CPB Netherlands Bureau for Economic Policy Analysis

CPB Discussion Paper | 345

Negative home equity and job mobility

Andrea Morescalchi
Sander van Veldhuizen
Bart Voogt
Benedikt Vogt

Negative home equity and job mobility

Andrea Morescalchi, Sander van Veldhuizen, Bart Voogt, Benedikt Vogt*

This version: 09-03-2017

Abstract

We investigate the impact of negative home equity on job mobility. Panel fixed effects estimation is carried out by making use of Dutch administrative panel in the period 2006-2011. To control for self-selection into negative home equity, we consider homeowners who fall into negative home equity because of an exogenous price decline in their house. We compare them to homeowners with positive equity. Negative home equity has a moderate negative effect on the probability to switch jobs. If a household plunges into negative home equity, then the head of the household is about 5.2% less likely to switch jobs.

JEL codes: D1; J6; R2; R23

Keywords: Negative home equity; labor mobility; household mobility; under water; mortgage lock-in;

* Corresponding author is Benedikt Vogt. Morescalchi: European Commission Joint Research Centre (JRC), Via E. Fermi 2749 T.P. 361, 21027 Ispra (VA), Italy. (e-mail: a ndrea.morescalchi@jrc.ec.europa.eu); van Veldhuizen, Voogt and Vogt: CPB – Netherlands Bureau for Economic Policy Analysis, P.O. Box 80510, 2508 GM The Hague, The Netherlands (e-mail: Veldhuizen: s.van.veldhuizen@cpb.nl; Vogt: b.vogt@cpb.nl; Voogt: b.voogt@cpb.nl). We would like to thank Leon Bettendorf, Michiel Bijlsma, Jonneke Bolhaar, Sander Gerritsen, Thomas van Huizen and Remco Mocking for helpful comments. The Stata Do files which were used to construct the data set and to conduct the analysis are available upon request. The data used for our analysis is strictly confidential data and only available for personally registered users of Statistics Netherlands (CBS-remote access). We will provide all necessary assistance to get access to the data. All remaining errors are ours.

1. Introduction

During the recent economic crisis the large decline in house prices led many homeowners into negative home equity (NHE). It has been suggested that the large increase in NHE hindered the mobility of workers and had negative consequences on the labor market (Stiglitz 2009; Krugman 2010; Katz 2014). The increase in the fraction of homeowner households with NHE was particularly high in the Netherlands. Indeed, it increased from less than 10% to more than 20% in the period 2006-2011. This increase is especially due to home owners who fell into negative home equity due to unexpected declining house prices.

Several empirical studies have tested the impact of NHE on residential mobility with mixed findings. While some studies find that NHE reduces the probability of moving (Henley 1998; Ferreira, Gyourko, and Tracy 2010; Modestino and Dennett 2013; Andersson and Mayock 2014), some others find the opposite (Donovan and Schnure 2011; Schulhofer-Wohl 2011; Coulson and Grieco 2013; Bricker and Bucks 2016).

However, whether or not underwater homeowners are more or less mobile, only limited attention has been devoted to investigating the effect of NHE on the labor market. To our knowledge, only Mumford and Schultz (2014) have investigated the relationship between NHE and job transitions using survey data from the Panel Study of Income Dynamics (PSID). In the present paper we make use of Dutch administrative data to estimate the effect of NHE on job-to-job transitions and commuting. This is the first study investigating the impact of NHE on the labor market based on administrative data. Panel fixed effects estimation is carried out by making use of a panel data of Dutch home owners in the period 2006-2011.

To prevent biased estimates due to self-selection into negative home equity based on unobserved characteristics, we consider homeowners who fall into negative home equity

because of an exogenous price decline and we compare them to homeowners with positive equity.

The impact of NHE on job mobility is expected to work via the effect on residential mobility. Although existing evidence on the effect of NHE on residential mobility is mixed, a negative effect has been found for the Dutch case (Veldhuizen et al., 2016). Reduced propensity to relocate can determine the following outcomes: (i) homeowners with NHE might be less likely to switch jobs because they are more prone to discard job opportunities requiring relocation. Then a reduction in the probability to switch jobs may prolong inefficient job matches and deprive homeowners of interesting job opportunities that would have improved the quality of their job match (Munch et al., 2006; 2008); (ii) homeowners with NHE might be less mobile but prone to longer commuting. Indeed, discarding job opportunities in distant areas might be too costly and hence they might be willing to take up new jobs in distant areas as much as above water mortgagers, but without relocation (Kantor et al, 2012). In conclusion we expect that being under water causes either case (i), or (ii) or a combination of the two cases.

The paper is structured as follows. Section 2 places the paper in the literature. Section 3 describes the data set. Section 4 describes the methodological approach. Section 5 presents the results, including a robustness analysis. Section 6 concludes.

2. Literature review & theoretical background

The present paper is related to two strands of literature. The first deals with the impact of NHE on residential mobility. The second one deals with the impact of homeownership on labor market outcomes.

2.1. Negative home equity and residential mobility

As concerns the first strand of literature, there exist theories that explain either a negative or positive impact of NHE on residential mobility. On the one hand, three reasons have been put forward to explain the well-known "lock-in effect", predicting a negative effect of NHE on residential mobility. First underwater homeowners may be less mobile because of liquidity constraints to make down payment on a new home (Stein 1995). Second, nominal loss aversion may make underwater mortgagers less willing to sell the home after its price has fallen (Genesove and Mayer 2001; Engelhardt 2003; Cunningham and Engelhardt 2008). Third, (Chan 2001) notes that the lock-in effect can be present only in case of localized price declines. On the other hand, NHE could bear incentive to default and hence could even increase mobility (Coulson and Grieco 2013).

Several empirical studies have tested the impact of NHE on residential mobility with mixed findings, reflecting the ambiguity of theoretical predictions. While some studies find that NHE reduces the probability of moving (Henley 1998; Ferreira, Gyourko, and Tracy 2010; Modestino and Dennett 2013; Andersson and Mayock 2014), some others find the opposite (Donovan and Schnure 2011; Schulhofer-Wohl 2011; Coulson and Grieco 2013; Bricker and Bucks 2016).

There are two explanations for this very mixed set of results. The first explanation is that all the studies investigate different samples and different countries which differ in their institutional setting. The second explanation is a potential selection of more mobile individuals into high debt levels. To our knowledge there is only one paper in the literature which tries to tackle the issue of self-selection. Veldhuizen et al. (2016) distinguish between households who select themselves into high debt levels and those who fell involuntarily into NHE due to unexpected decreasing house prices. They find that

households who fell into NHE are 18 percent less likely to move on an annual basis. We tackle self-selection in a similar way.

2.2. Home ownership and the labor market

As concerns the second strand of literature, since the Eighties many scholars have maintained that homeownership should impair the labor market functioning. This claim is based to a large extent on the argument that higher costs for selling and buying houses render homeowners less mobile, which has become popular under the label of "Oswald's thesis" (Oswald 1996, 1997, 1999; Blanchflower and Oswald 2013).[1] Reduced residential mobility make homeowners less prone to relocate for jobs and hence they are expected to have higher reservation wage, lower search intensities, and lower job-finding rate for non-local jobs, but lower reservation wage, higher search intensities, and higher job-finding rates for local jobs (Munch et al., 2008; Morescalchi 2016). Overall, homeowners should have lower search intensities as well as lower job-finding rate (Morescalchi, 2016).

Empirical evidence consistently reports that homeowners are less prone to relocate for jobs (Henley 1998; Munch, Rosholm, and Svarer 2006; Battu, Ma, and Phimister 2008; Aico 2009). However, most micro-econometric studies have found that homeowners have no longer, or even shorter, unemployment spells than renters (Goss and Phillips 1997; Coulson and Grieco 2013; Flatau et al. 2003; Munch, Rosholm, and Svarer 2006; Munch, Rosholm, and Svarer 2008; Battu, Ma, and Phimister 2008; van Vuuren 2009; Morescalchi, 2016). This evidence has led to the well-known puzzle of homeowners having shorter unemployment spells although being less prone to job-related moves (Morescalchi, 2016).

[1] Blanchflower and Oswald (2013) and Laamanen (2013) have recently focused on the role of negative externalities of high homeownership rates (Bover et al. 1989).

Fewer microeconometric studies have investigated the impact of homeownership on transitions from employment. Evidence shows that homeownership does reduce unemployment risks for employees (van Leuvensteijn and Koning, 2004; de Graaff et al., 2009; de Graaff and Leuvensteijn 2013) as well as the risk of job-to-job transitions. In order to check whether lower job-to-job transitions of homeowners are explained by lower regional mobility, Battu et al. (2008) and Munch et al., (2008) decompose job-to-job transitions between transitions to local jobs and transitions to jobs associated with relocation in another labor market. They both found that homeownership reduces the probability of transition to non-local jobs. They also find a negative effect on transitions to local jobs, but this effect is smaller in both studies and not even significant in Battu et al. (2008).

As a way to reconcile the argument underlying Oswald's thesis and empirical evidence, some microeconometric studies have operated distinctions between outright owners and mortgage-holders, and between private and social renters. Within the pool of homeowners, unemployed mortgagers should have higher incentives to search for a job to prevent foreclosure (Rouwendal and Nijkamp 2010). Consistently with this argument, unemployed mortgagers are found to have the shortest unemployment duration (Goss and Phillips, 1997; Flatau et al., 2003; Brunet et al., 2007; Kantor et al., 2012) as well as the highest search intensity (Morescalchi, 2016). Within the pool of renters, social renters should be less mobile than private renters because of below-market rent, long waiting lists, security of tenure, and restricted transferability within social housing (Hughes et al., 1987; McCormick, 1983; de Graaff et al. 2009). Consistently with this argument, social renters

are found to have longer unemployment duration (Flatau et al., 2003; Battu et al., 2008) as well as lower search intensity (Morescalchi, 2016).[2]

The two strands of literature described so far have limitations. First, investigation on the impact of NHE on residential mobility does not explicitly quantify the consequences on the labor market. Second, existing studies on the effect of housing tenure on labor market outcomes do not take into consideration explicitly the role of NHE. The present paper fills these gaps by investigating the impact of NHE on the labor market. We are aware of only one study investigating the relation between NHE and the labor market. Mumford and Schultz (2014)investigate the effect of NHE on the probability to become unemployed and on the probability to switch job by using survey data from the Panel Study of Income Dynamics (PSID)[3]. They do not find significant effects in either case. The present paper use administrative data and is based on a much larger sample.

2.3. Theoretical background and potential mechanisms

The impact of NHE on job mobility is expected to work via the effect on residential mobility. Although existing evidence on the effect of NHE on residential mobility is mixed, a negative effect has been found for the Dutch case (Veldhuizen et al., 2016). Reduced propensity to relocate can determine the following outcomes:

(i) homeowners with NHE might be less likely to switch jobs because they are more prone to discard job opportunities requiring relocation. Then a reduction in the probability to switch jobs may prolong inefficient job matches and deprive homeowners of interesting

[2] The effect of homeownership on the probability of being unemployed as well as on wages has been also investigated. See Havet and Penot (2010) for a survey on the effect of homeownership on the labor market. A recent study by Hassink & Meekes (2016) shows that higher levels of negative home equity are related to higher job finding rates, after a worker is displaced due to firm bankruptcy.

[3] For the job transitions they use a binary indicator taking one for flows from unemployment to job and from job to another job, and taking zero for switches from employment to unemployment or out of the labor force, and for individuals maintaining the same job or remaining unemployed.

job opportunities that would have improved the quality of their job match (Munch et al. 2006, 2008).

(ii) home owners with NHE might be less mobile but prone to longer commuting. Indeed, discarding job opportunities in distant areas might be too costly and hence they might be willing to take up new jobs in distant areas as much as above water mortgagers, but without relocation (Kantor et al., 2012).

In conclusion we expect that being under water causes either case (i), or (ii) or a combination of the two cases. We are aware of only one study investigating the impact of NHE on commuting. Using Danish administrative data, Bloze and Skak (2015) find that NHE increases the propensity to commute, especially during a recession period.

3. Data set & descriptive statistics

Our analysis is based on 438,057 individuals followed through the period 2006-2011. This section describes the most important features of the data. The data set is based on the full population of all home owners in the Netherlands who bought a house after 1995.[4]

In total, we merge 17 independent administrative data sets by Statistics Netherlands. These sets contain information on the current job, address, value of the house and household balance sheet information such as income, financial assets and most importantly the mortgage of the house. We further obtain information on the household composition, number of individuals living in the households, the change in household composition such as marriage, divorce or registered partnership.

[4] For a very detailed description of the construction of the data set we refer to van Veldhuizen et al (2016). We use their data set and merge two additional data sets which contain labor market information of each individual: BAANKENMERKENBUS and BAANSOMMENTAB.

We restrict our analysis on a panel of male heads of household over 2006-2011. In order to avoid attrition bias, we consider all individuals who are continuously employed in all years. An individual is defined to be employed in a certain year if he works at least 10 months. Robustness checks with 4 four different employment spells are reported, too.

3.1. Dependent variable

We make use of a unique job identifier on the individual level from Statistics Netherland to identify job-to-job mobility.[5] We construct an indicator variable that takes the value one if a job identifier changes in a given year with respect to the previous year. The job identifier is corrected for the following confounding factors: mergers of companies or switches of a job within a company and renewal of (temporal) contracts at the same company.

3.2. Independent variables

Our data set contains rich information on the balance sheet of a household. We obtain information on the outstanding mortgage and the current value of the house. The outstanding value of the mortgage is extracted from administrative tax records. The value of the dwelling is obtained by making use of the official valuation of property ('woz' – value), which is estimated by the municipality. Each household in the Netherlands receives a letter every year with information on the current value. This is a very appropriate approximation for the actual market value of the house. The ratio of the transaction price and the 'woz'-value in our sample period is 99% (CBS, 2014).[6]

[5] We make use of the variable BAANID which is retrieved form the data set BAANKENMERKENBUS.

[6] We obtain this information from CBS (2014), p.8 table 2.3.2.2. This is the average rate of the yearly average transaction price and the yearly average woz-value in the sample period from 2006-2011. In order to calculate this rate we made use of the reference date in $t+1$ since the value is determined at the 1st of January in each year. Hence the corresponding rate for the year 2006 is the reference date in 2007.

The mortgage loan and the value of the house are used to calculate loan-to-value ratio (LTV's). Individuals are defined to have negative home equity (NHE) if the LTV exceeds 1. To capture the effect of NHE we compare outcomes between underwater mortgagers and mortgagers with LTV less than 100. However, the allocation between the two states may depend upon unobserved heterogeneity. Therefore, we define two different types of underwater mortgagers. More specifically, we distinguish between voluntary and involuntary underwater households. Individuals can self-select into a high LTV ratio by setting a very large value of the mortgage. These individuals can be less mobile than mortgagers with positive home equity (PHE) if they do not plan to sell their house in the foreseeable future. In this case, the straight comparison between underwater mortgagers and those with PHE may simply capture a different propensity in mobility rather than an impact of NHE.

Individuals are defined to have involuntary NHE if they experience a decline in their house value as high as to increase the LTV above 100. In case an individual gets underwater because of a combination of an increase in the mortgage and a reduction of the house price, he is considered to have voluntary NHE if the ratio between the current mortgage and the value of the year before is above 100, too. For individuals who are underwater in the first year of the sample, this distinction cannot be operated. However, if they bought a house in that year and the LTV exceeds the cutoff they are allocated to the category of those with voluntary NHE. Once an individual gets underwater he is defined to be underwater in the same category as long as the LTV remains above 100. If the LTV fluctuates below and above 100, the underwater status is updated according to the rule.

In order to capture the effect of NHE, the relevant comparison is made between mortgagers who are involuntarily underwater and those with PHE. In order to distinguish between voluntary and involuntary underwater mortgagers we include two binary indicators in the

regressions. The indicator of voluntary underwater mortgagers may reflect a lower mobility and hence we may expect that they are less mobile than involuntary underwater mortgagers. However, they might be even more mobile so long as they increase mortgage-related savings in parallel with the increase of the mortgage. In this case individuals may sell their house and buy a new one relatively quickly by using the mortgage-related savings.

Our data also contains a large set of control variables. In particular, we make use of housing tenure in years, household size, disposable real household income, real financial assets, household composition and changes in household composition, year and 40 region indicators (local labor market level 'COROP' regions) as control variables.

3.3. Descriptive statistics

-- Table 1 about here –

Table 1 shows descriptive statistics for each year. The table shows means of the variables and the corresponding standard errors in parentheses below. There are three important take-away messages from the descriptive statistics. First, there is a general decline in job mobility in our sample period. In 2006 about 8.18 percent of the individuals in our sample changed jobs per year, whereas this declined to only 4.39 percent in 2011. The average probability to switch jobs over all years is 5.65 percent. Second, commuting remains constant over our sample period. The average physical commuting distance is about 18 kilometers.

Finally, the most interesting observation can be made with regard to the home equity status of our individuals. In 2006, only 0.24 percent of the households remained involuntarily with negative home equity. This number increased to 9.7 percent in 2011. In the same

period, the number of households which remained with voluntary negative home equity only slightly increased (8.6 percent in 2006 compared to 10.93 percent in 2011).

4. Methodology

In estimating the impact of NHE we should take into consideration that the NHE status can be related to unobserved characteristics that in turn may have an impact on the outcome variable. We tackle this issue by using three devices.

First, we employ a panel fixed effects method to remove the potential endogeneity bias arising from time-constant unobserved heterogeneity. Second, we introduce a set control variables that should allow for time-varying heterogeneity. Third, we split the group of home owners with NHE in the following two groups: mortgagers who fell into NHE (i) because of a house price decline and (ii) because of a voluntary increase in the mortgage loan. In order to capture the impact of NHE, we compare group (i) to home owners with PHE. In this way the assignment to one of the two categories is determined exogenously.

One crucial assumption of our identification is that the change in house prices was random and unexpected. Figure A1 shows the relation between the cumulative percentage change in house prices in the period from 2008-2011 and the average house price per municipality in 2011. The picture that emerges from the figure is that there is no relationship between the average house price on the municipality level and the cumulative decline in house prices in the period from 2008-2011.

Using the sample of all employed homeowners in year t, job-to-job transitions can be modeled by the outcome variable y_{t+1} indicating a change of job in the following year. Hence, the following linear probability model is estimated:

$$y_{it+1} = \alpha_i + \beta \mathbb{1}(InvoluntaryNHE_{it}) + \delta \mathbb{1}(VoluntaryNHE_{it}) + \gamma X_{it} + \epsilon_{it} \quad (1)$$

In equation (1), β is our main coefficient of interest. α_i is an individual fixed effect, which captures all time invariant unobserved individual heterogeneity. The parameter vector γ captures the effects of other observable time varying characteristics which are summarized in the matrix X_{it}. It contains housing tenure, disposable household income and household financial assets. We also include indicator variables for the partnership status, marriage status, divorce and indicator variables for the household size.

Regional labor market development and general economic conditions can influence job mobility. A potential problem arises when regional house prices changes, which lead to a change in loan-to-value ratios, go along with regional labor market labor market conditions. If we do not control for these factors our estimate of NHE can be biased. We address this potential problem in two ways. First, we include year dummies and region dummies. These region dummies are on the level of the local labor market ('COROP' regions). We also include region dummies interacted with year dummies in order to control for potential local labor market shocks which can vary over time. ϵ_{it} is an error term with the usual assumptions.

5. Results

5.1. Negative Home Equity and Job-to-Job Mobility

In a first step we analyze the effect of NHE on job-to-job mobility. Estimates of parameters in equation (1) are reported in Table 2. Coefficients in Table 2 have to be interpreted in terms of percentage point changes of the probability to switch jobs in the subsequent year.

-- Table 2 about here --

Columns (1) reports the results of our baseline specification. This specification contains year dummies and dummies for housing tenure. We define two dummy variables which capture the home equity status of the household. The first takes the value one for mortgagers who are underwater because of a decline in the house price. They are considered to be involuntarily underwater. This is our main variable of interest. A second dummy takes the value one if mortgagers are underwater because they deliberately chose a high LTV either from the very beginning of home purchase or due to an increase in the mortgage. They are considered to be voluntarily underwater. The baseline category describes the situation in which a household has PHE.

Column (1) shows that NHE reduces the probability to switch jobs in the following year by 0.339 percentage points.[7] Our results remain nearly unchanged when we add further control variables. In column (2) we control for disposable household income, financial assets and the household size.[8] The estimates of household income show a negative association between higher household incomes on the household level and the propensity to switch a job in the consecutive year. Higher financials assets are slightly negatively associated with job mobility. Despite the fact that most of them are statistically significant, the relative and absolute effects remain small.

Our results do not change if we add further controls for the change in household composition in column (3). This is important since events such as divorce and marriage can also influence labor market mobility. We add three indicator variables which capture the household composition and changes in the household composition. We include a dummy variable which takes the value one if a household is living in a registered

[7] The average probability to switch jobs for this group is 7.1% compared to an overall probability of 5.65%.
[8] All financial variables are deflated in 2011 Euros.

partnership or marriage. The other two indicator variables take the value one if an individual is divorced in year t or is going to divorce in the following year.

Our results also remain unchanged if we control for local labor market conditions. Since job mobility patterns can differ between different labor markets we add control variables for local labor market conditions. In order to control for these conditions we add dummies for each local labor market ('COROP'-area) and dummies for each region interacted with the year in columns (4)-(6).

Column (4) contains the same control variables as column (1). In the following we subsequently add the same control variables from columns (2) and (3). All regressions reveal point estimates which are very similar to the initial specification in column (1). Column (6) shows that plunging into NHE is associated with a 0.295 percentage point decrease in the probability to switch jobs. Since the average probability to switch jobs across all years is 5.65 percent, this boils down to a relative effect of about 5.2% ($\frac{0.00295}{0.0565} * 100$).

Table 2 also shows no relationship between voluntarily chosen NHE and job to job mobility. All coefficients in columns (1) to (6) are not statistically significantly different from zero.

5.2. Exploring mechanisms: Negative Home Equity and Commuting

We find that NHE reduces the probability of a job switch, although the effect is small. This is consistent with previous evidence for the Netherlands showing that NHE has moderate negative effect on residential mobility. A small negative effect on job transitions might come along with a positive effect on commuting. That is homeowners with NHE might be

as much willing to take up new jobs in distant area as much homeowners with PHE, but they might be prone to longer commuting.

We use two different measures for commuting reflecting the extensive and intensive margins. The Netherlands is divided into 40 different local labor markets ('COROP'-areas) according to Statistics Netherlands. At the extensive margin, we construct a binary indicator capturing whether the region where an individual lives coincides with the local labor market (COROP-areas) where the individual works.

At the intensive margin, we define commuting as the distance in kilometers between the municipalities where the individual is living and working. More specifically, we take the logarithm of the commuting distance between the municipality of the home and the municipality of the job location in kilometers. This is the distance between the center of the municipality where and individual is living and the center of the municipality where a company is located.[9]

In a first step we estimate the *extensive margin*, namely the probability to commute between (local) labor markets. This variable takes the value one if the job location is in a different local labor market than an individual's home address. In a second step we also estimate the *intensive margin* in terms of the commuting distance in kilometers between the municipality of an individual's home and an individual's workplace.

5.2.1. Extensive margin

Table 3 reports the results on the propensity to commute. We estimate similar panel data fixed effects models as for job-to-job mobility. The regression results in Table 3 reveal no relation between the probability to commute and the home equity status of a household.

[9] Statistics Netherlands provides the coordinates of these centered points.

The coefficient in column (1) of our indicator variable "Involuntary NHE" is not statistically significant. Next to that, the point estimate is 0.163 percentage points which seems also economically negligible if we compare this with the average sample probability to commute between municipalities which is 37.47 percent.

The results do not change if we add further controls in columns (2) and (3). We find positive and highly significant associations between the propensity to commute and household wealth. Higher levels of household income and higher levels of financial assets go along with a higher propensity to commute. Households with an income above 40,000 Euros per year are 1.6 percentage points more likely to commute than households with an income smaller or equal to 20,000 Euros. The point estimates of the home equity status remain insignificant, also if we control for local labor market conditions in columns (4) - (6). The results of the control variables remain unchanged and show that households with higher incomes and more financial assets are more likely to commute. We find no association between commuting and the cohabiting status of a household.

-- Table 3 about here ---

5.2.2. Intensive margin

In a next step we investigate the relationship between the home equity status and commuting on the intensive margin. Table 4 reports estimates of panel regressions. In all columns, the coefficient of our variable of interest is statistically not different from zero, therefore we do not find any relation between involuntary NHE and the commuting distance. The results from our control variables are consistent with what we find on the propensity to commute. We find that higher household income and greater financial assets are also positively associated with longer commuting distances.

-- Table 4 about here ---

5.3. Robustness

5.3.1. Net Financial Assets

A potential critique of our previous estimations can be that we do not take into account the full set of assets on a household's balance sheet. A household can still compensate potential equity losses on its home with bank savings or by selling other liquid assets. The underlying idea is that by calculating the actual net wealth of a household we are able to create a proxy for the ability to provide a down-payment or to pay the costs of moving. Therefore, we calculate the net financial asset position of the household:

$$Net\ Financial\ Assets = (Value\ of\ the\ dwelling) - mortgage + (financial\ assets) \quad (2)$$

The value of the dwelling is used by taking the official valuation of property ('woz-value') which is calculated by the municipality. We use the value of the outstanding mortgage and the amount of financial assets. The variable 'financial assets' includes bank savings, as well stock and bond holdings on the household level.

We create four categories of this variable which are de facto dummy variables for each of the four scenarios. The first category, which is our baseline category, is the one in which both net financial assets are positive and the LTV is smaller than 100. In the second category the LTV is smaller than 100, but financial assets are below 0. This means that a household has PHE but higher household debts which exceed the overvalue of the house. This can for instance be the result of high consumer credits on a bank account. In the third category net financial assets are above zero and the LTV is above 100. This implies that a household is underwater in terms of home equity but has still enough financial assets to

compensate the NHE. This can for instance be in the case of high savings or high stockholdings of one of the household members. In the fourth category the LTV is above 100 and net financial assets are below zero. This means that a household has NHE and not enough savings or other financial assets to compensate the NHE.

In order to estimate the impact of net financial assets on job-to-job mobility we estimate the following augmented model of equation (1):

$$y_{it+1} = \alpha_i + \sum_{c=1}^{4} \beta \, NetFinancialAssets_{cit} + \gamma X_{it} + \epsilon_{it} \quad (3)$$

The first three columns of Table 5 show the results for the whole sample. We find a significant and negative association between job mobility and a LTV greater or equal than 100 in combination with negative and positive net financial assets. If a household is underwater but still remains with positive net financial assets the probability to switch jobs in the next year declines by about 0.233 percentage points (column 1).

The effect is twice as large for households who are 'underwater' and also have negative net financial assets. The probability to switch jobs, if a household has negative home equity and has no other financial assets to compensate it, declines by 0.432 percentage points (column 1). The results remain stable if we add controls for household income, financial assets and household composition in columns (2) and (3).

We check if our estimation results still hold, if we restrict our sample only to involuntary increases in LTV. Note that in column (1) to (3), changes in the LTV and Net Financial Assets also stem from endogenous increases in mortgages. We therefore drop these households in columns (4) - (6).

The picture that emerges from columns (4) to (6) is that NHE is the key driver in decreasing the propensity to switch jobs. Households with a LTV above 100 and an overall positive net financial asset position have 0.555 percentage point decrease to switch jobs.

The effect is marginally stronger for individuals with both NHE and a negative net financial asset position. Their probability to switch jobs decreases by about 0.617 percentage points. The results remain stable if we add further controls in columns (5) and (6).

-- Table 5 about here --

5.3.2. Does the choice of the employment length matter?

We make a selection with regard to our sample when it comes to the length of employment. Our main analysis focusses on an employment spell of at least 10 months in each year. One important question is hence to check if our results change if we allow longer or shorter employment spells.

In order to address this question we conduct the same analysis with samples of different employment spells. We look at spells of 8, 9, 11 and 12 months of employment in each year. In the following, we run the same analysis as in Table 2.

Our analysis reveals that the choice of the length of the employment spell does not influence our main result. Figure 1 shows the point estimates with 95% confidence bounds of our key coefficient of interest. The x-axis shows the respective length of employment in each year. Regardless of the choice of employment spell we find a statistically significant and negative association between plunging into NHE and the propensity to switch jobs. The figure also shows that these point estimates are not statistically significantly different. NHE is associated with a moderate decrease in job-to-job mobility. Please note that the full set of regression results of this robustness check is provided in Tables A1-A4 in the appendix.

5.3.3. How unexpected was the shock? – Evidence from 2006-2009

One assumption of our empirical methodology is that the house prices changes are unexpected. Since this assumption is most likely to hold in the years immediately after the crisis we conduct an additional set of regressions only for the time period from 2006-2009. We conduct the same regressions as for our main analysis in Table 2. Table 6 shows the outcome of these regressions. Column (1) shows a point estimate of -0.0037 of involuntary NHE on job-to-job mobility. Note that the coefficient in Table 2 of this regression is -0.00386. The key message from Table 6 is that our main results from Table 2 do not change significantly. We still find a statistically significant negative relationship between involuntary NHE and job-to-job mobility. However, we lose some statistical power due to the shorter time span of our panel and fewer within household variation in house prices.

-- Table 6 about here --

6. Conclusion

In this paper we investigate the effect of negative home equity status on job-to-job mobility. We make use of a Dutch administrative panel data set of home owners in the period from 2006-2011. Our analysis reveals a small negative effect of negative home-equity (NHE) on job-to-job mobility. Households who plunge involuntarily into NHE due to unanticipated falling house prices are 5.2% less likely to switch jobs compared to households remaining with positive home equity. We find no relationship between voluntarily chosen NHE and job-to-job mobility.

The effect sizes are relatively small, especially when we compare this to effect sizes of household residential mobility. We therefore investigate whether households who plunge into negative home equity compensate their immobility with longer commuting. Our

findings show that households who plunge involuntarily into negative home equity are not more likely to commute compared to households remaining with positive home equity.

We think that there are four main reasons why the effects are that small. First, individuals might already move to regions where they know that it easier to switch jobs. The metropolitan region 'Randstad' covers the four biggest cities of the country: Amsterdam, Rotterdam, the Hague and Utrecht. In this region the infrastructure is such that individuals do not have to move when they switch jobs.

Second, the institutional setup such as the National Mortgage Insurance Scheme covers the mortgage payments in case of default due to involuntary unemployment. This mitigates the potential risks which go along with switching jobs when being a home owner.

A third reason might be that in the Netherlands, high levels of mortgage debt do not go along with weak borrower characteristics or higher default probabilities (Mocking and Overvest, 2015). This is one of the key differences to the US or other countries, where high levels of mortgage debt often went along with weaker borrower characteristics, such as low income, low socioeconomic background or lower education levels. When the housing market collapsed many of these 'subprime' mortgages defaulted, also because many of the mortgagers became unemployed due to their weak positions on the labor market.

A fourth important factor is the type of employment contract of the homeowner. Homeowners with a permanent contract have a better bargaining position than homeowners with a temporary contract. The homeowners with a permanent contract might therefore negotiate to get a permanent contract at their new job or a higher salary, which in turn makes it more attractive for these homeowners to accept a new job. If homeowners with a permanent contract are still relatively immobile in terms of job switches, then this is only a problem if homeowners with a permanent contract are more (or less) likely to move

into NHE, which is unlikely given that the shock in house prices is random. However, the effect of NHE on job switches might be different for homeowners with permanent or temporary contracts. Unfortunately, our data does not allow us to distinguish between these groups. Therefore, we find an average effect. The effect for one of the subgroups might be larger (smaller).

For policy-makers our findings show that the direct impact of negative home equity on labor mobility seems to be moderate in the case of the Netherlands. This can be due to the existing institutional framework and the size of the country, which mitigate job switches for home owners. However, whether this is indeed the case creates interesting and important avenues for further research.

7. References

Andersson, Fredrik, and Tom Mayock. 2014. "How Does Home Equity Affect Mobility?" *Journal of Urban Economics* 84 (November): 23–39.

Battu, Harminder, Ada Ma, and Euan Phimister. 2008. "Housing Tenure, Job Mobility and Unemployment in the UK." *The Economic Journal* 118 (527): 311–28.

Blanchflower, David G., and Andrew J. Oswald. 2013. "Does High Home-Ownership Impair the Labor Market?" Working Paper 19079. National Bureau of Economic Research.

Bloze, Gintautas, and Morten Skak. 2015. "Housing Equity, Residential Mobility and Commuting." *Discussion Papers on Business and Economics, University of Southern Denmark* 16.

Bover, Olympia, John Muellbauer, and Anthony Murphy. 1989. "Housing, Wages and Uk Labour Markets." *Oxford Bulletin of Economics and Statistics* 51 (2): 97–136.

Bricker, Jesse, and Brian Bucks. 2016. "Negative Home Equity, Economic Insecurity, and Household Mobility over the Great Recession." *Journal of Urban Economics* 91 (January): 1–12.

Brunet, Carole, Andrew E. Clark, and Jean-Yves Lesueur. 2007. "Statut résidentiel et durée de chômage en France et au Royaume-Uni." *Revue Française d'Economie* 22 (2): 165–90.

CBS. 2014. "Prijsindex Bestaande Koopwoningen - Methodebeschrijving." Centraal Bureau voor Statistiek.

Chan, Sewin. 2001. "Spatial Lock-in: Do Falling House Prices Constrain Residential Mobility?" *Journal of Urban Economics* 49 (3): 567–86.

Coulson, N. Edward, and Paul L. E. Grieco. 2013. "Mobility and Mortgages: Evidence from the PSID." *Regional Science and Urban Economics* 43 (1): 1–7.

Cunningham, Christopher R., and Gary V. Engelhardt. 2008. “Housing Capital-Gains Taxation and Homeowner Mobility: Evidence from the Taxpayer Relief Act of 1997.” *Journal of Urban Economics* 63 (3): 803–15.

De Graaff, Thomas, Michiel Van Leuvensteijn, and Casper Van Ewijk. 2009. “Homeownership, Social Renting and Labor Mobility Accross Europe.” *Homeownership and the Labour Market in Europe*, 53–81.

Donovan, Colleen, and Calvin Schnure. 2011. “Locked in the House: Do Underwater Mortgages Reduce Labor Market Mobility?,” May. doi:10.2139/ssrn.1856073.

Engelhardt, Gary V. 2003. “Nominal Loss Aversion, Housing Equity Constraints, and Household Mobility: Evidence from the United States.” *Journal of Urban Economics* 53 (1): 171–95.

Ferreira, Fernando, Joseph Gyourko, and Joseph Tracy. 2010. “Housing Busts and Household Mobility.” *Journal of Urban Economics* 68 (1): 34–45.

Flatau, Paul, Matt Forbes, and Patric H. Hendershott. 2003. “Homeownership and Unemployment: The Roles of Leverage and Public Housing.” w10021. National Bureau of Economic Research. http://www.nber.org/papers/w10021.

Genesove, David, and Christopher Mayer. 2001. “Loss Aversion and Seller Behavior: Evidence from the Housing Market.” *The Quarterly Journal of Economics* 116 (4): 1233–60.

Goss, Ernest P., and Joseph M. Phillips. 1997. “The Impact of Home Ownership on the Duration of Unemployment.” *Review of Regional Studies*.

Graaff, Thomas De, and Michiel Van Leuvensteijn. 2013. “A European Cross-Country Comparison of the Impact of Homeownership and Transaction Costs on Job Tenure.” *Regional Studies* 47 (9): 1443–61.

Hassink, Wolter & Meekes, Jordy. 2016. " The role of the housing market in workers’ resilience to job displacement after firm bankruptcy" *Utrecht School of Economics Discussion Paper.*

Havet, Nathalie, and Alexis Penot. 2010. “Does Homeownership Harm Labour Market Performances? A Survey,” May. doi:10.2139/ssrn.1625248.

Henley, Andrew. 1998. “Residential Mobility, Housing Equity and the Labour Market.” *The Economic Journal* 108 (447): 414–27.

Hughes, Gordon, Barry McCormick, and Barry McCormick. 1987. “Housing Markets, Unemployment and Labour Market Flexibility in the UK.” *European Economic Review* 31 (3): 615–41.

Kantor, Yuval, Peter Nijkamp, and Jan Rouwendal. 2012. “Homeownership, Unemployment and Commuting Distances,” February. doi:10.2139/ssrn.2327010.

Katz, Lawrence. 2014. “Long-Term Unemployment in the Great Recession.” *Mimeo, Harvard University.*.

Krugman, Paul “Beveridge Worries - The New York Times.” 2010. Accessed December 7 2016. http://krugman.blogs.nytimes.com/2010/07/29/beveridge-worries/?_r=0.

Laamanen, Jani-Petri. 2013. “Home-Ownership and the Labour Market: Evidence from Rental Housing Market Deregulation.” *Tampere Economic Working Papers Net Series : 89/2013*.

Leuvensteijn, Michiel van, and Pierre Koning. 2004. “The Effect of Home-Ownership on Labor Mobility in the Netherlands.” *Journal of Urban Economics* 55 (3): 580–96.

McCormick, Barry. 1983. “Housing and Unemployment in Great Britain.” *Oxford Economic Papers* 35: 283–305.

Mocking, Remco, and Bastiaan Overvest. 2015. “Estimating the Impact of Forced Sales on House Prices.” CPB Discussion Paper. CPB Netherlands Bureau for Economic Policy Analysis. http://econpapers.repec.org/paper/cpbdiscus/304.htm.

Modestino, Alicia Sasser, and Julia Dennett. 2013. “Are American Homeowners Locked into Their Houses? The Impact of Housing Market Conditions on State-to-State Migration.” *Regional Science and Urban Economics* 43 (2): 322–37.

Morescalchi, Andrea. 2016. “The Puzzle of Job Search and Housing Tenure: A Reconciliation of Theory and Empirical Evidence.” *Journal of Regional Science* 56 (2): 288–312. doi:10.1111/jors.12240.

Mumford, Kevin J., and Katie Schultz. 2014. “The Effect of Underwater Mortgages on Unemployment.” *Mimeo, Columbia University*. http://www.krannert.purdue.edu/faculty/kjmumfor/papers/Underwater_and_Unemploy ed.pdf.

Munch, Jakob Roland, Michael Rosholm, and Michael Svarer. 2006. “Are Homeowners Really More Unemployed?*.” *The Economic Journal* 116 (514): 991–1013.

———. 2008. “Home Ownership, Job Duration, and Wages.” *Journal of Urban Economics* 63 (1): 130–45.

Oswald, Andrew J. 1996. “A Conjecture on the Explanation for High Unemployment in the Industrialized Nations: Part 1.” Discussion Paper.

———. 1997. "Thoughts on NAIRU." *Journal of Economic Perspectives*, 11, 227–228.

———. 1999. “The Housing Market and Europe’s Unemployment: A Non-Technical Paper.” *Homeownership and the Labour Market in Europe*.

Rouwendal, Jan, and Peter Nijkamp. 2010. “Homeownership and Labour-Market Behaviour: Interpreting the Evidence.” *Environment and Planning A* 42 (2): 419–33. doi:10.1068/a41343.

Schulhofer-Wohl, Sam. 2011. “Negative Equity Does Not Reduce Homeowners’ Mobility.” Working Paper 16701. National Bureau of Economic Research. http://www.nber.org/papers/w16701.

Stein, Jeremy C. 1995. “Prices and Trading Volume in the Housing Market: A Model with Down-Payment Effects.” *The Quarterly Journal of Economics* 110 (2): 379–406. doi:10.2307/2118444.

Stiglitz, Joseph E. 2009. “The Challenge of Creating Jobs in the Aftermatch of the‘ Great Recession.’” *Testimony before the Joint Economic Committee, Washington, DC, December* 10.

van Vuuren, Aico. 2009. “The Impact of Homeownership on Unemployment in the Netherlands.” In *Homeownership and the Labour Market in Europe*, 113–36. OUP Oxford.

Veldhuizen, Sander van, Benedikt Vogt, and Bart Voogt. 2016. “Negative Home Equity and Household Mobility: Evidence from Administrative Data.” CPB Discussion Paper 323. CPB Netherlands Bureau for Economic Policy Analysis. https://ideas.repec.org/p/cpb/discus/323.html.

Table 1: Descriptive Statistics

Variable/Year	2006	2007	2008	2009	2010	2011
Job Mobility	0.0818	0.0710	0.0501	0.0424	0.0498	0.0439
	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Propensity to commute	0.37530	0.37402	0.37127	0.37410	0.37650	0.37723
	(0.4842)	(0.4839)	(0.4831)	(0.4839)	(0.4845)	(0.4847)
Commuting distance (km)	18.15	18.43	18.02	18.30	18.38	18.20
	(0.0393)	(0.0408)	(0.0394)	(0.0402)	(0.0401)	(0.0394)
Positive home equity (PHE)	0.9112	0.9115	0.8990	0.8707	0.8400	0.7937
	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0006)	(0.0006)
Involuntary negative home equity (NHE)	0.0024	0.0062	0.0139	0.0358	0.0587	0.0970
	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0004)
Voluntary NHE	0.0863	0.0823	0.0871	0.0935	0.1013	0.1093
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Disposable HH income	39,614.36	41,743.57	42,503.12	43,716.86	43,584.43	43,579.76
	(25.4599)	(28.6924)	(28.6641)	(28.6754)	(28.8234)	(29.2537)
Financial assets	49,149.03	52,177.69	49,252.97	54,359.46	54,927.94	58,109.38
	(246.4086)	(257.5025)	(393.0074)	(431.23)	(283.5162)	(452.015)
Mortgage	174,023.42	175,338.66	174,457.44	174,089	172,893.34	168,693.03
	(134.4507)	(136.0783)	(136.9659)	(137.5357)	(137.703)	(137.3129)
House price	273,946.16	279,334.03	274,831.19	265,920.97	256,977.13	242,236.55
	(173.1247)	(177.928)	(175.7459)	(169.3979)	(162.8502)	(154.1337)
Loan age	5.58	6.41	7.25	8.15	9.06	9.98
	(0.0051)	(0.0052)	(0.0054)	(0.0056)	(0.0057)	(0.0059)
Married	0.7054	0.7163	0.7251	0.7313	0.7357	0.7380
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Partner	0.1820	0.1715	0.1626	0.1552	0.1487	0.1438
	(0.0006)	(0.0006)	(0.0006)	(0.0005)	(0.0005)	(0.0005)
# children	1.29	1.32	1.35	1.36	1.37	1.36
	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Household size	3.20	3.23	3.25	3.27	3.27	3.26
	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)
Age	40.88	41.88	42.88	43.88	44.88	45.88
	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)	(0.0117)
Divorce	0.0050	0.0057	0.0059	0.0061	0.0065	0.0066
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
N			438,057			

Notes. The table shows means and standard errors (in parentheses) for each year of the panel of all variables which we use in our analysis. "Job mobility" indicates the fraction of household heads which switch jobs in a subsequent year. "Commuting distance" is defined as the distance between the center of the municipality where the job is located and the center of the municipality where an individual's home is located. "Positive home equity (PHE)" shows the fraction of households who have a loan to value ratio lower than 100%. The variable "Involuntarily underwater" shows the fraction of households who fell into negative home equity (NHE) due to a fall in the house price. "Voluntarily underwater" shows the fraction of households who have NHE due to an increase in the mortgage. All monetary variables such as disposable household (HH) income, financial assets, mortgage and house price are transferred transformed to 2011 Euros. "Loan age" indicates the years an individual is living in the current house. "Married" and "Partner" are dummy variables which take the value one if an individual is married or in a registered partnership.

Table 2: Determinants of job-to-job mobility

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	-0.00339**	-0.00294**	-0.00290*	-0.00345**	-0.00299**	-0.00295**
	(0.00112)	(0.00112)	(0.00112)	(0.00113)	(0.00113)	(0.00113)
Voluntary NHE	-0.00235	-0.00221	-0.00219	-0.00246	-0.00231	-0.00229
	(0.00138)	(0.00138)	(0.00138)	(0.00138)	(0.00138)	(0.00138)
HH income>20000 & HH income<=30000		-0.00929**	-0.00948**		-0.00936**	-0.00955**
		(0.00161)	(0.00161)		(0.00161)	(0.00161)
HH income>30000 & HH income<=40000		-0.0143**	-0.0146**		-0.0144**	-0.0147**
		(0.00173)	(0.00173)		(0.00173)	(0.00173)
HH income>40000 & HH income<=50000		-0.0186**	-0.0189**		-0.0188**	-0.0190**
		(0.00183)	(0.00183)		(0.00183)	(0.00183)
HH income>50000		-0.0215**	-0.0218**		-0.0215**	-0.0218**
		(0.00193)	(0.00193)		(0.00193)	(0.00193)
Financial assets>10000 & Financial assets<=20000		-0.000761	-0.000802		-0.000721	-0.000762
		(0.000632)	(0.000632)		(0.000632)	(0.000632)
Financial assets>20000 & Financial assets<=30000		-0.00164*	-0.00169*		-0.00158*	-0.00164*
		(0.000792)	(0.000792)		(0.000792)	(0.000793)
Financial assets>30000 & Financial assets<=40000		-0.00239**	-0.00248**		-0.00235*	-0.00244**
		(0.000926)	(0.000926)		(0.000926)	(0.000926)
Financial assets>40000		-0.00186*	-0.00196*		-0.00180	-0.00191*
		(0.000936)	(0.000937)		(0.000936)	(0.000937)
Divorced			-0.00946**			-0.00940**
			(0.00193)			(0.00193)
Partner/Married			0.00630**			0.00625**
			(0.00140)			(0.00140)
Will divorce			-0.00398*			-0.00398*
			(0.00181)			(0.00181)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,628,342			
Number of individuals			438,057			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual switches jobs in the subsequent year All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred to 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Table 3: Extensive margin – propensity to commute between local labor markets

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	0.00163	0.00171	0.00169	0.00146	0.00154	0.00153
	(0.00130)	(0.00130)	(0.00130)	(0.00130)	(0.00130)	(0.00130)
Voluntary NHE	0.00171	0.00180	0.00178	0.000529	0.000637	0.000620
	(0.00162)	(0.00162)	(0.00162)	(0.00160)	(0.00160)	(0.00160)
HH income>20000 & HH income<=30000		0.00748**	0.00751**		0.00767**	0.00769**
		(0.00162)	(0.00163)		(0.00162)	(0.00162)
HH income>30000 & HH income<=40000		0.0119**	0.0120**		0.0122**	0.0122**
		(0.00178)	(0.00178)		(0.00177)	(0.00177)
HH income>40000 & HH income<=50000		0.0160**	0.0161**		0.0165***	0.0165**
		(0.00190)	(0.00190)		(0.00189)	(0.00189)
HH income>50000		0.0184**	0.0185**		0.0189**	0.0189**
		(0.00204)	(0.00204)		(0.00203)	(0.00203)
Financial assets>10000 & Financial assets<=20000		7.49e-05	7.82e-05		3.25e-05	3.37e-05
		(0.000666)	(0.000666)		(0.000664)	(0.000664)
Financial assets>20000 & Financial assets<=30000		0.000722	0.000726		0.000700	0.000701
		(0.000872)	(0.000873)		(0.000870)	(0.000871)
Financial assets>30000 & Financial assets<=40000		0.00384**	0.00385**		0.00386**	0.00386**
		(0.00104)	(0.00104)		(0.00104)	(0.00104)
Financial assets>40000		0.00283**	0.00284**		0.00280**	0.00280**
		(0.00108)	(0.00108)		(0.00108)	(0.00108)
Divorced			0.000818			0.000481
			(0.00213)			(0.00212)
Partner/Married			-0.000831			-0.000559
			(0.00157)			(0.00156)
Will divorce			-0.00143			-0.00190
			(0.00202)			(0.00201)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,628,342			
Number of individuals			438,057			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual commutes between different labor local markets (COROP areas). All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred to 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Table 4: Intensive margin - commuting distance

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	0.000987	0.00124	0.00121	0.00161	0.00188	0.00185
	(0.00395)	(0.00395)	(0.00395)	(0.00395)	(0.00395)	(0.00395)
Voluntary NHE	0.0122*	0.0126*	0.0125*	0.00988*	0.0103*	0.0102*
	(0.00505)	(0.00505)	(0.00505)	(0.00502)	(0.00502)	(0.00502)
HH income>20000 & HH income<=30000		0.0193**	0.0194**		0.0198**	0.0199**
		(0.00526)	(0.00526)		(0.00524)	(0.00525)
HH income>30000 & HH income<=40000		0.0366**	0.0368**		0.0375**	0.0376**
		(0.00569)	(0.00569)		(0.00568)	(0.00568)
HH income>40000 & HH income<=50000		0.0520**	0.0522**		0.0534**	0.0535**
		(0.00604)	(0.00604)		(0.00603)	(0.00603)
HH income>50000		0.0632**	0.0633**		0.0645**	0.0647**
		(0.00642)	(0.00642)		(0.00641)	(0.00641)
Financial assets>10000 & Financial assets<=20000		0.000515	0.000520		0.000300	0.000301
		(0.00206)	(0.00206)		(0.00205)	(0.00205)
Financial assets>20000 & Financial assets<=30000		0.00199	0.00199		0.00183	0.00182
		(0.00266)	(0.00266)		(0.00265)	(0.00265)
Financial assets>30000 & Financial assets<=40000		0.00666*	0.00667*		0.00666*	0.00667*
		(0.00315)	(0.00315)		(0.00314)	(0.00315)
Financial assets>40000		0.00796*	0.00797*		0.00766*	0.00766*
		(0.00328)	(0.00329)		(0.00328)	(0.00328)
Divorced			0.00273			0.00207
			(0.00649)			(0.00647)
Partner/Married			-0.00158			-0.00113
			(0.00486)			(0.00484)
Will divorce			-0.00469			-0.00598
			(0.00610)			(0.00608)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,628,342			
Number of individuals			438,057			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable is logarithm (+1) of the commuting distance between the municipality of the home and the work of an individual. All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred into 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Table 5: Job- to Job Mobility and Net Financial Assets

	(1)	(2)	(3)	(4)	(5)	(6)
LTV<100 & Assets>=0		*Reference category*			*Reference category*	
Net Financial Assets = 2, LTV<100 & Assets<0	-0.00318	-0.00396	-0.00405	-0.00108	-0.00135	-0.00141
	(0.00592)	(0.00593)	(0.00593)	(0.00620)	(0.00621)	(0.00621)
Net Financial Assets = 3, LTV>=100 & Assets>=0	-0.00233*	-0.00182	-0.00182	-0.00555**	-0.00500**	-0.00496**
	(0.00104)	(0.00104)	(0.00104)	(0.00137)	(0.00137)	(0.00137)
Net Financial Assets = 4, LTV>=100 & Assets<0	-0.00432**	-0.00429**	-0.00421**	-0.00617**	-0.00593**	-0.00588**
	(0.00119)	(0.00119)	(0.00119)	(0.00200)	(0.00200)	(0.00200)
HH income>20000 & HH income<=30000		-0.00937**	-0.00956**		-0.00910**	-0.00925**
		(0.00161)	(0.00161)		(0.00176)	(0.00176)
HH income>30000 & HH income<=40000		-0.0144**	-0.0147**		-0.0140**	-0.0142**
		(0.00173)	(0.00173)		(0.00189)	(0.00189)
HH income>40000 & HH income<=50000		-0.0188**	-0.0191**		-0.0181**	-0.0184**
		(0.00182)	(0.00183)		(0.00199)	(0.00199)
HH income>50000		-0.0216**	-0.0219**		-0.0206**	-0.0208**
		(0.00193)	(0.00193)		(0.00209)	(0.00210)
Financial assets>10000 & Financial assets<=20000		-0.000823	-0.000862		-0.000312	-0.000334
		(0.000633)	(0.000633)		(0.000675)	(0.000675)
Financial assets>20000 & Financial assets<=30000		-0.00175*	-0.00180*		-0.000436	-0.000465
		(0.000796)	(0.000796)		(0.000842)	(0.000842)
Financial assets>30000 & Financial assets<=40000		-0.00256**	-0.00264**		-0.00167	-0.00172
		(0.000930)	(0.000930)		(0.000977)	(0.000978)
Financial assets>40000		-0.00205*	-0.00215*		-0.000510	-0.000570
		(0.000942)	(0.000942)		(0.000991)	(0.000991)
Divorced			-0.00940**			-0.00859**
			(0.00193)			(0.00211)
Partner/Married			0.00621**			0.00422**
			(0.00140)			(0.00160)
Will divorce			-0.00400*			-0.00278
			(0.00181)			(0.00197)
Full set of other controls	YES	YES	YES	YES	YES	YES
Observations		2,628,342			2,253,222	
Number of individuals		438,057			375,537	

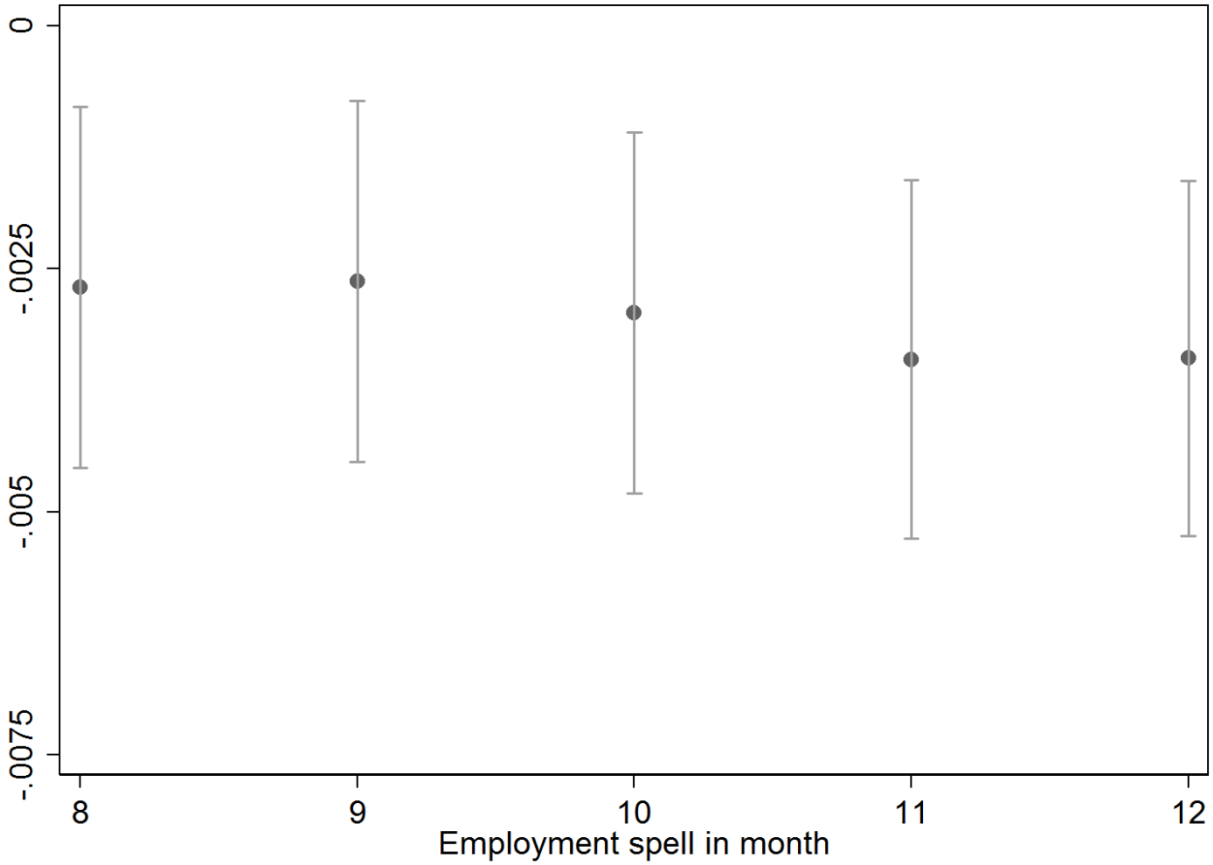
Notes. The table shows regression results of a linear fixed effects regression. The dependent variable takes the value 1 if an individual switches jobs in the following period. The panel is balanced. All regressions contain year fixed effects, controls for housing tenure, local labor market dummies and local labor market dummies interacted with each year. The variables household (HH) income and financial assets are transferred into 2011 Euros. "Other controls" contain dummy variables for the household size. The regressions in columns (4) – (6) are restricted to the sample of those individuals who experienced an increase in their LTV only due to a decrease in house price. Standard errors are clustered on the individual level. *p<0.05 , **p<0.01.

Table 6: Determinants of job-to-job mobility for the period from 2006-2009

	(1)	(2)	(3)	(4)	(5)	(6)
Above water			*Reference category*			
Involuntarily under water	-0.00370*	-0.00325	-0.00319	-0.00381*	-0.00335	-0.00330
	(0.00216)	(0.00216)	(0.00216)	(0.00216)	(0.00216)	(0.00216)
Voluntarily under water	0.000786	0.000633	0.000637	0.000770	0.000623	0.000626
	(0.00186)	(0.00186)	(0.00186)	(0.00186)	(0.00186)	(0.00186)
HH income>20000 & HH income<=30000		-0.0119***	-0.0121***		-0.0120***	-0.0122***
		(0.00214)	(0.00214)		(0.00214)	(0.00214)
HH income>30000 & HH income<=40000		-0.0194***	-0.0196***		-0.0195***	-0.0198***
		(0.00231)	(0.00231)		(0.00231)	(0.00231)
HH income>40000 & HH income<=50000		-0.0262***	-0.0265***		-0.0264***	-0.0266***
		(0.00245)	(0.00245)		(0.00245)	(0.00245)
HH income>50000		-0.0312***	-0.0314***		-0.0313***	-0.0315***
		(0.00261)	(0.00261)		(0.00261)	(0.00261)
Financial assets>10000 & Financial assets<=20000		-0.000752	-0.000797		-0.000721	-0.000765
		(0.000854)	(0.000854)		(0.000854)	(0.000854)
Financial assets>20000 & Financial assets<=30000		-0.00136	-0.00142		-0.00133	-0.00138
		(0.00109)	(0.00109)		(0.00109)	(0.00109)
Financial assets>30000 & Financial assets<=40000		-0.00338***	-0.00347***		-0.00334***	-0.00342***
		(0.00128)	(0.00128)		(0.00128)	(0.00128)
Financial assets>40000		-0.00226*	-0.00235*		-0.00223*	-0.00232*
		(0.00132)	(0.00132)		(0.00132)	(0.00132)
Divorced			-0.00933***			-0.00919***
			(0.00271)			(0.00270)
Partner			0.00629***			0.00620***
			(0.00196)			(0.00196)
Will divorce			-0.00323			-0.00316
			(0.00260)			(0.00260)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			1,752,228			
Number of individuals			438,057			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual switches jobs in the subsequent year. All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred into 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

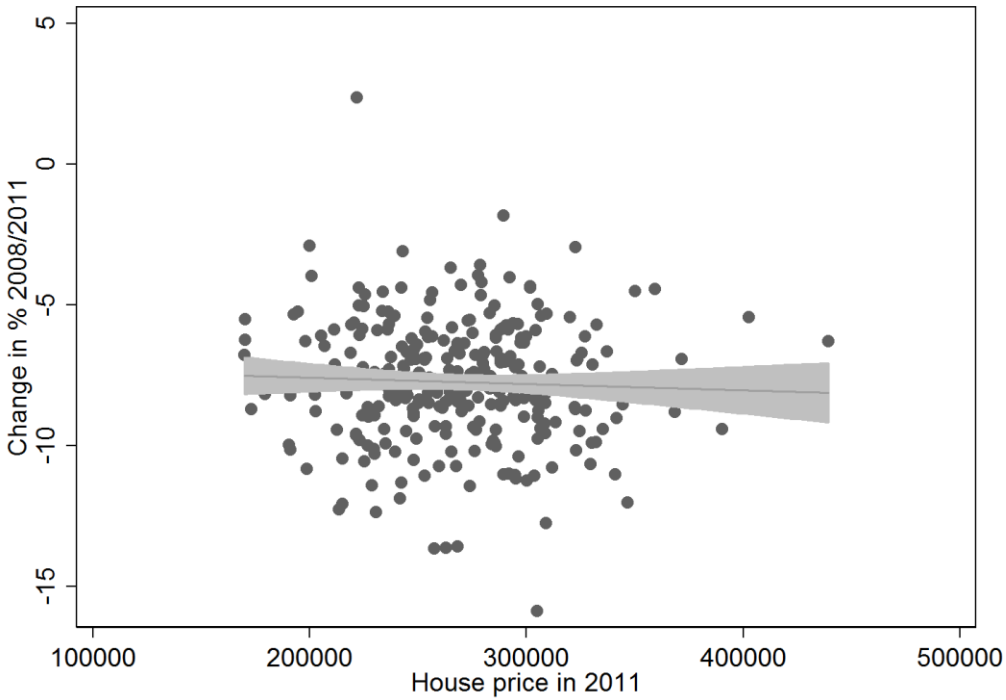
Figure 1. Effect of involuntary NHE on job-to-job mobility for different employment spells



Notes. The figure shows point estimates with 95% confidence bounds of linear panel regression with job to job mobility as dependent variable for different samples. The x-axis indicates the minimum employment length per year. The point estimate for an employment tell of 10 month is the one from Table2 in column (6). The full regression results for the other samples are shown in TablesA1-A4.

Appendix

Figure A1 – No relationship between decline in house price and value of the house



Notes. The figure shows the average decline house prices between 2008 and 2011 per municipality on the y-axis and the average house price in 2011 on the x-axis. The grey line shows a linear regression with 95% confidence bounds.

Table A1: Determinants of job-to-job mobility for minimum employment spell of 8 months

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	-0.00313**	-0.00268*	-0.00263*	-0.00318**	-0.00274*	-0.00269*
	(0.00113)	(0.00113)	(0.00113)	(0.00113)	(0.00113)	(0.00113)
Voluntary NHE	-0.00248	-0.00234	-0.00232	-0.00261	-0.00247	-0.00244
	(0.00139)	(0.00139)	(0.00139)	(0.00139)	(0.00139)	(0.00139)
HH income>20000 & HH income<=30000		-0.00932**	-0.00952**		-0.00938**	-0.00958**
		(0.00162)	(0.00162)		(0.00162)	(0.00162)
HH income>30000 & HH income<=40000		-0.0140**	-0.0143**		-0.0141**	-0.0144**
		(0.00175)	(0.00175)		(0.00174)	(0.00175)
HH income>40000 & HH income<=50000		-0.0181**	-0.0184**		-0.0182**	-0.0185**
		(0.00184)	(0.00184)		(0.00184)	(0.00184)
HH income>50000		-0.0204**	-0.0207**		-0.0205**	-0.0208**
		(0.00195)	(0.00195)		(0.00195)	(0.00195)
Financial assets>10000 & Financial assets<=20000		-0.000370	-0.000410		-0.000333	-0.000373
		(0.000638)	(0.000639)		(0.000638)	(0.000638)
Financial assets>20000 & Financial assets<=30000		-0.00145	-0.00151		-0.00140	-0.00146
		(0.000800)	(0.000800)		(0.000800)	(0.000801)
Financial assets>30000 & Financial assets<=40000		-0.00227*	-0.00235*		-0.00222*	-0.00231*
		(0.000935)	(0.000935)		(0.000935)	(0.000935)
Financial assets>40000		-0.00176	-0.00186*		-0.00170	-0.00180
		(0.000945)	(0.000945)		(0.000945)	(0.000945)
Divorced			-0.00975**			-0.00970**
			(0.00195)			(0.00195)
Partner/Married			0.00620**			0.00614**
			(0.00140)			(0.00140)
Will divorce			-0.00366*			-0.00365*
			(0.00183)			(0.00183)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,671,206			
Number of individuals			445,201			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual switches jobs in the subsequent year All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred to 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Table A2: Determinants of job-to-job mobility for minimum employment spell of 9 months

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	-0.00306**	-0.00261*	-0.00257*	-0.00312**	-0.00267*	-0.00263*
	(0.00113)	(0.00113)	(0.00113)	(0.00113)	(0.00113)	(0.00113)
Voluntary NHE	-0.00240	-0.00226	-0.00224	-0.00252	-0.00238	-0.00236
	(0.00138)	(0.00138)	(0.00138)	(0.00138)	(0.00138)	(0.00138)
HH income>20000 & HH income<=30000		-0.00950**	-0.00968**		-0.00955**	-0.00973**
		(0.00162)	(0.00162)		(0.00162)	(0.00162)
HH income>30000 & HH income<=40000		-0.0144**	-0.0146**		-0.0145**	-0.0147**
		(0.00174)	(0.00174)		(0.00174)	(0.00174)
HH income>40000 & HH income<=50000		-0.0185**	-0.0188**		-0.0186**	-0.0189**
		(0.00184)	(0.00184)		(0.00184)	(0.00184)
HH income>50000		-0.0210**	-0.0213**		-0.0211**	-0.0214**
		(0.00194)	(0.00195)		(0.00194)	(0.00195)
Financial assets>10000 & Financial assets<=20000		-0.000422	-0.000461		-0.000383	-0.000422
		(0.000636)	(0.000636)		(0.000636)	(0.000636)
Financial assets>20000 & Financial assets<=30000		-0.00150	-0.00156		-0.00145	-0.00150
		(0.000797)	(0.000797)		(0.000797)	(0.000797)
Financial assets>30000 & Financial assets<=40000		-0.00229*	-0.00237*		-0.00225*	-0.00233*
		(0.000931)	(0.000931)		(0.000931)	(0.000931)
Financial assets>40000		-0.00173	-0.00183		-0.00167	-0.00177
		(0.000941)	(0.000941)		(0.000941)	(0.000941)
Divorced			-0.00939**			-0.00934**
			(0.00195)			(0.00195)
Partner/Married			0.00600**			0.00593**
			(0.00140)			(0.00140)
Will divorce			-0.00393*			-0.00392*
			(0.00182)			(0.00182)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,654,238			
Number of individuals			442,373			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual switches jobs in the subsequent year All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred to 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Table A3: Determinants of job-to-job mobility for minimum employment spell of 11 months

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	-0.00389**	-0.00344**	-0.00339**	-0.00394**	-0.00349**	-0.00343**
	(0.00111)	(0.00111)	(0.00111)	(0.00111)	(0.00112)	(0.00112)
Voluntary NHE	-0.00221	-0.00208	-0.00204	-0.00229	-0.00216	-0.00212
	(0.00137)	(0.00137)	(0.00137)	(0.00137)	(0.00137)	(0.00137)
HH income>20000 & HH income<=30000		-0.00835**	-0.00852**		-0.00844**	-0.00861**
		(0.00159)	(0.00159)		(0.00159)	(0.00159)
HH income>30000 & HH income<=40000		-0.0137**	-0.0139**		-0.0138**	-0.0141**
		(0.00171)	(0.00171)		(0.00171)	(0.00171)
HH income>40000 & HH income<=50000		-0.0183**	-0.0186**		-0.0185**	-0.0187**
		(0.00180)	(0.00181)		(0.00180)	(0.00180)
HH income>50000		-0.0215**	-0.0218**		-0.0216**	-0.0219**
		(0.00191)	(0.00191)		(0.00191)	(0.00191)
Financial assets>10000 & Financial assets<=20000		-0.000648	-0.000689		-0.000610	-0.000651
		(0.000625)	(0.000625)		(0.000625)	(0.000625)
Financial assets>20000 & Financial assets<=30000		-0.00136	-0.00142		-0.00131	-0.00137
		(0.000784)	(0.000784)		(0.000784)	(0.000784)
Financial assets>30000 & Financial assets<=40000		-0.00205*	-0.00214*		-0.00202*	-0.00210*
		(0.000916)	(0.000917)		(0.000916)	(0.000916)
Financial assets>40000		-0.00161	-0.00172		-0.00156	-0.00167
		(0.000926)	(0.000926)		(0.000926)	(0.000926)
Divorced			-0.00819**			-0.00813**
			(0.00190)			(0.00190)
Partner/Married			0.00664**			0.00658**
			(0.00139)			(0.00139)
Will divorce			-0.00255			-0.00254
			(0.00179)			(0.00179)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,584,374			
Number of individuals			430,729			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual switches jobs in the subsequent year All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred to 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Table A4: Determinants of job-to-job mobility for minimum employment spell of 12 months

	(1)	(2)	(3)	(4)	(5)	(6)
No negative home equity (NHE)			*Reference category*			
Involuntary NHE	-0.00386**	-0.00343**	-0.00337**	-0.00392**	-0.00348**	-0.00342**
	(0.00110)	(0.00110)	(0.00110)	(0.00111)	(0.00111)	(0.00111)
Voluntary NHE	-0.00294*	-0.00282*	-0.00278*	-0.00302*	-0.00290*	-0.00286*
	(0.00136)	(0.00136)	(0.00136)	(0.00136)	(0.00136)	(0.00136)
HH income>20000 & HH income<=30000		-0.00758**	-0.00778**		-0.00767**	-0.00787**
		(0.00156)	(0.00156)		(0.00156)	(0.00156)
HH income>30000 & HH income<=40000		-0.0130**	-0.0133**		-0.0131**	-0.0134**
		(0.00168)	(0.00168)		(0.00168)	(0.00168)
HH income>40000 & HH income<=50000		-0.0182**	-0.0186**		-0.0184**	-0.0187**
		(0.00177)	(0.00177)		(0.00177)	(0.00177)
HH income>50000		-0.0217**	-0.0221**		-0.0218**	-0.0221**
		(0.00188)	(0.00188)		(0.00188)	(0.00188)
Financial assets>10000 & Financial assets<=20000		-0.000896	-0.000939		-0.000858	-0.000900
		(0.000614)	(0.000615)		(0.000614)	(0.000614)
Financial assets>20000 & Financial assets<=30000		-0.00175*	-0.00181*		-0.00171*	-0.00177*
		(0.000772)	(0.000772)		(0.000772)	(0.000772)
Financial assets>30000 & Financial assets<=40000		-0.00264**	-0.00272**		-0.00261**	-0.00270**
		(0.000902)	(0.000902)		(0.000902)	(0.000902)
Financial assets>40000		-0.00199*	-0.00209*		-0.00195*	-0.00205*
		(0.000911)	(0.000911)		(0.000911)	(0.000911)
Divorced			-0.00910**			-0.00906**
			(0.00185)			(0.00185)
Partner/Married			0.00698**			0.00695**
			(0.00138)			(0.00138)
Will divorce			-0.00255			-0.00252
			(0.00176)			(0.00176)
Other controls	NO	YES	YES	NO	YES	YES
Region dummies & region (x) year dummies	NO	NO	NO	YES	YES	YES
Observations			2,482,644			
Number of individuals			413,774			

Notes. The table shows results from a linear panel regression with fixed effects on the individual level. The dependent variable takes the value 1 if an individual switches jobs in the subsequent year All regressions contain year fixed effects and controls for housing tenure. The variables household (HH) income and financial assets are transferred to 2011 Euros. "Other controls" contain dummy variables for the household size. Robust standard errors in parentheses. ** p<0.01, * p<0.05.

Publisher:

CPB Netherlands Bureau for Economic Policy Analysis
P.O. Box 80510 | 2508 GM The Hague
T (088) 984 60 00

March 2017 | ISBN 978-90-5833-767-2