.094	1.74	0.204	1.59
Shortage of space	-0.785	-18.22	-0.660	-8.30	-1.111	-27.05	-0.933	-21.74	-1.083	-32.84	-0.934	-22.55
Noisy neighborhood	-0.285	-8.20	-0.197	-4.19	-0.294	-7.65	-0.246	-5.42	-0.314	-13.91	-0.236	-9.38
Not enough light	-0.219	-3.90	-0.172	-1.51	-0.405	-6.54	-0.259	-2.83	-0.388	-9.93	-0.355	-6.03
Inadequate heating facilities	-0.325	-5.29	-0.149	-1.09	-0.451	-7.30	-0.127	-1.37	-0.334	-9.16	-0.221	-3.32
Leaky roof	-0.186	-2.70	-0.177	-1.35	-0.383	-4.87	-0.291	-4.39	0.019	0.38	-0.175	-3.29
Damp walls. floors. etc.	-0.369	-6.69	-0.337	-3.70	-0.326	-5.82	-0.218	-3.35	-0.259	-8.23	-0.170	-3.65
Rot in window frames or floor	-0.257	-4.42	0.518	3.20	-0.351	-5.59	-0.257	-4.24	-0.252	-7.56	-0.204	-4.65
Pollution or environmental problem	-0.164	-3.69	-0.161	-2.48	-0.257	-4.48	-0.127	-1.94	-0.081	-2.53	-0.113	-3.39
Crime or vandalism	-0.195	-4.28	0.031	0.42	-0.255	-5.78	0.002	0.03	-0.205	-8.10	-0.098	-3.31
μ_1	-2.041	-6.70	-0.389	-0.89	-2.936	-2.16	-1.156	-2.40	-3.399	-13.58	-3.948	-11.65
μ_2	-1.149	-3.79	0.143	0.33	-2.117	-1.56	-0.398	-0.83	-2.651	-10.65	-3.389	-10.11
μ_3	-0.207	-0.68	0.794	1.82	-1.293	-0.95	0.423	0.89	-1.772	-7.14	-2.438	-7.32
μ_4	0.742	2.44	1.662	3.82	-0.368	-0.27	1.545	3.23	-0.722	-2.91	-1.170	-3.52
μ_5	2.198	7.21	3.375	7.72	0.876	0.65	3.223	6.74	0.809	3.26	0.847	2.55
ρ	0.342	22.12	0.413	23.07	0.386	24.29	0.520	42.29	0.395	39.46	0.501	54.75
(log-likelihood)	1,581		403		2,269		1,795		3,118		1,821	
Sample size	7,375		6,156		7,776		13,663		17,456		21,723	

Note: All the estimates include dummies for time and region. Germany, Denmark and The Netherlands do not include dummies for region.

Table A1: Continuation

	Belgium				France				UK			
	Renters		Owner		Renters		Owner		Renters		Owner	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
log(income)	0.024	0.79	0.046	1.93	-0.024	-1.34	0.086	5.10	0.031	0.77	0.106	4.00
Household size	-0.102	-4.41	-0.076	-4.33	-0.083	-6.32	-0.062	-4.74	-0.109	-4.06	-0.127	-5.99
Year occupier	-0.051	-4.78	-0.088	-10.34	-0.079	-12.46	-0.065	-10.87	-0.061	-3.35	-0.094	-6.67
Year occupier squared	0.001	3.32	0.003	7.44	0.003	10.14	0.002	7.26	0.003	3.09	0.004	5.77
Married	0.041	2.51	-0.091	-5.66	0.024	2.66	-0.023	-2.03	0.009	0.48	-0.046	-2.72
Age	0.018	10.55	0.024	14.04	0.005	4.50	0.004	3.51	0.014	7.26	0.023	12.43
Women	0.037	0.69	0.140	2.61	0.057	1.77	-0.047	-1.10	-0.007	-0.12	0.159	2.72
Flat	-0.099	-1.94	0.014	0.18	0.027	0.70	-0.031	-0.61	-0.193	-2.83	-0.302	-3.24
Public or non-profit	0.044	0.83			0.101	3.50			0.262	3.80		
Employer	-0.136	-0.72			0.313	3.41			0.044	0.28		
Number of rooms	0.084	4.55	0.031	2.43	0.134	8.96	0.131	9.56	0.026	0.90	0.144	6.83
Indoor flushing toilet	0.291	2.57	0.164	1.51	0.361	4.01	0.486	4.82	-0.210	-0.61	-0.449	-0.94
Hot running water	0.367	3.67	0.403	4.33	0.186	1.73	0.293	2.50	0.076	0.16	0.976	2.33
Heating	0.286	6.08	0.199	4.59	0.201	4.17	0.234	4.70	0.200	2.96	0.279	3.97
Terrace or garden	0.266	5.78	0.299	4.26	0.176	5.16	0.232	5.33	0.109	1.45	0.172	1.12
Shortage of space	-0.700	-16.74	-0.392	-9.29	-1.044	-37.65	-0.815	-21.69	-0.569	-10.32	-0.644	-14.08
Noisy neighborhood	-0.232	-6.25	-0.204	-6.58	-0.272	-11.68	-0.152	-5.83	-0.348	-6.73	-0.299	-7.05
Not enough light	-0.404	-7.83	-0.374	-8.06	-0.341	-10.86	-0.326	-8.69	-0.234	-3.41	-0.108	-1.80
Inadequate heating facilities	-0.361	-7.18	-0.289	-4.95	-0.319	-11.40	-0.244	-6.72	-0.322	-5.23	-0.409	-5.87
Leaky roof	-0.051	-0.78	-0.091	-1.70	-0.217	-4.94	-0.246	-6.00	-0.167	-1.55	-0.330	-4.13
Damp walls. floors. etc.	-0.291	-6.33	-0.244	-6.19	-0.339	-12.18	-0.288	-9.70	-0.365	-6.50	-0.286	-5.16
Rot in window frames or floor	-0.274	-5.33	-0.218	-4.36	-0.401	-13.63	-0.390	-9.49	-0.316	-5.57	-0.254	-4.67
Pollution or environmental problem	-0.126	-2.57	-0.128	-3.47	-0.048	-1.70	-0.009	-0.32	-0.141	-2.27	-0.231	-4.84
Crime or vandalism	0.031	0.74	-0.069	-2.14	-0.149	-6.01	-0.051	-2.14	-0.219	-4.52	-0.093	-2.42
μ_1	-1.089	-3.12	-1.893	-6.12	-2.626	-12.36	-2.259	-9.54	-1.937	-3.05	-1.205	-1.92
μ_2	-0.383	-1.10	-1.263	-4.11	-1.980	-9.35	-1.601	-6.86	-1.303	-2.06	-0.373	-0.60
μ_3	0.546	1.57	-0.303	-0.99	-1.068	-5.05	-0.646	-2.78	-0.521	-0.82	0.548	0.88
μ_4	1.505	4.31	0.784	2.56	0.124	0.59	0.729	3.14	0.333	0.53	1.642	2.63
μ_5	2.635	7.53	2.346	7.65	2.131	10.06	3.101	13.32	1.391	2.20	3.192	5.10
ρ	0.382	22.85	0.494	47.35	0.330	32.22	0.419	49.56	0.422	19.05	0.541	40.21
(log-likelihood)	1,335		983		4,594		2,034		901		1,282	
Sample size	6,217		15,512		16,968		26,738		4,068		8,908	

Note: All the estimates include dummies for time and region.

Table A1: Continuation

	Ireland				Italy				Spain			
	Renters		Owner		Renters		Owner		Renters		Owner	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
log(income)	0.043	0.86	0.119	5.12	0.127	5.71	0.144	12.28	0.055	2.48	0.090	9.39
Household size	-0.029	-1.25	-0.051	-4.49	-0.050	-2.93	-0.054	-5.71	-0.087	-4.96	-0.061	-9.09
Year occupier	-0.059	-3.40	-0.064	-6.94	-0.060	-6.94	-0.018	-3.56	-0.042	-3.82	-0.033	-7.15
Year occupier squared	0.002	2.78	0.002	5.73	0.002	5.55	0.000	1.37	0.001	2.21	0.001	3.07
Married	0.091	4.03	-0.026	-2.05	-0.023	-1.45	-0.033	-3.34	-0.018	-1.17	-0.045	-6.07
Age	0.014	5.35	0.019	13.68	0.004	2.62	-0.002	-2.53	0.007	4.15	0.005	7.43
Women	-0.127	-1.78	-0.058	-1.41	0.044	0.85	-0.062	-1.88	-0.023	-0.44	0.055	2.26
Flat	-0.003	-0.03	-0.218	-1.02	0.119	2.55	-0.068	-2.88	-0.077	-1.34	0.004	0.21
Public or non-profit	0.624	6.80			0.172	4.20			0.236	3.56		
Employer	0.044	0.13			0.074	0.90			0.231	3.67		
Number of rooms	0.043	1.37	0.156	10.80	0.213	10.04	0.197	19.37	0.150	7.44	0.150	18.84
Indoor flushing toilet	-0.154	-0.55	0.107	0.97	-0.028	-0.22	0.159	2.22	0.347	2.44	0.202	2.43
Hot running water	0.257	1.83	0.492	5.42	0.338	3.49	0.154	2.77	0.535	6.11	0.385	7.74
Heating	0.212	3.17	0.315	7.38	0.122	2.65	0.150	5.90	0.295	5.87	0.261	14.89
Terrace or garden	0.119	1.31	-0.031	-0.41	0.285	6.84	0.272	10.35	0.115	3.18	0.095	6.10
Shortage of space	-0.496	-7.09	-0.438	-11.07	-0.473	-13.53	-0.518	-24.80	-0.578	-12.77	-0.497	-26.34
Noisy neighborhood	-0.223	-3.33	-0.032	-0.74	-0.043	-1.36	-0.004	-0.23	-0.045	-1.20	-0.051	-3.31
Not enough light	-0.141	-1.33	-0.007	-0.10	-0.125	-3.03	-0.143	-6.05	-0.236	-5.92	-0.102	-5.68
Inadequate heating facilities	-0.302	-3.84	-0.361	-6.63	-0.218	-5.38	-0.175	-7.14	0.000	0.00	-0.077	-2.13
Leaky roof	-0.162	-1.32	-0.264	-4.45	-0.215	-3.92	-0.094	-2.65	-0.259	-4.64	-0.225	-9.21
Damp walls. floors. etc.	-0.529	-5.98	-0.457	-9.70	-0.217	-4.28	-0.135	-4.28	-0.366	-8.06	-0.268	-13.65
Rot in window frames or floor	-0.307	-3.41	-0.324	-5.98	-0.415	-8.59	-0.287	-7.65	-0.499	-8.80	-0.476	-15.94
Pollution or environmental problem	-0.035	-0.41	-0.040	-0.84	-0.094	-2.67	-0.054	-2.67	-0.080	-1.68	-0.051	-2.55
Crime or vandalism	-0.228	-3.31	-0.087	-2.27	-0.064	-1.76	0.011	0.50	-0.093	-2.14	0.008	0.45
μ_1	-0.369	-0.66	-0.284	-1.07	-0.194	-0.70	-1.191	-7.80	-0.619	-2.20	-0.868	-6.66
μ_2	0.227	0.41	0.324	1.23	0.794	2.88	-0.275	-1.81	0.203	0.72	-0.139	-1.07
μ_3	0.935	1.68	1.004	3.80	1.821	6.60	0.792	5.22	1.066	3.79	0.647	4.99
μ_4	1.642	2.95	1.866	7.06	2.861	10.34	1.938	12.77	1.949	6.92	1.539	11.87
μ_5	2.521	4.52	3.146	11.89	3.969	14.29	3.290	21.65	3.209	11.32	2.909	22.39
ρ	0.295	10.89	0.396	36.13	0.365	27.52	0.407	62.00	0.244	13.73	0.194	31.10
(log-likelihood)	565		1,491		1443		3323		1130		3,906	
Sample size	2,493		16,593		9,210		38,664		5,316		37,259	

Note: All the estimates include dummies for time and region.

Table A1: Continuation

	Portugal				Austria				Finland			
	Renters		Owner		Renters		Owner		Renters		Owner	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
log(income)	0.067	2.40	0.122	8.49	0.099	2.81	0.200	7.08	-0.068	-2.21	0.055	1.62
Household size	-0.078	-4.30	-0.084	-8.14	-0.135	-5.24	-0.117	-7.32	-0.082	-2.97	-0.049	-2.87
Year occupier	-0.018	-1.59	-0.052	-7.88	-0.069	-6.13	-0.044	-3.53	-0.074	-6.23	-0.107	-12.72
Year occupier squared	0.000	0.95	0.001	4.94	0.003	6.20	0.001	1.69	0.002	4.74	0.003	8.43
Married	-0.001	-0.03	-0.025	-2.05	0.006	0.35	-0.066	-3.82	0.046	2.96	0.012	0.91
Age	0.002	1.37	0.001	0.54	0.010	5.27	0.004	2.44	0.013	7.18	0.020	11.99
Women	-0.121	-1.97	-0.088	-2.17	0.040	0.72	0.060	1.07	0.165	3.53	0.267	6.42
Flat	0.294	5.50	-0.086	-2.04	0.139	2.00	-0.221	-3.10	-0.033	-0.67	-0.204	-3.92
Public or non-profit	0.318	5.15			0.207	4.40			-0.026	-0.66		
Employer	0.283	3.58			0.279	2.62			-0.065	-0.83		
Number of rooms	0.161	7.21	0.190	15.81	0.198	8.77	0.113	6.52	0.184	6.71	0.172	10.93
Indoor flushing toilet	0.321	4.89	0.362	8.49	0.180	2.08	0.159	1.29	-0.271	-0.76	0.780	3.75
Hot runing water	0.304	5.22	0.377	10.37	0.203	1.43	0.237	1.85	0.419	1.14	0.132	0.69
Heating	0.090	1.30	0.170	5.20	0.275	5.18	0.493	7.93	0.490	2.13	0.243	2.52
Terrace or garden	0.152	3.96	0.096	3.62	0.236	5.19	0.259	3.62	0.187	3.73	0.050	0.55
Shortage of space	-0.485	-11.66	-0.430	-16.01	-0.954	-19.89	-0.717	-12.92	-0.945	-21.50	-0.765	-18.33
Noisy neighborhood	-0.064	-1.61	0.052	1.84	-0.275	-6.65	-0.168	-3.92	-0.314	-8.34	-0.114	-3.14
Not enough light	-0.389	-8.75	-0.303	-9.39	-0.310	-5.26	-0.213	-2.42	-0.395	-5.46	-0.157	-2.74
Inadequate heating facilities	-0.129	-3.29	-0.179	-8.15	-0.180	-2.65	-0.366	-4.57	-0.182	-2.59	-0.120	-1.34
Leaky roof	-0.333	-7.31	-0.218	-6.91	0.089	0.87	-0.311	-3.89	-0.340	-2.87	-0.090	-1.05
Damp walls. floors. etc.	-0.233	-5.56	-0.244	-9.38	-0.443	-6.90	-0.366	-5.98	-0.283	-3.29	-0.328	-4.20
Rot in window frames or floor	-0.208	-4.77	-0.313	-10.66	-0.218	-2.86	-0.289	-3.49	-0.317	-3.43	-0.471	-5.08
Pollution or environmental problem	-0.153	-3.30	-0.068	-2.10	-0.150	-2.66	-0.208	-3.35	0.044	0.95	-0.096	-2.42
Crime or vandalism	0.020	0.45	0.080	2.51	-0.103	-1.85	-0.023	-0.28	-0.127	-3.38	-0.090	-2.62
μ_1	-1.509	-5.49	-2.088	-13.86	-0.898	-2.32	-1.622	-4.68	-2.709	-7.49	-1.762	-4.40
μ_2	-0.288	-1.05	-1.034	-6.94	-0.285	-0.74	-0.841	-2.48	-1.683	-4.68	-0.834	-2.10
μ_3	0.875	3.19	0.104	0.70	0.370	0.96	-0.167	-0.49	-0.764	-2.13	0.135	0.34
μ_4	2.635	9.57	2.068	13.89	1.339	3.47	0.918	2.73	0.374	1.04	1.403	3.53
μ_5	3.866	13.91	3.596	24.03	2.745	7.11	2.576	7.64	1.744	4.85	3.134	7.88
ρ	0.370	23.84	0.445	55.72	0.396	23.88	0.474	36.85	0.366	21.29	0.539	53.51
(log-likelihood)	1,529		3,522		1,477		989		1,158		1,405	
Sample size	7,102		26,334		6,689		12,224		5,841		14,632	

Note: All the estimates include dummies for time and region.

Table A2: Random-effects probit estimates of the moving equation (12)

	Germany		Denmark		Netherlands		Belgium		France		UK	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Constant	0.221	0.37	1.854	1.89	2.074	4.91	1.686	2.77	2.687	7.05	-1.353	-2.11
log(income) (t-1)	0.045	0.93	0.017	0.41	0.107	2.97	0.060	1.29	0.088	2.91	0,154	2,48
Household size (t)	-0.010	-0.31	-0.020	-0.90	-0.139	-5.82	-0.073	-2.46	-0.054	-2.67	-0,073	-2,23
Married (t)	0.035	1.38	0.017	1.04	0.005	0.27	0.007	0.27	-0.011	-0.66	0,002	0,09
Age (t)	-0.094	-5.45	-0.103	-10.78	-0.217	-20.22	-0.135	-8.92	-0.223	-21.43	-0,020	-1,22
Age squared (t)	0.001	3.37	0.001	6.72	0.001	15.00	0.001	5.30	0.001	15.06	0,000	0,13
Women (t)	-0.010	-0.14	0.114	2.33	0.056	1.04	0.240	2.86	0.093	1.45	-0,160	-1,80
Duration of residence lagged (t-1)	0.058	9.59	0.079	17.19	0.160	34.49	0.142	21.02	0.187	38.70	-0,001	-0,12
Housing satisfaction (S_{it})	0.323	11.29	0.291	15.42	0.383	18.47	0.266	11.48	0.388	21.70	0,231	6,70
Housing satisfaction lagged (S_{it-1})	-0.322	-13.03	-0.346	-20.17	-0.425	-22.91	-0.329	-15.13	-0.352	-21.08	-0,304	-9,28
Homeowner (O_t)	1.153	8.94	-0.273	-4.57	0.690	10.43	0.474	5.54	0.685	11.69	-0,279	-1,74
Homeowner lagged (O_{t-1})	-1.916	-13.99	-0.470	-7.60	-1.006	-14.8	-1.941	-20.19	-1.890	-27.90	-0,162	-1,01
Regional dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Time dummies	Yes		Yes		Yes		Yes		Yes		Yes	
ρ	0.316		0.428		0.584		0.640		0.694		0.153	
(log-likelihood)	-1.617		-4.793		-5.673		-3.197		-8.126		-900	
Likelihood ratio test: $\rho=0$	63		546		1.019		1.015		3.521		2	
Sample size	8.409		16.625		31.147		17.429		36.013		6.950	

Table A2 (continuation)

	Ireland		Italy		Spain		Portugal		Austria		Finland	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Constant	2.017	2.50	2,432	4,95	0.236	0.76	-1.851	-3.03	1.666	1.84	1.440	3.50
log(income) (t-1)	0.240	3.42	0,102	2.50	0.135	4.73	0.219	4.74	0.203	2.60	0.064	1.75
Household size (t)	-0.131	-4.09	-0,138	-5,10	0.009	0.53	-0.025	-0.90	-0.158	-3.60	-0.184	-8.20
Married (t)	-0.038	-1.14	-0,053	-1,92	0.061	3.76	0.051	1.53	-0.035	-0.94	-0.044	-2.57
Age (t)	-0.248	-12.10	-0,202	-14,57	-0.105	-11.71	-0.184	-11.70	-0.277	-12.54	-0.080	-8.13
Age squared (t)	0.002	9.24	0,001	10,29	0.001	9.28	0.001	8.32	0.002	9.50	0.000	3.40
Women (t)	0.064	0.58	0,046	0,50	-0.069	-1.25	0.090	0.85	0.161	1.28	-0.048	-0.95
Duration of residence (t-1)	0.139	16.09	0,178	34,11	0.032	7.83	0.134	21.60	0.193	20.96	0.088	19.63
Housing satisfaction (S_{it})	0.214	6.84	0,213	10,00	0.228	13.03	0.395	12.35	0.402	9.94	0.332	15.49
Housing satisfaction lagged (S_{it-1})	-0.192	-6.74	-0,191	-9,40	-0.161	-10.46	-0.292	-9.49	-0.418	-11.59	-0.359	-18.12
Homeowner (O_t)	-0.306	-2.14	0,486	5,77	0.542	8.09	1.170	10.01	1.070	6.39	-0.300	-4.37
Homeowner lagged (O_{t-1})	-1.140	-7.56	-1,582	-17,94	-1.384	-20.42	-1.816	-15.59	-2.240	-12.44	-0.995	-13.41
Regional dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Time dummies	Yes		Yes		Yes		Yes		Yes		Yes	
ρ	0.632		0.715		0.280		0,710		0.761		0,511	
(log-likelihood)	-1,502		-4,486		-3,791		-2,855		-1,731		-4,612	
Likelihood ratio test: $\rho=0$	645		2,549		132		1,825		1,386		571	
Sample size	14,406		38,599		32,455		26,848		14,544		14,626	