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"Mobility and Housing Satisfaction: An Empirical Analysis for Twelve EU Countries"

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Mobility and Housing Satisfaction:

An Empirical Analysis for Twelve EU Countries

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Abstract

Using panel data for twelve EU countries, we analyze the relationship between self-reported housing satisfaction and residential mobility. Our results indicate the existence of a positive link between the two variables and that housing satisfaction exerts a mediating effect between residential characteristics and dwellers' mobility propensities. Some interesting cross-country differences regarding the effect of other variables on mobility are also observed. Our results can be used in defining, implementing and evaluating housing and neighbourhood policies. Residential satisfaction is put forward as one of the most appropriate indicators of the success or failure of such policies.

Keywords: *Housing satisfaction, residential mobility*

JEL classification: *R21, D19*

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1. Introduction

During the late 80s and early 90s, many researchers from various scientific areas, including psychology, geography and demography, showed great interest in the analysis of the determinants of housing satisfaction[1] and the determinants of residential mobility.[2] Nonetheless, the two issues have been addressed separately. Research on the behavioral consequences of housing satisfaction, i.e. the link between housing satisfaction and residential mobility is scarce and has only recently attracted the attention of social scientists.[3] One of the main drawbacks of the few studies dealing with the link between residential satisfaction and mobility is that they analyze the relationship between residential satisfaction and mobility intentions, which do not necessarily match actual mobility.

This paper contributes to the literature mentioned above by empirically investigating the importance of housing satisfaction as a determinant of observed residential mobility. Our research was performed by estimating reduced form equations of mobility in 12 European countries using longitudinal datasets from the European Community Household Panel for the years 1994-2001. The use of panel data allows us to observe residential mobility when it happens and link the mobility action to the household/individual situation at that moment.

Our results unambiguously indicate that housing satisfaction is crucial in determining the moving propensities of European households. In particular, we find that: i) those who report dissatisfaction with their housing situation are more prone to

[1] See e.g. Galster and Hesser (1981), Galster (1987), Lu (1990), Jagun et al. (1990), Johnson et al. (1993), Nathan (1995), Bruin and Cook (1997), Varady and Carrozza (2000) or Molin and Timmermans (2003).
[2] See e.g. Boehm (1981), Boehm and Ihlanfeldt (1986), Lee et al. (1994), Henley (1998), Kan (1999, 2002 and 2007).
[3] See Lu (2002), Joong-Hwan (2003), Kearns and Parkes (2003) and Barcus (2004).

move than their satisfied counterparts, and ii) housing satisfaction plays a mediating role between dwellers' residential characteristics and their moving propensities.

The study of the determinants of residential mobility is relevant not only from an individual, but also from a social point of view. On the one hand, mobility decisions are among the most important decisions that households/individuals face throughout the course of their lives. On the other hand, residential mobility is the mechanism through which neighborhood dynamics are driven. As pointed out in Rothenberg et al. (1991), intensive inflows and outflows of residents in a neighborhood lead to neighborhood instability. In this context, the link between residential satisfaction and mobility becomes relevant for policy makers. Increasing the level of satisfaction of unhappy with their housing situation dwellers through policy intervention may encourage residents to stay put, and hence is a way of promoting neighborhood stability and fostering social cohesion.

An interesting feature of our study is the subjective nature of the housing satisfaction variable. We consider that self-reported satisfaction acts as a mediator between many objective factors regarding residential conditions and mobility propensities of the households. Our hypothesis is that unfavorable or deteriorating housing conditions result in increased levels of frustration, which may trigger the decision to move. Furthermore, we consider that, *ceteris paribus*, a given housing (dis)amenity does not necessarily affect dwellers' utility in the same way. In other words, a given housing (dis)amenity in itself is not as important as the way it is perceived by dwellers, which in turn is expected to have an heterogeneous effect on residential satisfaction, and hence on residential mobility.

Finally, another relevant contribution of our study is its multi-country dimension. While there exist empirical evidence analyzing the triggering factors of residential mobility, the literature is US-oriented. Outside of the US, the few existing studies concentrate on the UK at a neighborhood level, the Netherlands and rural-urban mobility in some Chinese provinces. In the context of the few existing studies, focusing on a limited number of countries and/or regions, there remains a need to provide evidence on the determinants of residential mobility in Europe and how it varies by country. The relevance of comparing European states stems from the fact that there are marked differences in national housing markets in Europe (see Diaz-Serrano 2005a, 2005b), and also from the idiosyncrasy of European citizens, which is quite heterogeneous by country.

The remainder of the paper is structured as follows. In section 2 we briefly go over the literature on residential mobility and housing satisfaction. Section 3 describes the data and the variables used in this study. Section 4 presents the econometric framework. The empirical results are shown and discussed in section 5; and section 6 summarizes and concludes.

2. Overview of the literature

Previous research regarding residential mobility mainly focuses on the study of the triggering events of mobility. Since Rossi's (1955) seminal work, which states that mobility is the primary means of making adjustments in housing consumption, changes in the household's life course, housing stress and transitions into homeownership have been identified as determining factors for residential mobility. Household formation or dissolution, changes in marital status and family composition are expected to exert a positive effect on moving propensities. These factors lead to the need for more or less housing space, which in turn may cause room stress, i.e. the housing space occupied does not match the space needed. Hence, households react by adjusting housing consumption. This is known as the stress-threshold model (see e.g. Wolpert, 1965). Using data from a survey on London residents Clark and Huang (2003), found a significant positive effect of household life-course events and room stress on residential mobility. Similar results are also reported by Li (2004) for China and by Clark and Ledwith (2006) for the US.

Job changes are also major life-course events that may trigger residential moves. Bartel (1979), Linneman and Graves (1983), Clark and Withers (1999) and Kan (1999, 2002) found a positive link between job and residential mobility in the US, while Boheim and Taylor (2002) confirmed this result for the UK. The quality and perception of the neighborhood is also found to exert an effect on the mobility propensities of households. Using US data, Boehm and Ihlanfeldt (1986) concluded that a households' perceptions of the level of neighborhood quality influences the inner-city mobility decisions of the residents of city centers. Also in the US context, Lee et al. (1994) found a link between subjective features of the neighborhood context and the decision to move. A study by Kearns and Parkes (2003) revealed that residential moves among English households were triggered not only by the dissatisfaction with the home itself, but also by the wish to improve neighborhood quality. Using data for the Netherlands, Van Ham and Feijten (2008) studied the influence of objective neighborhood characteristics (percentage of rented dwellings, low-income households, and ethnic minorities in the neighborhood) on resident’s decision to move. The authors reported that the propensity to move was higher for those individuals’ whose own characteristics did not match the characteristics of the neighborhood. This evidence was strongest for ethnicity. In a recent work, Kan (2007) analyzed the role of local social capital, proxied by social ties with people living nearly, in households' residential mobility behavior. Intensive social interactions, i.e. higher level of local social capital, were found to exert a negative effect on households' moving propensities.

The link between residential mobility and tenure choice has also received considerable attention. Using US data Boehm (1981) found that homeowners are less likely to move. Ioannides (1987) models tenure choice and mobility as simultaneous decisions, while Ioannides and Kan (1996) consider both decisions as a sequential process, where tenure choice is decided after moving. In longitudinal analyses, Helderman et al. (2004) and Huang and Deng (2006) found evidence that homeowners are less mobile than renters in the Netherlands and China, respectively. The reason for this negative link between homeownership and mobility is due to the fact that homeowners face higher moving costs. Weinberg et al. (1981) in the US, and Van Ommeren and Van Leuvensteijn (2005) in the Netherlands, also find empirical evidence on the negative link between transaction costs and residential mobility. Using UK data, Henley (1998) investigated the impact of negative housing equity on residential mobility and found strong evidence that this effect is adverse, which in turn suggests that homeowners are less mobile.

There is little evidence on the direct relationship between residential satisfaction and mobility. Moreover, this evidence is not unambiguous. Using US data, Speare (1974) observed a negative link, while Landale and Guest (1985) found that satisfaction does not affect mobility. However, in a recent study, Clark and Ledwith (2006) found that the negative relationship exists but is fairly modest. Joong-Hwan (2003) aimed to reveal the combined effect of social bonds and residential satisfaction on the mobility intentions of elderly residents in Chicago. The author found that social bonds exert a significant positive effect on residential satisfaction, which in turn reduces the intention to move. Kearns and Parkes (2003) found a significant and negative relationship between residential satisfaction and housing mobility intentions in poor neighborhoods in the UK. Finally, other studies have aimed to study this relationship but change the direction of the causality, i.e. how actual housing satisfaction is affected by previous mobility. Barcus (2004) uses US data to study the determinants of changes in residential satisfaction of urban-rural migrants.[4] Lu (2002) analyzes the residential consequences of migration within the US, and finds that individuals that moved from one place to another also tended to report higher levels of residential satisfaction.

3. Empirical framework

As mentioned above, one of the most interesting features of our analysis is the use of longitudinal data. It allows us to study observed mobility, rather than intentions to move, and changes in the covariates when mobility occurs. Given both the binary and the panel nature of our data, a natural candidate to model residential mobility is the random effects probit model. Unfortunately, as we will discuss bellow, the binary panel data framework is quite cumbersome and unfriendly in the presence of simultaneity and interdependency between at least one of the covariates and the dependent variable. In our case, the potential simultaneity between housing satisfaction and the mobility

[4] Barcus (2004) uses a multinomial logit model where the dependent variable reflects changes in the level of residential satisfaction for a sample of individuals that moved during the twelve months previous to the survey. However, the study does not establish an explicit link between housing mobility and housing satisfaction, but analyzes the determinants of the changes in residential satisfaction for the sample of movers.

propensities of the households is likely to generate a problem of endogeneity.[5] Pooled data models are a feasible alternative if the issue of endogeneity of the housing satisfaction in the residential mobility equation is to be addressed. Thus, our empirical strategy consists of two steps. Firstly, we need to assess the suitability of pooled models vs. panel data ones. To do so, we determine the relevance of household heterogeneity in the mobility equation. Secondly, once the suitability of the pooled models is assessed, we tackle the simultaneity problem by means of the pooled two-stage probit model and the pooled bivariate probit model.

3.1. The pooled probit model vs. the random-effects probit model

Let us define the moving decision as an observed binary variable, M_{it}, that takes the value one if the household *i* experiences residential mobility between periods *t-1* and *t*, and zero otherwise. It is important to note that the endogenous variable equals one only during the period the household moves and that it equals zero during the periods before and after the move. This definition of the endogenous variable is very appropriate if we want to observe the effect of the covariates at the precise moment that the household moves from one dwelling to another. In this context, M_{it} is the realization of the unobserved propensity to move for household *i* at period *t*, M_{it}^{*}. Hence, the econometric specification can be written as:

$$M_{it} = I(M_{it}^{*} > 0) = I(\lambda S_{it-1} + \gamma Z_{it} + \nu_{it} > 0) \qquad (i = 1,...,N; t = 1,...,T), \tag{1}$$

where $I(\cdot)$ is a binary indicator function that takes the value one if the argument is true and zero otherwise, S_{it-1} is an indicator of the household head's residential satisfaction,

[5] Simultaneity is one of the three common sources of endogeneity listed by Wooldridge (2002).

Z_{it} is a vector of explanatory variables, λ and γ are a set of coefficients to be estimated, and ν_{it} is the error term. Equation (1) represents the standard pooled probit model, which ignores heterogeneity across households. If ν_{it} is independent of Z_{it}, the estimates coming from this model are consistent but non-asymptotically efficient. However, the following clustering correction allows us to estimate the standard errors efficiently (Greene, 2004):

$$\hat{V}(\hat{\delta},\hat{\gamma}) = \left(\frac{N}{N-1}\right)\left(-H^{-1}\right)\left(\sum_{i=1}^{N} g_i g_i^{'}\right)\left(-H^{-1}\right), \qquad (2)$$

where g_{it} and H are the gradient and the Hessian of the corresponding likelihood function of equation (1), respectively, and $g_i = \sum_{t=1}^{T} g_{it}$.

If we make the standard assumption that the error term in equation (1) can be additively decomposed into an unobservable household-specific component, δ_i, which is constant over time and normally distributed with zero-mean and variance σ_{δ}^{2}, and a time-varying white noise, e_{it}, independent of both δ_i and Z_{it}, then equation (1) becomes:

$$M_{it} = I(M_{it}^{*} > 0) = I(\lambda S_{it-1} + Z_{it}^{'}\gamma + \delta_i + e_{it} > 0) \qquad (i = 1,...,N; t = 1,...,T) . \qquad (3)$$

Equation (3) corresponds to the standard random effects probit model for which maximum likelihood estimates are generally consistent and asymptotically efficient (see e.g. Greene, 2000). We can also obtain an estimate of ρ defined as:

$$\rho = corr(\delta_i + e_{it}, \delta_i + e_{is}) = \frac{\sigma_{\delta}^{2}}{(\sigma_{\delta}^{2} + \delta_{e}^{2})} \qquad \forall t \neq s \qquad (4)$$

This term is the correlation between the composite latent error, δ_i+e_{it}, across any two time periods, but also measures the relative importance of the household's unobserved effect, δ_i.

An additional discussion within the panel data framework refers to the choice between the random-effects and the fixed-effects models. While the standard random effects probit model described above has the advantage of taking into account heterogeneity across households, it does not allow for correlation between the explanatory variables, Z_{it}, and the time-constant household effect, δ_i. If this correlation exists the random effects model might provide inconsistent estimates, and the fixed-effect version of the model is preferred. However, given that the conditional fixed-effects nonlinear models are computationally unfeasible, one of the following two alternatives is to be chosen: the correlated random-effects model (Mundlak, 1978) or the conditional logit model (Chamberlain, 1980). Mundlak's approach is an unconditional estimation and it consists in assuming that the term δ_i is distributed as $\delta_i \mid Z_{it} \sim N(\eta_i + \overline{Z}_i\lambda, \sigma_\alpha^2)$, where $\overline{Z}_i$ is the time-average of Z_{it}, and σ_α^2 is the variance of α_i in the equation $\delta_i = \eta + \overline{Z}_i\lambda + \alpha_i$. The Mundlak's assumption implies that the standard random-effects probit model given in equation (3) can be expressed as:

$$y_{it} = I(y_{it}^* > 0) = I(\eta + Z_{it}^{'}\beta + \overline{Z}_i^{'}\lambda + \alpha_i + e_{it} > 0) \qquad (i = 1,...,N; t = 1,...,T). \tag{5}$$

The conditional logit model, on the other hand, provides consistent estimates of the parameters, but has some important limitations. Firstly, only individuals who move at least once during the sample period are used in the estimation, i.e. a considerable number of observations that might be important in determining the causal relationship are lost.[6] Secondly, only variables that vary over time are used as covariates. This means that the effect of certain time-invariant factors that might be relevant in explaining the mobility propensities cannot be estimated. And thirdly, the fixed-effects absorb the influence of those covariates with little variation throughout the sample period. This is the case of the majority of our explanatory variables. Therefore, we consider that Mundlak's correlated random-effects model provides a more suitable framework for our analysis.

To sum up, both the pooled and the random effects models provide consistent estimates of the determinants of residential mobility. In addition, after applying the correction expressed in equation (2) the pooled probit model turns out to be also efficient. The potential differences between the estimated coefficients in the random-effects and the pooled probit models will depend on the importance of households' heterogeneity picked up by the specific time-invariant effects, α_i, in equation (5). Therefore, the estimated parameters of the correlated random-effects probit model will converge to the estimated parameters of the pooled probit model as ρ tends to zero. If ρ=0, the estimates of the two alternative models will be identical. Therefore, the choice of the pooled models, more suitable to tackle further specification problems, will be conditioned upon whether the parameter ρ is estimated to be close to zero.

3.2. Simultaneity and endogeneity

As previously mentioned at the beginning of section 3, the potential simultaneity between residential satisfaction (or dissatisfaction) and mobility is likely to be an issue in our analysis. This simultaneity might cause identification problems in the estimation

[6] The percentage of observations we loose under the conditional logit approach ranges from 72% for Denmark to 94% in the case of Ireland.

of equation (1), since the satisfaction variable is endogenous in the outcome equation of residential mobility. The endogeneity of housing satisfaction in the mobility equation arises from the fact that the error term in the mobility equation might be correlated with the household's level of residential satisfaction. Such a correlation might arise because there are a number of non-observed factors simultaneously affecting residential mobility and satisfaction. These non-observed determinants are picked up by the error term of the mobility equation. If we do not account for this simultaneity between the mobility decision and the residential satisfaction status, and hence the resulting endogeneity problem, the estimates will be biased. To account for endogeneity we employ two different strategies. The first is a two-stage estimator that consists of estimating the following residential satisfaction equation:

$$S_{it} = I(S_{it}^{*} > 0) = I(X_{it}^{'}\beta + \varepsilon_{it} > 0) \qquad (i = 1,...,N; t = 1,...,T), \tag{6}$$

where S_{it} is an observed binary variable that takes the value one if the household head i declares residential satisfaction at period t, and zero otherwise.[7] In the second stage, the predictions of the binary satisfaction equation provided by equation (6) are plugged into the mobility equation (1).[8]

The second strategy consists of estimating simultaneously both equations (1) and (6), where $\text{cov}(\varepsilon_{it}, \upsilon_{it}) = \rho *$. In this two-equation model simultaneity exists if $\rho^{*} \neq 0$, while if $\rho^{*} = 0$, we have the standard pooled probit model. Therefore, the size of the bias will depend on the size of ρ^{*}. Unbiased and asymptotically efficient estimates of

[7] Detailed description of this variable is given in section 4.

[8] Note that we use the pooled model. Therefore, we assume that in equation (4) ρ is sufficiently small. The plausibility of this assumption will be assessed in the empirical section.

the simultaneous equation model composed by equations (1) and (6) can be obtained by means of the maximum likelihood estimation of a pooled bivariate probit model.[9]

3.3. The mediating effect of housing satisfaction

As we mention in the introduction, many housing and neighbourhood characteristics would exert an effect on residential mobility. However, these factors taken separately would not in themselves trigger mobility, rather they would do so through their effect on housing satisfaction, since the utility caused by a given (dis)amenity may differ among dwellers. In order to assess this mediating effect between housing conditions and residential mobility, we also estimate equation (1) but now replacing housing satisfaction (S_{it}) with the set of housing and neighbourhood characteristics considered in the satisfaction equation (6). Thus, the mobility equation now reads as:

$$M_{it} = I(M_{it}^{*} > 0) = I(\lambda X_{it-1} + \gamma Z_{it} + \nu_{it} > 0) \qquad (i = 1,...,N; t = 1,...,T), \tag{7}$$

The mediating effect of housing satisfaction would be confirmed if most of the housing and neighbourhoods conditions (X_{it}) are statistically significant in the satisfaction equation (6), but they are not in the mobility equation (7).

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 covering the period 1994-2001.[10] We use all the available waves of the ECHP for twelve countries. In ten countries

[9] Asymptotic efficiency is condition to the fact that in equation 5 $\rho \cong 0$.
[10] EU-15 refers to the fifteen member states of the European Union before the May 1st 2004 enlargement.

(Denmark, the Netherlands, Belgium, France, UK, Ireland, Italy, Spain, Greece and Portugal) the data covers the period 1994-2001. For Austria and Finland the available files only cover the periods 1995-2001 and 1996-2001, respectively. The main advantage of the ECHP is that the questionnaires are standardized, which allows us to obtain cross-country comparable data. The ECHP contains information about households, dwelling and multiple individual characteristics about all household members over 16 years old. Since, in both the mobility and the satisfaction equation we combine household and individual information, the individual variables linked to a given household refers to the household head.[11]

In the ECHP, household information is structured into five blocks. These are demographic variables, income, financial situation, possession of durables and accommodation. The accommodation questions contain variables regarding tenure status, dwelling characteristics (i.e. amenities and deprivations), duration of residence and some of the characteristics of the neighbourhood. Individual variables are structured into demographic information, employment, unemployment, job search, previous job, income, training-education, health status, social relations, migration and satisfaction with regard different aspects of their life. Satisfaction questions refer to job, financial situation, housing situation and leisure. The housing satisfaction question reads as follows:

> *"What is your degree of satisfaction with respect to your current situation regarding your housing conditions?"*

[11] In the ECHP household heads are defined as the household member who is the main contributor to household income.

Individuals have to answer an integer number between 1 and 6, where 1 means very dissatisfied and 6 means fully satisfied. This question is answered by all members in the household aged 16 and above.

In the mobility equation (1), the outcome variable (M_{it}) is a dichotomous indicator that takes the value 1 if the household *i* moves between period *t-1* and *t*, and 0 otherwise. We construct this indicator by means of the duration of residence variable. We assume that if the duration of residence in the current dwelling for household *i* at period *t* is zero years, this is because they moved to the current residence between period *t-1* and *t*.

To estimate the effect of housing satisfaction on residential mobility, in mobility equation (1), our satisfaction indicator (S_{it}) is a dichotomous variable that takes the value 1 if the individual reports a satisfaction score of four, five or six, and zero if the individual reports a satisfaction score of between one and three.[12] The covariates contained in matrix Z_{it} in the mobility equation (1) are: (i) a set of variables regarding household's life-course; (ii) household income; (iii) a set of household head characteristics; (iv) a dummy variable reflecting if the household owns the dwelling, and; (v) a set of year and region dummies. A detailed description of the variables is provided in table 1.

In satisfaction equation (6), the outcome variable is the same housing satisfaction indicator (S_{it}) used as a covariate in mobility equation (1). The covariates contained in matrix X_{it} in the satisfaction equation are household real annual income, the number of members in the household, marital status and age of the household head, and a set of dwelling and neighbourhood characteristics (see table 1).

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[12] In the empirical analysis, moving the threshold of our housing satisfaction indicator from four to five makes no difference.

[Insert table 1, around here]

In table 2 we report summary statistics of the covariates and the outcome variable in the mobility equation. Mobility differs remarkably across countries. In Denmark, Finland and France, the percentage of households that experience a move during the sample period is around 30 percent, while in the remaining countries household mobility rates range between around 13 and 22 percent. The summary statistics are reported separately for movers and stayers. A first look allows us to detect some interesting patterns. Recall that our satisfaction variable is a binary indicator. In Southern European countries (Spain, Portugal, Italy and Greece) the percentage of dissatisfied households is remarkably higher than in Central or Northern European countries. As one would expect, the percentage of dissatisfied households is higher for movers than for stayers. On average, movers are younger, more educated, and are more likely to be renters than stayers. Regarding the life-course variables, movers tend to experience more changes in household composition than stayers. It is also worth noting that while income level does not apparently differ significantly between movers and stayers, movers tend to experience higher income growth between periods.

[Insert table 2 around here]

5. Empirical results

5.1. The determinants of residential mobility

Table 3 contains the estimation results of three alternative specifications: the correlated random-effects probit model (CRE), the pooled two-stage probit (2S), and the pooled bivariate probit (Bi-probit). We do not show the results from the pooled standard probit model, as the estimated ρ is sufficiently close to zero, i.e. the results coming from this model coincide with the ones obtained from the correlated random-effects probit model. In order to allow for comparisons across countries and alternative models, we report the corrected marginal effects instead of the estimated coefficients.[13] For the sake of conciseness, only the marginal effects associated with the household head's housing satisfaction, household characteristics and the life-course variables are shown in table 3.[14]

Before discussing the determinants of the households' decision to move, we briefly refer to the accurateness and suitability of the alternative models. The estimated values of the parameter ρ in the correlated random-effects model are barely above zero in all countries. They range from 0.038 in France to 0.055 in Denmark. This result implies that household specific effects are not important in the analyses of any of the countries, and hence the estimated coefficients from the correlated random effects and the pooled probit models are practically identical.[15] This circumstance is very convenient, since it allows us to tackle the simultaneity problem using pooled estimators instead of panel data estimators.

We account for the simultaneity between mobility and satisfaction, and hence the endogeneity of satisfaction in the mobility equation, by means of the pooled two-stage and the pooled bivariate probit models. In both models, we apply the clustering

[13] Marginal effects for the correlated random-effects model are computed following Arulampalam (1999).
[14] Full estimates are available from the authors upon request.
[15] The standard errors of the estimated coefficients in the pooled model are corrected using the clustering expressed in equation (2).

correction proposed in equation (2), which guarantees that the obtained estimates are not only consistent, but also efficient. Only the results regarding the mobility equation are reported in table 3**.** The first result to look at is the estimated correlation of the residuals, (ρ^*), of the mobility and satisfaction equations in the bivariate probit model. We observe that the estimated correlations are relatively important in most of the countries under analysis. The values of ρ^*, which range from 0.128 in the Netherlands to 0.529 in Portugal, confirm the presence of simultaneity bias. The size of this bias will be proportional to the size of ρ^*.

Given the irrelevance of the household specific effects and the existence of simultaneity bias, the pooled bivariate probit model appears to be the most suitable framework of analysis. This model is the only estimation strategy that ensures unbiased estimates. Hereafter, we will rely on the pooled bivariate probit model for our inference on the effect of the covariates on the mobility propensities.

Our key variable, the housing satisfaction indicator lagged one period (S_{t-1}), proved statistically significant in all countries and exerts the expected negative effect on residential mobility. However, the size of the effect of this variable is quite heterogeneous across countries. We can distinguish three groups of countries. The first, which shows the strongest effects, is composed of Denmark, Finland and France with estimated marginal effects, in absolute value, above 0.08. The second is made up of a set of countries whose absolute values of the estimated effects range between 0.035 and 0.055. These are the Netherlands, Belgium, Austria and Ireland. And the third group comprises the Southern European countries (Spain, Portugal, Italy and Greece) plus the UK, which report the smallest estimated effects, below 0.03. It is important to remark that of all the variables considered in the mobility equation, the housing satisfaction indicator was found to be the variable with the largest estimated marginal effects in one third of the countries included in the analysis. Among the rest of the covariates, only the indicator of homeownership (*$OWNER_{t-1}$*) and the variable reflecting cohabiting and marital unions (*$COUP_t$*) report in some cases estimated effects with larger magnitude than the housing satisfaction indicator (*S_{t-1}*).

Life-course events provide quite mixed results across countries, though in line with previous studies in the UK and US. Nonetheless, the formation of cohabiting and marital partnerships (*$COUP_t$*) increases enormously the probability of residential move in all countries. Moreover, establishing a partnership is the primary determinant of mobility in France, Finland and the Netherlands. Compared to the rest of life-course covariates included in the mobility equation, the estimated marginal effects of the partnership formation variable are the largest in magnitude. Union dissolutions (*$UNCOUP_t$*) exert statistically significant and positive effect on mobility in Denmark, the Netherlands, France, Ireland, Greece, Spain and Finland. Contrary to partnership formation and dissolution, changes in household composition due to birth of a child (*$BORN_t$*) do not generally lead to adjustments in housing consumption.

The variable reflecting the homeownership status of the household (*$OWNER_{t-1}$*) behaves according to expectations. Consistent with the previous empirical findings, this indicator exerts a significant negative effect on residential mobility in all countries, i.e. homeownership acts as a barrier to residential mobility. The magnitude of the effect is especially strong in Belgium, France, Spain and the UK. Moreover, being an owner is the most relevant factor explaining variations in housing mobility propensities in Belgium, Spain and the UK.

Job change is also one of the factors that have been considered in the literature as a trigger event of residential mobility. Our results are mixed across countries. Job mobility increases the probability to move residence in Denmark, the Netherlands, France, the UK, Portugal, Austria and Finland. Similar effect, although smaller in magnitude and at a lower level of significance, is found in Italy. On the contrary, job changes do not significantly affect residential mobility in Belgium, Ireland, Greece and Spain. Lower labour mobility rates, higher housing prices, and cultural traits related to housing habits are plausible explanations of the latter finding.

Consistent with some previous evidence in the US, we observe a significant negative relation between duration of residence in the current dwelling and mobility. The Netherlands is the only exception to this general result.[16]

The effect of income variables on residential mobility also varies across countries. The level of household annual income exerts a positive and significant effect on residential moves in just four of the countries studied. These are Belgium, the UK, Greece and Portugal. The household income growth between *t* and *t-1*, which is expected to increase mobility propensities, does not affect the probability of residence move in most of the countries. Surprisingly, in the few cases when it is significant (Finland, the UK, and Belgium), the associated parameter is negative. We can draw the general conclusion that the income effect (in levels and differences) is not so important when deciding whether to move or not as one would expect. However, this result is consistent with previous evidence in the US and the UK (see e.g. Kan, 2007; or Clark and Huang, 2003).

[16] In order to test whether residential mobility is U-shaped in duration of residence (see e.g. Lu, 2002), we have also estimated the mobility equation including a squared polynomial of duration of residence. We found that mobility is U-shaped in duration of residence only in Denmark, Belgium and Greece.

Finally, the household head characteristics (not displayed in table 3) showed the expected effects on mobility behaviour. Mobility is U-shaped in age, while the level of education and gender do not exert a significant effect in any country. Results regarding the marital status dummies are mixed across countries. In some of the countries these variables are not significant, and when they are significant, results indicate that married household heads are less mobile than their single, widowed or divorced counterparts.

[Insert table 3 around here]

5.2. Assessing the mediating effect of housing satisfaction

In order to assess the mediating effect of housing satisfaction on the moving propensities, we estimated mobility equation (7) and compared the results with the estimates of the satisfaction equation (6). Recall that mobility equation (7) differs from mobility equation (1) in that in equation (7) housing satisfaction (S_{it-1}) is replaced by the set of housing and neighbourhood characteristics (X_{it-1}) used to estimate the determinants of satisfaction in equation (6). In table 4, we summarize the results of the comparison between the two equations.[17] Our findings are quite revealing. Most of the housing characteristics considered in the analysis are statistically significant in satisfaction equation (6), but they are not in mobility equation (7). We observe that only less than 3 out of 16 housing and neighbourhood characteristics directly impact on household mobility propensities. At the same time, the elements of housing quality and neighbourhood attributes salient to residential satisfaction range between 9 and 14. These results support the hypothesis that the effect of current housing and

[17] Since the estimates involve a large number of variables and countries, we do not show the results of the estimations, but they are available from the authors upon request.

neighbourhood attributes on the households' subsequent residential adjustments is mediated by residential satisfaction.[18] That is, poor housing and living conditions increase residential mobility propensities through their effect on housing dissatisfaction.

The variable $NOSPACE_{t-1}$, which is a proxy of room-stress, is statistically significant in the mobility equation in all countries under analysis (except in Greece) and at any significance level. This result is consistent with the stress-threshold model and indicates that room-stress is one of the circumstances powerful enough in itself to trigger residential mobility.[19] The remaining one or two housing characteristics, that significantly impact on mobility propensities, vary depending on the country. For instance, living in a dwelling with a few rooms increases the probability of residential move in Ireland, Spain and Portugal, but does not affect moving decisions in the rest of the states. This finding may be an indicator of differences in living arrangements styles across Europe. Residing in a dwelling which does not dispose of adequate heating facilities may trigger the decision to move in Denmark, Belgium and Portugal. French and Greek households have higher probability of changing their dwelling if it lacks sufficient natural lighting.

[Insert table 4 around here]

6. Conclusions

In this paper we investigate the relationship between residential mobility and housing satisfaction. Our study differs from the previous literature in several ways. First, this is

[18] Speare (1974) was the first who claimed that household and location characteristics operate on the desire to move through the intervening variable of residential satisfaction. He also provided empirical evidence to support this conceptualization.

[19] There are a number of empirical studies that establish a positive link between room-stress and mobility propensities. See Clark and Huang (2003), Clark and Ledwith (2006) or Li (2004).

one of the few studies that focuses on observed mobility rather than the commonly used indicators based on the intention to move. Second, this is also one of the few studies based on panel data, which allows us to observe variations in the determinants of housing mobility when this event occurs. Third, we study mobility in several countries using national data. Previous empirical evidence was mainly focused on the US and uses metropolitan data. In our estimates we account for the simultaneity between housing satisfaction and mobility. We unambiguously determine that housing satisfaction triggers residential mobility in all the countries under analysis. Our results are also in line with previous empirical evidence. In all countries, we observe that the main triggering events of residential mobility, in addition to housing dissatisfaction, is the formation of cohabiting or marital unions, while home owning is the primary barrier to mobility.

Moreover, we also confirm the hypothesis that housing satisfaction mediates the effect of residential characteristics on mobility propensities of the households. In all countries, we observe that while most residential characteristics exert a significant effect on housing satisfaction, just a few of them (1, 2 or 3 depending on the country) have a direct impact on residential mobility. The only variable among the housing attributes that exerts a direct impact on residential mobility is the lack of sufficient space/rooms in the dwelling (room stress). Another interesting finding is that, with few exceptions, the residential mobility enablers differ across countries. This result probably has to do with different perceptions, tastes and mobility restrictions that dwellers experience in different countries.

The study of the determinants of residential mobility sheds some light on which factors should policy makers pay attention at in defining, implementing and evaluating housing and neighbourhood policies. Our analyses make us think that residential satisfaction (or utility) is probably one the best indicators of the success or failure of neighbourhood policies, especially those designed to promote neighbourhood stability.

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Table 1: Description of the variables used in the econometric estimates.

Variable name	Description
Mobility equation (M_{it})	
S_{it-1}	Dummy takes the value 1 if the household has reported a housing satisfaction score of 4, 5 or 6 at period t-1, and 0 if 1, 2 or 3.
Life course variables	
$COUP_t$	Dummy variable takes value 1 if the household head started living with a couple between t-1 and t.
$UNCOUP_t$	Dummy variable takes value 1 if the household head stop living with a couple between t-1 and t
$BORN_t$	Number of members born between t-1 and t
$DEAD_t$	Dummy that takes the value 1 if any of the members of the household dead between t-1 and t.
$CJOB_t$	Dummy that takes the value 1 if the household head changed the job between t-1 and t.
H. head characteristics	
AGE_t	Age of the household head.
$AGE2_t$	Age of the household head squared.
$FEMALE_t$	Dummy that takes the value 1 if the household head is a woman.
$HIGHER_t$	Dummy that takes the value 1 if the highest educational level of the household head is higher education.
$SECONDAR_t$	Dummy that takes the value 1 if the highest educational level of the household head is secondary education.
$SEPARATED_{t-1}$	Dummy that takes the value 1 if the marital status of the household head at period t-1 is separated.
$DIVORCED_{t-1}$	Dummy that takes the value 1 if the marital status of the household head at period t-1 is divorced.
$WIDOWED_{t-1}$	Dummy that takes the value 1 if the marital status of the household head at period t-1 is widowed.
$SINGLE_{t-1}$	Dummy that takes the value 1 if the marital status of the household head has never been married.
Household characteristics	
$CHILDREN_t$	Number of children (younger than 12) at period t
$Ln(NCOME)_{t-1}$	Natural logarithm of real annual household income at period t-1.
$\Delta Ln(NCOME)_t$	Ln(NCOME)t - Ln(NCOME)t-1
$DRESID_{t-1}$	Duration of residence at period t-1
Dwelling characteristics	
$HOUSE_{t-1}$	Dummy that takes the value 1 if the dwelling a detached or semi-detached house in period t-1.
$OWNER_{t-1}$	Dummy that takes the value 1 if the household owns the dwelling at period t-1.

Table 1 (continuation)

Variable name	Description
Satisfaction equation (S_{it})	
H. head characteristics	Same household characteristics than in the mobility equation.
Household characteristics	
$NMEMBERS_t$	Number of members in the household at period t.
$Ln(NCOME)_t$	Natural logarithm of real annual household income at period t-1.
$DRESID_{t-1}$	Duration of residence at period t-1.
Dwelling characteristics	
$NROOMS_t$	Number of rooms without counting kitchens, bathrooms and toilets.
$KITCHEN_t$	Dummy that takes the value 1 if the dwelling has separate kitchen.
$BATH_t$	Dummy that takes the value 1 if the dwelling has bath or shower.
$TOILET_t$	Dummy that takes the value 1 if the dwelling has indoor flushing toilet.
$WATER_t$	Dummy that takes the value 1 if the dwelling has hot running water.
$HEATERS_t$	Dummy that takes the value 1 if the dwelling has heating, or electronic storage heaters.
$TERRACE_t$	Dummy that takes the value 1 if the dwelling has a place to sit outside, terrace or garden.
$NOSPACE_t$	Dummy that takes the value 1 if the dwelling has shortage of space.
$NOISE_t$	Dummy that takes the value 1 if the dwelling has noise from neighbours or from outside (traffic, business, factories, etc.)
$DARK_t$	Dummy that takes the value 1 if the dwelling is too dark or does not have enough light.
$HEATING_t$	Dummy that takes the value 1 if the dwelling has adequate heating facilities.
$LROOF_t$	Dummy that takes the value 1 if the dwelling has leaky roof.
$DAMP_t$	Dummy that takes the value 1 if the dwelling has damp walls, floors, foundations, etc.
ROT_t	Dummy that takes the value 1 if the dwelling has rot in window frames or floors.
$ENVIRON_t$	Dummy that takes the value 1 if the neighbourhood suffers of pollution, grime, environmental problems due to traffic industry.
$CRIME_t$	Dummy that takes the value 1 if the neighbourhood suffers of crime or vandalism.
$HOUSE_t$	Dummy that takes the value 1 if the dwelling a detached or semi-detached house in period..
$OWNER_t$	Dummy that takes the value 1 if the household owns the dwelling at period.

Table 2: Summary statistics of the variables in the mobility equation (1). Pooled sample 1995-2001.

	Denmark				The Netherlands				Belgium				France			
	Movers		Stayers		Movers		Stayers		Movers		Stayers		Movers		Stayers	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
S_{it-1}	0,524	0,500	0,803	0,397	0,483	0,500	0,779	0,415	0,388	0,488	0,698	0,459	0,435	0,496	0,704	0,456
<u>Houshold charac.</u>																
$DRESID_{t-1}$	5,027	6,359	9,463	7,077	7,807	7,244	10,266	6,941	5,970	6,627	11,261	6,998	4,974	6,492	10,938	7,549
$Ln(NCOME)_{t-1}$	12,049	0,665	12,219	0,612	10,580	0,708	10,740	0,633	13,646	0,818	13,739	0,738	11,653	0,859	11,869	0,716
$\Delta Ln(NCOME)_{t}$	0,069	0,578	0,008	0,393	0,076	0,694	0,015	0,468	0,077	0,742	0,008	0,515	0,122	0,735	0,022	0,498
$CHILDREN_{t}$	0,416	0,786	0,439	0,830	0,456	0,861	0,488	0,891	0,641	1,007	0,516	0,920	0,587	0,922	0,481	0,870
<u>H. Life-course</u>																
$BORN_{t}$	0,075	0,264	0,034	0,180	0,045	0,208	0,031	0,173	0,093	0,291	0,029	0,169	0,088	0,284	0,028	0,165
$COUP_{t}$	0,110	0,313	0,022	0,146	0,079	0,270	0,010	0,102	0,049	0,217	0,010	0,101	0,067	0,250	0,010	0,101
$UNCOUP_{t}$	0,058	0,234	0,022	0,146	0,039	0,193	0,012	0,110	0,022	0,146	0,016	0,125	0,030	0,171	0,015	0,120
$DEATH_{t}$	0.009	0.094	0,007	0,087	0.000	0.000	0.000	0.000	0.006	0.079	0.009	0.093	0.007	0.087	0.008	0.091
$CJOB_{t}$	0,206	0,405	0,071	0,256	0,128	0,334	0,037	0,188	0,063	0,244	0,022	0,146	0,142	0,349	0,031	0,174
<u>H. head charac.</u>																
AGE_{t}	34,148	14,395	49,879	17,488	36,051	14,948	49,093	16,345	37,100	14,532	51,782	16,609	33,698	13,717	51,878	16,710
$SECONDAR_{t}$	0,511	0,500	0,430	0,495	0,228	0,420	0,239	0,427	0,323	0,468	0,305	0,460	0,243	0,429	0,244	0,430
$HIGHER_{t}$	0,252	0,434	0,280	0,449	0,086	0,280	0,097	0,296	0,354	0,478	0,302	0,459	0,287	0,452	0,190	0,393
$FEMALE_{t}$	0,511	0,500	0,416	0,493	0,466	0,499	0,362	0,480	0,498	0,500	0,319	0,466	0,412	0,492	0,265	0,442
$SEPARATED_{t}$	0,030	0,171	0,016	0,125					0,087	0,283	0,030	0,170	0,012	0,107	0,010	0,099
$DIVORCED_{t}$	0,130	0,336	0,116	0,320	0,101	0,302	0,096	0,294	0,140	0,348	0,097	0,295	0,083	0,276	0,085	0,280
$WIDOWED_{t}$	0,043	0,202	0,119	0,324	0,049	0,216	0,095	0,293	0,062	0,242	0,134	0,341	0,039	0,192	0,119	0,324
$SINGLE_{t}$	0,538	0,499	0,267	0,443	0,446	0,497	0,201	0,401	0,285	0,452	0,137	0,344	0,477	0,500	0,193	0,395
$HOUSE_{t-1}$	0,392	0,488	0,661	0,473	0,564	0,496	0,731	0,444	0,540	0,499	0,792	0,406	0,327	0,469	0,645	0,479
$OWNER_{t-1}$	0,373	0,484	0,673	0,469	0,364	0,481	0,559	0,497	0,204	0,404	0,732	0,443	0,171	0,377	0,649	0,477
% of mMovers	31.05				15.48				17.23				33.07			
Simple size	16,813				31,805				18,119				36,647			

Note: Estimates do not use population weights.

Table 2 (continuation)

	UK				Ireland				Italy				Greece			
	Movers		Stayers		Movers		Stayers		Movers		Stayers		Movers		Stayers	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
S_{it-1}	0,525	0,500	0,741	0,438	0,414	0,494	0,752	0,432	0,243	0,429	0,456	0,498	0,283	0,451	0,341	0,474
Houshold charac.																
$DRESID_{t-1}$	6,507	6,114	9,941	6,601	5,757	6,386	13,275	6,187	9,142	7,062	13,145	6,624	6,790	6,396	13,138	6,451
$Ln(NCOME)_{t-1}$	9,761	0,717	9,632	0,749	9,559	0,763	9,653	0,726	10,267	0,798	10,319	0,752	15,178	0,801	14,978	0,842
$\Delta Ln(NCOME)_t$	0,014	0,662	0,013	0,477	0,125	0,526	0,033	0,416	0,085	0,661	0,025	0,565	0,100	0,677	0,028	0,558
$CHILDREN_t$	0,595	0,917	0,466	0,874	0,903	1,146	0,741	1,144	0,673	0,860	0,392	0,726	0,759	0,913	0,425	0,780
H. Life-course																
$BORN_t$	0,058	0,234	0,031	0,172	0,101	0,302	0,037	0,188	0,050	0,217	0,026	0,159	0,045	0,207	0,022	0,147
$COUP_t$	0,036	0,187	0,011	0,106	0,024	0,154	0,006	0,076	0,016	0,126	0,007	0,081	0,021	0,142	0,008	0,087
$UNCOUP_t$	0,023	0,149	0,015	0,120	0,016	0,124	0,014	0,119	0,007	0,085	0,015	0,123	0,010	0,099	0,015	0,123
$DEATH_t$	0.002	0.042	0.007	0.086	0.014	0.117	0.017	0.129	0.017	0.129	0.016	0.124	0.013	0.113	0.021	0.143
$CJOB_t$	0,121	0,326	0,059	0,235	0,193	0,395	0,050	0,218	0,097	0,295	0,022	0,147	0,125	0,331	0,037	0,190
H. head charac.																
AGE_t	35,389	13,747	51,408	16,673	32,270	12,642	53,363	15,910	38,108	14,376	54,693	15,590	36,792	14,428	54,509	16,207
$SECONDAR_t$	0,177	0,382	0,202	0,401	0,360	0,480	0,277	0,448	0,420	0,494	0,262	0,440	0,366	0,482	0,223	0,416
$HIGHER_t$	0,549	0,498	0,392	0,488	0,251	0,434	0,144	0,351	0,121	0,326	0,075	0,264	0,282	0,450	0,150	0,357
$FEMALE_t$	0,460	0,499	0,382	0,486	0,453	0,498	0,268	0,443	0,386	0,487	0,231	0,421	0,366	0,482	0,253	0,434
$SEPARATED_t$	0,049	0,216	0,021	0,145	0,045	0,208	0,035	0,185	0,054	0,227	0,020	0,139	0,019	0,138	0,008	0,087
$DIVORCED_t$	0,094	0,292	0,109	0,312	0,011	0,106	0,004	0,066	0,021	0,145	0,012	0,108	0,025	0,157	0,022	0,148
$WIDOWED_t$	0,038	0,191	0,129	0,335	0,049	0,216	0,132	0,339	0,072	0,259	0,141	0,348	0,046	0,210	0,144	0,351
$SINGLE_t$	0,427	0,495	0,145	0,352	0,397	0,490	0,130	0,336	0,111	0,314	0,077	0,267	0,147	0,354	0,095	0,294
$HOUSE_{t-1}$	0,783	0,413	0,874	0,332	0,698	0,460	0,968	0,177	0,259	0,439	0,339	0,473	0,291	0,455	0,553	0,497
$OWNER_{t-1}$	0,746	0,436	0,843	0,364	0,423	0,495	0,882	0,322	0,401	0,491	0,814	0,389	0,301	0,459	0,858	0,349
% of mMovers	19.42				12.80				14.84				18.13			
Sample size	13,421				14,729				39,452				29,465			

Note: Estimates do not use population weights.

Table 2 (continuation)

	Spain				Portugal				Austria				Finland			
	Movers		Stayers		Movers		Stayers		Movers		Stayers		Movers		Stayers	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
S_{it-1}	0,421	0,494	0,570	0,495	0,161	0,368	0,309	0,462	0,433	0,496	0,824	0,381	0,440	0,497	0,700	0,458
Houshold charac.																
$DRESID_{t-1}$	7,877	6,896	12,817	6,406	8,957	7,456	14,070	6,230	6,932	7,047	14,036	6,625	5,116	6,852	10,289	7,542
$Ln(NCOME)_{t-1}$	14,616	0,870	14,590	0,812	14,534	0,814	14,272	0,892	12,580	0,680	12,748	0,673	11,422	0,918	11,824	0,651
$\Delta Ln(NCOME)_t$	0,107	0,849	0,020	0,677	0,102	0,560	0,034	0,508	0,075	0,602	0,004	0,455	0,002	0,925	0,017	0,352
$CHILDREN_t$	0,601	0,837	0,415	0,752	0,766	0,971	0,404	0,781	0,694	0,909	0,487	0,855	0,477	0,925	0,510	0,943
H. Life-course																
$BORN_t$	0,053	0,225	0,023	0,151	0,070	0,256	0,022	0,148	0,069	0,253	0,024	0,152	0,073	0,260	0,035	0,184
$COUP_t$	0,020	0,140	0,005	0,070	0,009	0,095	0,006	0,079	0,046	0,211	0,011	0,104	0,095	0,293	0,014	0,117
$UNCOUP_t$	0,020	0,140	0,015	0,122	0,007	0,085	0,021	0,144	0,009	0,094	0,019	0,135	0,047	0,212	0,017	0,128
$DEATH_t$	0.024	0.153	0.020	0.141	0.019	0.138	0.024	0.153	0.000	0.000	0.017	0.132	0.009	0.095	0.008	0.090
$CJOB_t$	0,169	0,375	0,048	0,214	0,150	0,357	0,030	0,170	0,154	0,361	0,034	0,181	0,200	0,400	0,050	0,219
H. head charac.																
AGE_t	37,038	14,884	55,517	16,214	36,403	15,341	56,736	15,868	32,662	11,710	52,856	16,127	31,613	13,330	46,703	15,972
$SECONDAR_t$	0,195	0,396	0,120	0,325	0,150	0,357	0,061	0,239	0,716	0,451	0,653	0,476	0,552	0,497	0,389	0,488
$HIGHER_t$	0,310	0,463	0,162	0,368	0,102	0,303	0,051	0,219	0,096	0,295	0,070	0,256	0,245	0,430	0,283	0,451
$FEMALE_t$	0,376	0,484	0,243	0,429	0,361	0,481	0,276	0,447	0,461	0,499	0,344	0,475	0,507	0,500	0,478	0,500
$SEPARATED_t$	0,050	0,219	0,022	0,146	0,033	0,179	0,017	0,129	0,022	0,146	0,009	0,092	0,014	0,116	0,006	0,079
$DIVORCED_t$	0,023	0,151	0,012	0,107	0,047	0,212	0,026	0,160	0,134	0,341	0,081	0,273	0,105	0,306	0,097	0,296
$WIDOWED_t$	0,082	0,274	0,158	0,365	0,111	0,315	0,180	0,384	0,032	0,178	0,138	0,345	0,026	0,160	0,067	0,251
$SINGLE_t$	0,196	0,397	0,082	0,275	0,069	0,253	0,053	0,224	0,368	0,483	0,137	0,343	0,561	0,496	0,267	0,443
$HOUSE_{t-1}$	0,231	0,422	0,379	0,485	0,594	0,492	0,800	0,400	0,148	0,356	0,561	0,496	0,339	0,474	0,661	0,473
$OWNER_{t-1}$	0,515	0,500	0,889	0,314	0,411	0,493	0,796	0,403	0,133	0,340	0,668	0,471	0,326	0,469	0,771	0,420
% of Movers	21.24				17.92				15.30				28.89			
Sample size	33,654				27,501				14,799				15,344			

Note: Estimates do not use population weights.

Table 3: Estimates of the mobility equation (1994-2001)

	Denmark			The Netherlands			Belgium			France		
	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit
S_{it-1}	-0,0562	-0,0568	-0,0912	-0,0370	-0,0251	-0,0524	-0,0125	-0,0194	-0,0368	-0,0398	-0,0698	-0,1363
	-10,33	*-6,61*	*-8,74*	*-12,94*	*-5,47*	*-8,21*	*-5,92*	*-4,82*	*-6,55*	*-14,84*	*-12,70*	*-16,95*
$DRESID_{t-1}$	-0,0004	-0,0010	-0,0010	0,0000	-0,0001	-0,0001	-0,0003	-0,0004	-0,0005	-0,0009	-0,0012	-0,0014
	-1,34	*-2,92*	*-3,17*	*0,31*	*-0,53*	*-0,57*	*-2,21*	*-3,13*	*-3,24*	*-5,30*	*-5,07*	*-5,79*
$Ln(NCOME)_{t-1}$	0,0049	0,0074	0,0057	0,0030	0,0036	0,0026	0,0033	0,0038	0,0049	-0,0040	-0,0032	-0,0042
	0,88	*1,06*	*0,89*	*1,22*	*1,20*	*1,03*	*1,48*	*1,52*	*1,92*	*-1,44*	*-0,82*	*-1,04*
$\Delta Ln(NCOME)_t$	0,0002	0,0005	-0,0058	0,0002	0,0002	-0,0025	-0,0010	0,0003	-0,0057	-0,0057	-0,0059	-0,0019
	0,05	*0,09*	*-1,21*	*0,10*	*0,09*	*-1,43*	*-0,61*	*0,15*	*-2,73*	*-2,53*	*-1,90*	*-0,67*
$CHILDREN_t$	-0,0071	-0,0077	-0,0075	0,0001	0,0006	0,0000	0,0019	0,0021	0,0022	0,0006	-0,0068	-0,0069
	-1,62	*-1,62*	*-1,74*	*0,06*	*0,24*	*-0,01*	*1,13*	*0,99*	*1,04*	*0,24*	*-1,80*	*-1,78*
$OWNER_{t-1}$	-0,0420	-0,0503	-0,0345	-0,0016	-0,0295	-0,0152	-0,0749	-0,0798	-0,0584	-0,0892	-0,0833	-0,0707
	-5,78	*-5,00*	*-4,23*	*-0,56*	*-4,62*	*-3,36*	*-10,59*	*-8,02*	*-7,33*	*-15,00*	*-8,79*	*-8,22*
$BORN_t$	0,0132	0,0144	0,0118	0,0070	0,0092	0,0066	0,0113	0,0135	0,0124	0,0051	0,0028	0,0039
	1,67	*1,63*	*1,50*	*1,62*	*1,79*	*1,59*	*2,73*	*3,08*	*2,97*	*1,23*	*0,51*	*0,69*
$COUP_t$	0,0889	0,0966	0,0854	0,0840	0,0983	0,0766	0,0322	0,0332	0,0339	0,1171	0,1351	0,1181
	8,31	*8,31*	*8,21*	*8,86*	*9,50*	*9,16*	*4,34*	*4,10*	*4,32*	*11,84*	*10,32*	*10,05*
$UNCOUP_t$	0,0790	0,0886	0,0749	0,0441	0,0483	0,0399	0,0118	0,0160	0,0108	0,0664	0,0629	0,0564
	6,10	*6,04*	*5,77*	*5,39*	*5,15*	*5,10*	*1,77*	*1,91*	*1,48*	*6,36*	*4,61*	*4,36*
$DEATH_t$	-0,0061	-0,0117	-0,0058				0,0004	-0,0009	0,0011	0,0064	0,0073	0,0110
	-0,36	*-0,56*	*-0,30*				*0,05*	*-0,10*	*0,11*	*0,53*	*0,42*	*0,61*
$CJOB_t$	0,0213	0,0231	0,0206	0,0099	0,0105	0,0094	-0,0011	-0,0014	-0,0011	0,0306	0,0358	0,0363
	3,89	*3,97*	*3,93*	*2,72*	*2,43*	*2,57*	*-0,31*	*-0,36*	*-0,28*	*6,54*	*5,61*	*5,77*
Log-likelihood	-3.331,39	-3.370,40	-9.672,52	-3.069,33	-3.123,45	-15.728,05	-1.579,24	-1.569,82	1.036,75	-6.112,78	-4.138,52	-15.553,67
ρ (random effects)	0,055			0,040			0,042			0,038		
Pseudo-R^2 (2-stage)		0,195			0,189			0,185			0,239	
ρ^* (bivariate probit)			0,168			0,128			0,301			0,445
N		16.441			29.009			17.466			35.291	

Notes: CRE refers to the correlated random effects model, 2S to the two-stage model and Bi-probit to the bivariate probit model. All the models also include the household head characteristics described in table 1, the variable $HOUSE_{t-1}$ and dummies for year and region. In the the bivariate probit model we only report the results regarding the estimates of the mobility equation. Full estimates are available from the author upon request. Estimates do not use population weights.

Table 3 (Continuation)

	UK			Ireland			Italy			Greece		
	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit
S_{it-1}	-0,0238	-0,0260	-0,0141	-0,0085	-0,0108	-0,0358	-0,0056	-0,0122	-0,0078	-0,0035	-0,0166	-0,0103
	-5,46	*-5,22*	*-2,92*	*-6,09*	*-4,88*	*-6,91*	*-5,59*	*-3,62*	*-4,31*	*-3,81*	*-4,34*	*-5,54*
$DRESID_{t-1}$	-0,0004	-0,0004	-0,0005	-0,0003	-0,0004	-0,0005	-0,0002	-0,0003	-0,0002	-0,0003	-0,0004	-0,0004
	-2,74	*-2,85*	*-4,58*	*-4,89*	*-5,17*	*-5,71*	*-2,46*	*-3,49*	*-3,55*	*-3,78*	*-5,04*	*-5,02*
$Ln(NCOME)_{t-1}$	0,0107	0,0120	0,0093	0,0010	0,0013	0,0009	0,0002	0,0005	0,0004	0,0020	0,0033	0,0027
	2,01	*1,72*	*2,18*	*0,72*	*0,69*	*0,41*	*0,15*	*0,43*	*0,49*	*1,44*	*2,15*	*2,12*
$\Delta Ln(NCOME)_t$	0,0029	0,0033	-0,0048	0,0002	-0,0006	-0,0012	0,0006	0,0007	0,0001	0,0024	0,0036	0,0003
	0,81	*0,73*	*-2,19*	*0,18*	*-0,44*	*-0,76*	*0,65*	*0,65*	*0,26*	*2,27*	*3,00*	*0,39*
$CHILDREN_t$	0,0035	0,0040	0,0060	-0,0007	-0,0009	-0,0011	0,0004	0,0003	0,0002	0,0004	0,0001	0,0000
	0,72	*0,71*	*1,56*	*-0,82*	*-0,93*	*-0,97*	*0,34*	*0,27*	*0,31*	*0,32*	*0,04*	*-0,03*
$OWNER_{t-1}$	-0,2678	-0,2719	-0,0988	-0,0117	-0,0143	-0,0119	-0,0587	-0,0529	-0,0217	-0,0679	-0,0470	-0,0210
	4,11	*-3,94*	*-4,21*	*-3,14*	*-2,73*	*-2,43*	*-11,37*	*-6,72*	*-6,67*	*-10,86*	*-4,60*	*-4,54*
$BORN_t$	0,0005	0,0006	0,0047	-0,0003	-0,0006	-0,0007	-0,0021	-0,0024	-0,0016	-0,0035	-0,0038	-0,0033
	0,11	*0,12*	*0,88*	*-0,22*	*-0,45*	*-0,40*	*-1,22*	*-1,16*	*-1,19*	*-2,06*	*-1,98*	*-1,98*
$COUP_t$	0,0239	0,0263	0,0144	0,0064	0,0079	0,0110	0,0283	0,0253	0,0142	0,0292	0,0341	0,0223
	1,57	*2,39*	*1,71*	*1,60*	*1,55*	*1,73*	*3,81*	*3,87*	*3,65*	*3,75*	*3,73*	*3,68*
$UNCOUP_t$	0,0054	0,0062	0,0003	0,0131	0,0148	0,0193	0,0082	0,0094	0,0062	0,0214	0,0309	0,0219
	0,64	*0,76*	*0,05*	*2,09*	*2,15*	*2,27*	*1,45*	*1,52*	*1,57*	*2,82*	*2,45*	*2,51*
$DEATH_t$				0,0072	0,0053	0,0062	0,0005	0,0002	0,0002	-0,0010	-0,0021	-0,0020
				1,23	*0,82*	*0,84*	*0,14*	*0,05*	*0,06*	*-0,29*	*-0,49*	*-0,55*
$CJOB_t$	0,0074	0,0082	0,0067	-0,0004	-0,0002	-0,0004	0,0043	0,0051	0,0032	0,0008	-0,0002	-0,0003
	1,14	*1,36*	*1,80*	*-0,37*	*-0,16*	*-0,31*	*1,64*	*1,68*	*1,66*	*0,39*	*-0,10*	*-0,15*
Log-likelihood	-1.291,94	-879,25	-6.048,33	-911,23	-9.600,76	-7.726,69	-2.244,95	-2.224,25	-24.946,87	-1.893,15	-1.504,33	-13.730,65
ρ (random effects)	0,051			0,046			0,043			0,043		
Pseudo-R^2 (2-stage)		0,160			0,264			0,128			0,217	
ρ^* (bivariate probit)			0,207			0,343			0,176			0,399
N		13.091			15.322			37.717			27.690	

Notes: CRE refers to the correlated random effects model, 2S to the two-stage model and Bi-probit to the bivariate probit model. All the models also include the household head characteristics described in table 1, the variable $HOUSE_{t-1}$ and dummies for year and region. In the the bivariate probit model we only report the results regarding the estimates of the mobility equation. Full estimates are available from the author upon request. Estimates do not use population weights.

Table 3 (Continuation)

			Spain			Portugal			Austria			Finland
	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit	CRE probit	2S probit	Bi-probit
S_{it-1}	-0,0080	-0,0250	-0,0246	-0,0064	-0,0286	-0,0199	-0,0235	-0,0121	-0,0538	-0,0574	-0,0749	-0,0829
	-5,19	*-5,73*	*-5,87*	*-6,10*	*-7,48*	*-9,67*	*-9,65*	*-5,96*	*-8,60*	*-10,98*	*-7,32*	*-8,85*
$DRESID_{t-1}$	-0,0003	-0,0006	-0,0006	-0,0004	-0,0006	-0,0007	-0,0003	-0,0004	-0,0003	-0,0014	-0,0020	-0,0020
	-2,56	*-4,96*	*-4,99*	*-5,21*	*-7,89*	*-8,10*	*-4,95*	*-5,19*	*-5,70*	*-4,75*	*-6,44*	*-6,52*
$Ln(NCOME)_{t-1}$	0,0001	0,0011	0,0007	0,0022	0,0031	0,0033	-0,0006	0,0000	-0,0001	-0,0284	-0,0316	-0,0130
	0,05	*0,56*	*0,38*	*1,59*	*2,18*	*2,08*	*-0,42*	*0,02*	*-0,05*	*-4,82*	*-4,77*	*-4,44*
$\Delta Ln(NCOME)_{t}$	0,0019	0,0022	0,0011	0,0025	0,0028	-0,0002	-0,0006	-0,0009	-0,0004	-0,0405	-0,0478	-0,0285
	1,42	*1,34*	*1,22*	*2,27*	*2,00*	*-0,13*	*-0,57*	*-0,69*	*-0,46*	*-8,95*	*-9,07*	*-9,05*
$CHILDREN_{t}$	-0,0006	-0,0013	-0,0011	0,0003	0,0001	0,0000	0,0017	0,0017	0,0009	0,0123	0,0119	0,0011
	-0,35	*-0,73*	*-0,70*	*0,25*	*0,12*	*0,02*	*1,49*	*1,19*	*0,88*	*2,37*	*2,12*	*0,60*
$OWNER_{t-1}$	-0,1481	-0,1310	-0,0746	-0,0655	-0,0449	-0,0233	-0,0332	-0,0402	-0,0231	0,0170	-0,0644	-0,0260
	-15,64	*-11,52*	*-10,81*	*-9,81*	*-5,20*	*-4,82*	*-6,05*	*-4,84*	*-4,22*	*2,46*	*-4,95*	*-6,86*
$BORN_{t}$	-0,0015	-0,0021	-0,0014	-0,0007	-0,0008	-0,0012	0,0022	0,0011	0,0015	0,0058	0,0096	0,0099
	-0,46	*-0,63*	*-0,50*	*-0,33*	*-0,42*	*-0,53*	*0,93*	*0,42*	*0,72*	*0,66*	*1,02*	*1,48*
$COUP_{t}$	0,0436	0,0445	0,0360	0,0087	0,0096	0,0096	0,0273	0,0329	0,0267	0,1682	0,1698	0,1445
	4,16	*4,00*	*3,98*	*1,58*	*1,68*	*1,69*	*4,41*	*4,67*	*4,58*	*10,85*	*10,90*	*13,35*
$UNCOUP_{t}$	0,0249	0,0275	0,0220	0,0010	0,0008	0,0016	0,0030	0,0080	0,0052	0,0789	0,0821	0,0715
	3,26	*3,86*	*3,73*	*0,28*	*0,22*	*0,38*	*0,93*	*1,38*	*1,22*	*5,58*	*5,75*	*6,78*
$DEATH_{t}$	0,0021	0,0018	0,0020	0,0104	0,0105	0,0108			-0,0041	0,0231	-0,0117	0,0222
	0,41	*0,37*	*0,48*	*2,12*	*1,99*	*2,13*			*-14,98*	*3,62*	*-0,71*	*1,34*
$CJOB_{t}$	0,0027	0,0028	0,0022	0,0052	0,0059	0,0056	0,0041	0,0057	0,0034	-0,0034	0,0265	0,0308
	1,01	*0,98*	*0,93*	*2,26*	*2,22*	*2,07*	*1,57*	*2,47*	*2,08*	*-3,57*	*4,00*	*5,93*
Log-likelihood	-3.167,96	-3.185,78	-23.113,01	-1.736,02	-1.720,72	-1.555,32	-9.430,65	-9.250,44	-5.957,94	-3.149,79	-3.280,17	-11.090,70
ρ (random effects)	0,042			0,043			0,040			0,044		
Pseudo-R^2 (2-stage)		0,177			0,189			0,268			0,283	
ρ^* (bivariate probit)			0,275			0,529			0,303			0,324
N		33.086			26.553			14.225			14.811	

Notes: CRE refers to the correlated random effects model, 2S to the two-stage model and Bi-probit to the bivariate probit model. All the models also include the household head characteristics described in table 1, the variable $HOUSE_{t-1}$ and dummies for year and region. In the the bivariate probit model we only report the results regarding the estimates of the mobility equation. Full estimates are available from the author upon request. Estimates do not use population weights.

Table 4: Housing and neighbourhood characteristics that are statistically significant in the mobility or the satisfaction equations (6) and (7).

	Significance assessed at 5 percent level		
	(1)	(2)	(3)
Denmark	2	12	$NOSPACE_t$, $HEATING_t$
The Netherlands	1	9	$NOSPACE_t$
Belgium	2	11	$NOSPACE_t$, $HEATING_t$
France	3	13	$NOSPACE_t$, $NOISE_t$, $DARK_t$
UK	1	11	$NOSPACE_t$
Ireland	2	9	$NOSPACE_t$, $NROOMS_t$, $NOISE_t$
Italy	2	11	$NOSPACE_t$, $ENVIRON_t$
Greece	3	13	$NOSPACE_t$, $DARK_t$, $CRIME_t$
Spain	2	10	$NOSPACE_t$, $NROOMS_t$
Portugal	3	14	$NOSPACE_t$, $NROOMS_t$, $HEATING_t$
Austria	1	10	$NOSPACE_t$
Finland	2	11	$NOSPACE_t$, $LROOF_t$

Notes: Estimates do not use population weights.
(1) Number of housing and neighbourhood characteristics statistically significant in the mobility equation (7).
(2) Number of housing and neighbourhood characteristics statistically significant in the satisfaction equation (6).
(3) Name of the housing and neighbourhood characteristics statistically significant in the mobility equation (7).