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Income Uncertainty, House Price Uncertainty and the Transition Into Home Ownership in the United Kingdom

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by

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Abstract

Using household panel data, this paper examines the impact of income uncertainty and house price uncertainty on home ownership in the United Kingdom. The existing literature based on cross-sectional studies finds a negative relationship between income uncertainty and home ownership. This paper utilises data on transitions into home ownership and exogenous variation in income uncertainty, avoiding the endogeneity of income to home ownership status. It also conditions the empirical estimates on a measure of house price volatility utilising a local-level house price index to control house price uncertainty, which might also discourage home ownership. Results show a strong role for income uncertainty in lowering the likelihood of house purchase, but no statistically significant role for house price uncertainty.

Key words: Home ownership, income uncertainty, house price uncertainty

JEL classification: D12 D14 R21

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1. Introduction

This paper examines the impact of income uncertainty on the transition into home ownership, using a household panel data set for the United Kingdom (U.K.). The U.K. has a particularly volatile housing market and is a suitable context for such a study. Results show that income uncertainty at the household level reduces the probability that a renting household will enter home ownership. Exploiting exogenous variation in the risk of households becoming unemployed across households, plus controlling for house price uncertainty, a one standard-deviation reduction in income uncertainty is shown to increase the likelihood of home purchase by approximately 70% - 120%. In contrast, the impact of house price uncertainty on the transition into home ownership is statistically insignificant when controlling for income uncertainty.

Income uncertainty is important for the timing of house purchases because it may constrain both demand for housing by potential purchasers and the supply of mortgage credit from would-be lenders. In the presence of costly housing adjustment, uncertain and uninsurable income and house price changes increase the risk of default or loan non-repayment. This may induce households to avoid purchasing homes via mortgage borrowing for precautionary reasons, and may induce lenders to ration loans to households facing uncertain incomes. A large theoretical literature models the relationship between income uncertainty, house price uncertainty and home ownership. One implication is that households may to attempt to reduce their own income uncertainty by seeking forms of employment for which income is less volatile, or by spreading income risk across the household unit.

The negative relationship between income uncertainty and home ownership is well documented in existing studies. However, the existing empirical literature does not address the potential endogeneity of income uncertainty to homeownership, nor the impact of house price uncertainty on the purchase decision. The immediate precursors to this study are three papers by Diaz-Serrano (2005a, 2005b) and (Robst et. al., 1999). Diaz-Serrano (2005a, 2005b) finds that households with higher levels of income uncertainty are more likely to be renters rather than homeowners. This result is consistent across household data for the United States, Germany and Spain, with

some evidence that the effect is more likely induced by precautionary behaviour on the part of households, based on self-reported levels of risk aversion in German data.

This study improves on the existing empirical studies in two main ways. Firstly, existing studies are based on a comparison between the income uncertainty of renters and that of homeowners. In such a setting, to infer that home ownership is in part due to lower income uncertainty among homeowners, income uncertainty must be exogenous to housing tenure. However, it is quite possible that homeownership might itself lower the level of income uncertainty at the individual household level. Two impacts are plausible: the need to reduce income uncertainty caused by mortgage repayment commitments (Diaz-Serrano, 2005a) or the investment gains which accrue from housing decreasing the need for households to pursue riskier (but potentially more rewarding) forms of employment. This study avoids this potential endogeneity problem by exploiting transitions within a household panel using a sample of renters and exploiting variation across renters who become owners versus those who remain renters. The panel data set allows us to estimate the impact of income uncertainty on the likelihood of becoming a homeowner between waves, instead of the likelihood of being a homeowner in the cross-section, thus avoiding this form of reverse-causality.

Secondly, this study uses a proxy measure of income uncertainty based on exogenous income risk. Income uncertainty at the household level might be affected by the decision to pursue home ownership. Households may seek to reduce their income volatility in anticipation of making a purchase. Ideally, to avoid selection biases, one would want a measure of income uncertainty unaffected by the actions of the individual household. To create such a measure this study utilises an instrumental variables approach from the precautionary savings literature which uses industry-level variation in unemployment risk as a proxy measure for income uncertainty. To control for unobserved preferences for renting versus home ownership, the paper further exploits within-household variation in income risk using household fixed effects.

Finally, this study also examines the relationship between the transition into home ownership and the level of house price uncertainty faced by the household. House price uncertainty might restrain households from home purchase by increasing the risk of negative housing equity soon after purchase. Alternatively, if households have a sufficiently strong preference for home ownership versus renting over the life-cycle, greater house price uncertainty might induce households to purchase their homes earlier as insurance against future house price risk (Banks et al, 2004). If house

price uncertainty is correlated with income uncertainty, then empirical estimates which fail to control for the separate effect of house prices on the purchase decision may suffer from omitted variable bias. This study controls for house price uncertainty using a local-level house price index, hence obtaining a measure of the volatility of house prices in the locality in which renters are resident.

This study is based on a British household panel data set. Existing studies have found that a relationship between income uncertainty and home ownership is true in the U.S., Germany and Spain. We also find this to be the case, using our improved methodology for British households. We use the British data firstly because as a long-running panel it offers a sufficiently large sample of renter-transition observations, and also because it allows us to exploit local (county) level variation in house price volatility using a standardised mix-adjusted index available in the UK.

The remainder of the paper is structured as follows. Section 2 reviews the existing theoretical and empirical literature, and further explains the empirical methodology employed in this paper. Section 3 describes the data and the construction of the income uncertainty and house price uncertainty measures. Section 4 presents results, firstly based on across-household models which examine the relationship between the level of income uncertainty and the likelihood of house purchase, then secondly based on fixed effects models which exploit within-household changes in income uncertainty and housing tenure. Section 5 concludes.

2. Existing literature and empirical strategy

Understanding the impact of income uncertainty on home ownership in a theoretical model is complicated by the multi-faceted nature of housing in the consumer's objective function and the interplay between income risk, liquidity constraints and precautionary behaviour. Housing acts as both a durable consumption good and an investment asset (Henderson and Ioannides, 1983, 1987). Also, it provides collateral against which households can borrow for non-housing consumption, is a lumpy good and costly to adjust. Capturing these multiple features in a model of tenure choice presents a complex problem. In the model suggested by Fu (1995), agents face credit constraints and exhibit risk aversion, however an decrease in income uncertainty increases the likelihood of homeownership. However, part of the motive for home ownership is the role of housing as a store of

precautionary wealth, so if risk aversion is sufficiently high, a relaxation of credit constraints decreases the likelihood of homeownership.

More recent models have attempted to incorporate the lumpiness of housing and its costly adjustment. In Ortalo-Magne (2002, 2006) households face uncertainty over house price movements and rental price movements as well as over future income. In the absence of risk aversion, increased certainty over future income increases the likelihood of a household purchasing housing. However, while in most models income uncertainty reduces the likelihood of home ownership, house price uncertainty may actually increase the likelihood of home ownership. Banks *et al* (2004) examine the household's housing tenure decision under house price uncertainty in a model in which households place a strong preference weight on homeownership versus renting. Although risk aversion typically reduces demand for risky assets, in their model for the U.K. housing market (a market which has exhibited considered historical house price volatility) households purchase housing in part to insure themselves against future house price fluctuations. They present some empirical evidence to suggest that households in localities with higher house price volatility typically purchase housing at a younger age. However, their empirical results show that house price volatility reduces the likelihood of household refinancing their existing mortgage debts, plausibly due to the increased risk of negative housing equity.

The existing empirical evidence is unanimous in finding a negative relationship between income uncertainty and the propensity to be a home owner based on U.S. data (Haurin and Gill, 1987, Haurin, 1991, Robst et. al., 1999) and also Spanish and German data (Diaz-Serrano, 2005a) and Italian data (Diaz-Serrano, 2005b). In these studies uncertainty is typically incorporated as a measure of the volatility of income, such as the coefficient of variation in household labour income over previous years (e.g. Robst et. al. 1999), or of the component of household income not explained by household characteristics and permanent income (Diaz-Serrano, 2005a). These previous empirical studies have been based on cross-sectional comparison of being a homeowner versus being a renter, hence they draw on large household datasets in which homeownership status is observed. The advantage of using household panel data is that it contains income histories and often data on non-labour income, from which a measure of the dynamics of income uncertainty at the individual or household level can be calculated.

In his two studies, Diaz-Serrano (2005a, 2005b) cleverly tests the empirical hypothesis as to why the negative relationship between income uncertainty and home ownership exists. Using household panel data for Spain and Germany, Diaz-Serrano (2005b) shows that although the variance of income has a negative effect on home ownership, *skewness* in the income distribution has a positive effect on home ownership in both institutional settings. This can be explained by the risk-aversion of households which induces a preference for positively-skewed income distributions and reduces the likely loss from income uncertainty (in the case of homeownership the likelihood of mortgage default). Elsewhere, Diaz-Serrano (2005a) indicates that the negative relationship between income uncertainty and home ownership in Italy is also more likely explain by household attitude to risk than by the existence of credit constraints. Using subjective measures of risk-aversion and credit constraints, he finds that the negative relationship only holds for households which exhibit risk-aversion and credit constraints, with a stronger effect attributable to the role of risk-aversion. As with other existing empirical studies, these findings are based on models for the likelihood of homeownership versus renting.

One drawback with existing studies is that if income uncertainty is partly determined by housing tenure, then it is possible that the observed relationship between income uncertainty and homeownership arises endogenously. Diaz-Serrano (2005a) suggests one possible mechanism: home owning households face mortgage repayment commitments which encourage them to reduce their income uncertainty. An alternative mechanism is that home owning households experience strong capital gains on their housing (which has until recently typically been the case in the U.S. and U.K.) and these capital gains allow them to reduce their income risk. If either mechanism holds true then a reverse-causality problem may exist in studies based on a comparison of the income uncertainty exhibited by homeowners compared with renters using cross-section data. The causality between income uncertainty and home ownership may actually run in the other direction. One way to avoid this problem is to draw on a sample of transitions from renting to homeownership. This is the approach taken here. Whereas previous studies have had only relatively short-running household panels with too few observations of transitions available, this study draws on a long-running U.K. household panel which contains sufficient numbers of transitions to permit econometric analysis.

Modelling the likelihood of transition into homeownership removes the potential endogeneity issue arising from tenure, but does not address a related endogeneity issue arising from potential selection bias. If households anticipate purchasing a home via a mortgage, which involves a need for income commitment, they may seek to reduce their income uncertainty in anticipation of the purchase. Hence observed income uncertainty prior to purchase may be endogenous to the likely purchase by households selecting themselves into lower income-volatility groups. Ideally, the researcher would prefer a measure of income uncertainty beyond the individual household's control, to avoid such a bias. The approach adopted here is to exploit exogenous variation in household income uncertainty across industry occupations. This approach has previously been adopted in the literature on precautionary savings (see Carroll et al, 2003) in which a similar endogeneity problem may arise in the relationship between income risk and household saving. Occupation-level income uncertainty is exogenous to the household. However, it is not possible to compensate for households selecting into low-income uncertainty occupations. Results are presented using household fixed-effects, which exploit within-industry variation in income uncertainty over time.

To operationalise this approach, income uncertainty is measured in terms of unemployment risk. Using observations of employment data from the household panel, a model is estimated for the likelihood that a household becomes unemployed in the next year based on household socio-economic characteristics, demographic variables and educational variables. Included among the control variables is a dummy variable for the industry in which the individual is employed (using standard industrial classification categories). The coefficients on these dummies are found to be significantly different from one another across SIC categories, with considerable variation in the likelihood of individuals becoming employed across groups, controlling for individual characteristics. The likelihood of becoming unemployed based on industry group is then used as a proxy measure of income uncertainty in the second-stage model of house purchase. For econometric identification all of the controls from the first-stage regression are included in the second stage regression (so that variation in income uncertainty across households is attributable only to industrial classification in the model). Robust standard errors are calculated to obtain unbiased estimates.

Finally, this study also controls for house price uncertainty in the econometric model. If house price uncertainty affects the house purchase decision, as is suggested by the theoretical literature, then it is important to control for the separate effect of house price uncertainty when estimating the effect of income uncertainty. As the analysis is based on a sample of renters, some of whom become home owners, house price volatility is not observed at the individual level. A measure of house price uncertainty is obtained using the volatility of house prices in the locality (U.K. county) in which the renter is resident (only a few households move county when purchasing a home in the sample). This has the advantage of being exogenous to the individual household and also, in the case of the U.K., provides considerable heterogeneity in house price uncertainty across counties.

As the econometric model is based on transitions, each observation is based on two years of household panel observations with the dependent variable taking a value of 1 if the household becomes a home owner between years, and 0 otherwise. The estimation sample is composed of a sample of renters in the panel, some of whom become homeowners. Hence there are multiple observations per household. The minimum number of waves in which a household needs to be observed in the panel data is two. There are some observations of households present for only two years who purchase a home between years (and thus provide a single observation which takes the value 1). Alternatively, there are some observations for households present in all 16 years who do not purchase a home (and thus provide 15 observations all of which take the value 0). Pooled probit estimates, which are presented first, thus potentially suffer from the problem that households who are perpetually renters may have an underlying preference for renting. To control for this underlying time-invariant preference, fixed-effects estimates are also presented. In the fixed-effects model, only households who at some point make a house purchase are included, and the model estimates the impact of within-household variation in income and house price uncertainty on the transition into ownership. Although the second model is preferred, results between the two models are very similar in terms of the magnitude of the impact of income and house price uncertainty on house purchase.

3. Data

The dataset used for this study is the British Household Panel Survey (BHPS). The BHPS is the principal long-running household socio-economic panel survey in

the United Kingdom, based on the design of the U.S. Panel Study of Income Dynamics (PSID). The BHPS began in 1991 with a representative sample of the population of England and Wales, comprising of approximately 5,500 households containing approximately 10,000 individuals. Households are re-interviewed each year, including newly formed branch-off households, and households which attrit the survey are replaced such that any wave is representative of the U.K. population. Since 1999 additional households from Scotland and Northern Ireland have been included to make the survey representative of the U.K. population as a whole. The BHPS covers a broad range of socio-economic topics including labour market participation (and history), housing, education and demographic information. It also includes occasional 'modules' which incorporate questions on additional topics such as assets and debt and retirement saving. This study utilises all available waves from the BHPS, starting in 1991 with the most recent available wave for 2006. In each wave households are asked about their home ownership status and whether they have moved and/or purchased a home in the previous year. Households are also asked detailed questions about their labour market participation and also non-labour income.

For the purposes of this analysis the sample is restricted to households in which the head of household is aged above 20 years and below state pensionable age (65 for men and 60 for women). This omits households in retirement, for which the owning/renting decision is dependent on a broader set of decisions relating to bequests, ill-health and retirement saving (Venti and Wise 1990, 2004). The analysis is based on households (rather than individuals) with characteristics identified from those of the head of household. As the analysis is only concerned with transitions into home ownership, removing the sample of above retirement age households makes little difference to the analysis. Households are also omitted if they changed their household head (which rarely occurs) or if they changed their marital status in the previous year, events which most likely substantially alter the degree of income uncertainty facing the household. Finally, the analysis is based solely on households who are observed to be renters in at least one wave, who then either subsequently do or do not move into home ownership.

Movement into home ownership is identified by a change in self-reported home ownership status and also using an explicit question on whether the household bought a home for the first time over the course of the previous year. To be included in the sample for analysis households have to appear in at least two waves of the

survey plus be a renter in at least the first wave in which the household in observed. So for each household-year observation an indicator variable takes a value of 1 if the household moved into homeownership in the next wave and 0 if the household remained a renter in the next wave. The total sample of year-on-year changes in home ownership status in total comprises 22,799 household-year observations. The renter sample comprises 31% of the total BHPS sample and implies a BHPS household home ownership rate of 69%. This matches very closely the aggregate home ownership rate in the U.K. of 70% in the year 2000 (social statistics).

Summary statistics for the total sample of household-year observations are provided in Table 1. There are 1,292 observations of transitions into home ownership and 21,507 observations of households which remain renters. There are significant differences between the two groups in terms of various characteristics. The p-values from tests for the equivalence of group means reveal that there are significant differences in terms of those who become owners. They are typically younger, less likely divorced, more likely to be in professional or skilled/semi-skilled employment (compared to unskilled employment), more likely to be educated at degree level, and have higher household monthly income and a greater propensity to be a saver. Hence there are clear educational and skill-related factors which are associated with transitioning into home ownership, most likely correlated with higher household income. The higher saving rate among households who become owners most likely reflects the need to save to meet down payment requirements, on which see Engelhardt (1996) and Benito (2006).

To estimate the model for unemployment risk an indicator variable is constructed which takes the value of 1 if a head of household becomes unemployed between waves and takes a value of 0 otherwise. Unemployment is defined as an involuntary end to employment and excludes retirement, early retirement, firings or voluntary severance. Excluding the renter sample, there are a total of 61,798 observations of household-years for head of households of which 1,138 (1.8%) take a value of 1 (where the head becomes unemployed) and the remainder take a value of 0. A pooled probit model is then estimated with the unemployment indicator variable as the dependent variable, a range of socio-economic and demographic controls and a set of indicator dummies for the industry of employment in which the head of household's employment type is classified under the Standard Industrial Classification (SIC) system. The control variables included in this regression are

identical to the variable included in the second-stage regression for transition into homeownership, so the exclusion restriction is the set of industry dummies. As households can appear in the sample more than once, the model is estimated using correlated random effects.

Table 2 reports the coefficients and marginal effects on the industry dummies. Relative to a base classification of being employed in the public sector all other industries exhibit higher likelihood of unemployment, though the differences are not significant for agriculture, forestry and fishing or for transport and communication. This pattern in the results not unexpected as for the period considered the U.K. public sector exhibited near continual growth in employment. The baseline predicted probability of next-period unemployment in the model is 1.2%. Hence the largest of the marginal effects, on distribution, hotels and catering, implies that workers employed in that category of employment were approximately 75% more likely to face unemployment than workers employed in the public sector. So the industry variation in unemployment risk as measured by this model is non-negligible. This variation in unemployment risk is used in the second-stage regressions for home-purchase as the proxy measure of income uncertainty.

House price uncertainty is measured using the coefficient of variation of the county-level house price over the previous 5 years using a standardised (mix-adjusted) house price index provided by the U.K. banking group HBOS. HBOS plc, (which for the majority of the period considered here was the Halifax Building Society), is the largest provider of mortgages to households in the United Kingdom. The Halifax County-Level House Price Index, which is standardised to track the value of a 3-bedroom semi-detached house, tracks the value of housing by county of the United Kingdom on a monthly basis since the early 1970s. To calculate the coefficient of valuation, annual values for this index for the month of September (the month in which the BHPS surveys households) are used for the five years previous to the wave in which the household-observation occurs.

The distribution of this measure of house price uncertainty is illustrated in Figure 1, which plots the coefficient of variation for each county covered by the BHPS for the year 2000 (using data from the period 1996-2000 inclusive). There is considerable variation across counties, ranging from 0.25 for Grampian to 0.52 for Powys. By construction, the Halifax index is mix-adjusted and compensates for variation over time in the mix of housing types sold and volumes of sales. The

counties with lower house price uncertainty are typically the more rural, lower population counties in the sample (the lowest 5 counties are all in rural Scotland) whereas the counties with the highest measure of volatility are in areas where there is a proportionately larger market for second/holiday homes. In general, the Home Counties and south east England exhibit greater house price volatility than the midlands and north of England. As the coefficient of variation is measured at the county level and is common across households within a particular county, (county) cluster standard errors are calculated in the probit/logit models for house purchase included in the next section.

4. Results

The baseline empirical model is a probit model in which the dependent variable is the indicator variable for whether the renting household became a home owner in the next period and the independent variables are the measures of income uncertainty, house price uncertainty and a set of socio-economic and demographic controls. The previous literature suggests that the coefficient on the income uncertainty variable should be negative and statistically significant. There is less agreement in the literature on the expected coefficient on the hose price uncertainty variable.

Initial estimates are obtained using a pooled probit model with correlated random effects and (county) cluster standard errors, estimated by maximum likelihood for the full sample of 22,799 household-year observations across 7048 households (with an average of 4.4 observations per household). Control variables include the level of household income and dummy variables for demographic characteristics and educational qualifications. A dummy indicator variable is included for whether the head of household is self-employed and also for whether the spouse of the head of household is self-employed, both of which are likely to shift the income uncertainty households face. As the measure of income uncertainty is an imputed regressor from the first-stage regression, robust standard errors are calculated. Marginal effects are calculated at variable means and reported in Table 3.

Results from the pooled probit model show that transition into home ownership is positively associated with the level of educational qualifications obtained by the head of household, if the head of household is self-employed, if their spouse is self-employed and with the overall income level of the household (as might

be expected considering the lumpiness of housing and fixed costs associated with purchasing housing). In Column 1 the income uncertainty variable is included but the house price uncertainty variable is omitted. The marginal effect on the income uncertainty measure is negative and statistically significant at the 1% level. To evaluate the magnitude of the marginal effect, the baseline predicted probability of household purchasing a home is 0.048%. Against this baseline probability, a one standard deviation increase (0.013 against a mean value of 0.009) in unemployment risk lowers the likelihood of home purchase by approximately 118%, a very substantial margin. Hence the results indicate a strong a positive relationship between income uncertainty (as measured using the proxy measure of unemployment risk) and the likelihood of transitioning into home ownership.

Column 2 omits the measure of income uncertainty and includes only the measure of house price uncertainty. The marginal effect on the house price uncertainty coefficient is significant and positive at the 1% level, but the effect on the likelihood of house purchase is much smaller than for the income uncertainty variable. Here, a one standard deviation increase (0.06 against a mean of 0.37) in house price uncertainty is associated with a 50% increase in the likelihood of transitioning into home ownership. The positive coefficient on the house price uncertainty variable is a consistent with the findings of Banks et al for first-time buyers in the U.K., and suggests that there may be a motive for purchasing housing as insurance against future house price risk in the U.K.

In Column 3 both the income uncertainty and the house price uncertainty variables are included in the regression. With inclusion of both variables the coefficient on the house price uncertainty variable becomes statistically insignificant, while the coefficient on the income uncertainty variable remains statistically significant at the 1% confidence level. Hence, conditional on household income uncertainty, variation in house price uncertainty across counties does not induce differential propensities to transition into home ownership. The magnitude of the coefficient on income uncertainty now implies that a one standard deviation increase in income uncertainty induces a 81% increase in the likelihood of the household transitioning into home ownership.

One possible objection to the use of the pooled probit model is that it includes in the estimation sample a large number of perpetual renters who may be very unlikely to transition into home ownership as they have a preference for renting

versus ownership. The pooled probit approach models all households as possible candidates for becoming home owners. This is not inconsistent with the approach taken in the theoretical literature, in which household preferences are typically specified such that there is a stronger weight on home ownership than on renting. However, if a proportion of perpetual renters do indeed have a preference for renting then including these households in the sample will artificially increase the sample size. As the BHPS does not contain data on individual household preferences for renting versus being a home owner, we cannot control for this variation in preferences directly. However, if it is assumed that the underlying preference for homeownership (or for renting) is time-invariant (as in the theoretical literature), a fixed-effects estimator can be used to condition-out this time-invariant heterogeneity in preferences across households. This is not an ideal solution as it places a restrictive structure on the nature of consumer preferences, but it is a useful comparator to the pooled probit model in which all households are modelled as having a non-negative propensity for homeownership.

Table 4 presents estimates from a fixed effects model. The fixed-effects model includes only households in the sample observed with a positive observation of home ownership at some point over the waves in which they participate in the BHPS. This reduces the sample of households to 1,292 with a total of 5,626 household-year observations. The average number of observations per household in 4.7, hence households on are on average observed for 7.3 years prior to house purchase.

In Column 1 of Table 4 income price uncertainty is included in the model and house price uncertainty is excluded. The coefficient on income uncertainty is negative and significant at the 1% level. The magnitude of the coefficient is double that of the random effects model, but in the fixed-effects model estimated over households which become homeowners only, the baseline predicted probability of home ownership is much higher at 17%. Hence a one standard deviation increase in income uncertainty lowers the probability of transition into home ownership in this model by 64%. This is somewhat smaller that the equivalent statistic from the pooled probit model, but still a sizeable magnitude.

Columns 2 and 3 repeat the models from Table 3, but in this case again using the fixed-effects estimator applied to the sample of home purchasers. In Column 2 the house price uncertainty variable is statistically significant at the 5% confidence level and again positive. However, as was the case with the pooled probit model, in the

model with both house price and income uncertainty the coefficient on house price uncertainty becomes statistically insignificant. This confirms the result from Table 3 that, conditional on individual household income uncertainty, there is no statistically significant relationship between house price uncertainty in the locality of residence and the propensity to become a home owner. The coefficient on the income uncertainty variable in Column 3 implies that a one standard deviation increase in income uncertainty lowers the propensity to become a home owner by approximately 66%.

Taken together, the estimates from both models strongly support the existing literature in finding that there is a statistically significant negative (and sizeable) relationship between income uncertainty at the household level and the propensity of renting households to transition into home ownership. The results from the fixed-effects model suggest a lower magnitude for the effect of income uncertainty compared to the results from the pooled probit model, potentially because the fixed-effects model conditions-out other forms of household-specific heterogeneity assumed to be weakly correlated across households in the correlated random effects probit model. Alternatively the smaller sample size in the fixed-effects model most likely results in smaller coefficient estimates. Nevertheless, both models suggest that the impact of a one standard deviation increase in income uncertainty decreases the propensity of renting households to become homeowner in the range of 65% to 118%, somewhere between one-half and doubling the propensity. These are slightly higher effects than those found in the existing literature, which typically suggest that the effect is of a magnitude of 40% - 55% (see Diaz-Serrano, 2005).

Much less support is found for a statistically significant relationship between house price uncertainty in the locality of residence and the propensity to become a homeowner. It is possible that this is in part attributable to the particular measure of house price uncertainty utilised in the paper. The county level house price index is, by construction, a limited proxy for the volatility of the price of housing facing the prospective purchaser. However, this value is unobserved and could not be measured, apart from a survey question which asked households to estimate the price of a prospective house which they might purchase, which is somewhat ambiguous. This result for house price uncertainty raises doubts about empirical studies which attempt to estimate the impact of house price uncertainty on home ownership without controlling for some measure of household income uncertainty.

5. Conclusion

This paper has examined empirically the relationship between income uncertainty, house price uncertainty and the transition into home ownership. The main aim of the paper was to test whether income uncertainty causes a reduction in the likelihood that renting households become home owners. The principal innovations of the paper relative to the existing literature were to exploit transitions into home ownership in a household panel and estimate the impact of uncertainty of the likelihood of purchase (as opposed to a cross-sectional comparison between existing owners and renters) and to utilise an exogenous measure of income uncertainty. This approach addresses various forms of endogeneity and selection bias which could arise in cross-sectional studies which rely on the exogeneity of household income uncertainty to home ownership status. A large U.K. household survey provided a sufficient number of observations of transitions into home ownership to permit econometric analysis. An exogenous measure of household income uncertainty was obtained using a model for unemployment risk in which variation in income uncertainty across industry occupation entered as an exogenous exclusion restriction.

Results indicate that the negative relationship between income uncertainty and home ownership is robust to the instrumental variables approach utilised here. Controlling for the separate effect of house price uncertainty on home ownership, variation in income uncertainty is shown to have a sizeable effect on the likelihood of transition into home ownership is both a pooled probit model and a fixed-effects model. House price uncertainty has no statically significant effects on home ownership once income uncertainty is controlled for, a result which contrasts with previous studies.

The results presented here raise a number of avenues for potential future research. Firstly, this study could be replicated across using data from other countries to establish whether the robustness of the negative relationship between income uncertainty and home ownership is true elsewhere, as suggested by the existing cross-sectional literature which includes studies for other European nations and the United States. Secondly, all of the studies on this topic to date have taken the renter / home ownership decision (the ‘extensive margin’ of the purchase decision) as the variable of interest. This decision could be extended to consider the size of home purchase and household leverage decisions (the ‘intensive margin’). Finally, more attention could

be given to the cross-sectional and time series variation in income uncertainty and home ownership, particularly in the United States. To what extent might state-wide and racial variation in home ownership be attributable to variation in income uncertainty across regions and social groups? Hurst and Charles (2002) show that lower homeownership among blacks is in part attributable to lower rates of mortgage application, which could be caused by income uncertainty. Also, a growing empirical literature seeks to demonstrate the evolution of income uncertainty in the United States over previous decades. Microeconomic evidence suggests that income uncertainty rose considerably during the 1980s as social insurance programmes were reduced in the U.S. Over this same period the home ownership rate fell approximately 2% from 66% to 64%, before resuming strong growth from the early 1990s onwards. Variation in income uncertainty facing households over this period might do some way to explaining the fall and then rebound in the home ownership rate.

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Table 1 **Summary Statistics for Households That Become Homeowners vs Stay as Renters** **22,799 Household-Year Observations, BHPS 1991-2006**			
	Becomes Owner by next wave	*Does Not Become Owner by next wave*	*P-value of Difference*
Characteristics			
Age of Head	37.4	45.5	0.0000
Married	0.47	0.45	0.1482
Divorced	0.12	0.22	0.0000
No. Dependent Children	0.66	0.74	0.0152
Ethnic Minority	0.11	0.13	0.0065
Employment Type			
Professional	0.16	0.07	0.0000
Skilled	0.12	0.09	0.0001
Semi-Skilled	0.33	0.17	0.0000
Agricultural	0.02	0.01	0.0607
Education (age bands)			
Degree (18-21)	0.17	0.07	0.0000
A-level (16-18)	0.21	011	0.0941
GCSE (14-16)	0.31	0.27	0.0168
Income and Saving			
Hhd Monthly Income	£1,300	£1,000	0.0000
Saver	0.38	0.25	0.0000
N	1,292	21,507	

Notes to Table 1: Dependent variable takes a value of 1 is the renting household becomes a homeowner in the next year and a value of 0 if the renting household remains a renter. Individual characteristics are identified off head of household. Household monthly gross income is sum of incomes of head of household and spouse/partner (where applicable). 'Married', 'Divorced', 'Ethnic Minority', 'Employment Type' and 'Education' variables are all 1/0 dummy variables. No. Dependent Children is the number of dependent children within the household. 'Saver' is a 1/0 dummy variable for whether the household saves out of their current income.

Table 2 **First-Stage Regression for Unemployment Risk** **Coefficients and Marginal Effects on Industry Dummies** **61,798 Household-Year Observations, BHPS 1991-2006**		
	Coefficient (Standard Error)	Marginal effect (Standard Error)
Broad Industrial Classification (base is public sector employment)		
Agriculture, Forestry and Fishing	0.093 (0.076)	0.0035 (0.003)
Extraction	0.170** (0.04)	0.0065** (0.0017)
Engineering	0.152** (0.04)	0.0051** (0.0013)
Manufacturing	0.137** (0.04)	0.0050** (0.0014)
Construction	0.162 (0.05)	0.0068** (0.0023)
Distribution, Hotels, Catering	0.223 (0.04)	0.0092** (0.0020)
Transport and Communication	0.027 (0.056)	0.0009 (0.0020)
Banking	0.136 (0.046)	0.0052** (0.0019)
N	61798	
LR χ^2 (35)	429.93	
Prob > chi2	0.0000	
Pseudo – R^2	0.0419	

Notes to Table 2: Statistical significance at *=5%, **=1% level. Dependent variable takes a value of 1 if the head of household becomes unemployed in the next year and a value of 0 otherwise. Additional control variables (also included in second-stage regressions, results reported in tables 4 and 5) are age, gender, marital status, spouse/partner employment status, number of dependent children in household, dummies for educational qualifications, household income, region of residence.

Figure 1
Coefficients of Variation for House Prices in U.K. Counties, 2000
(derived from Halifax standardised prices index 1996-2000)

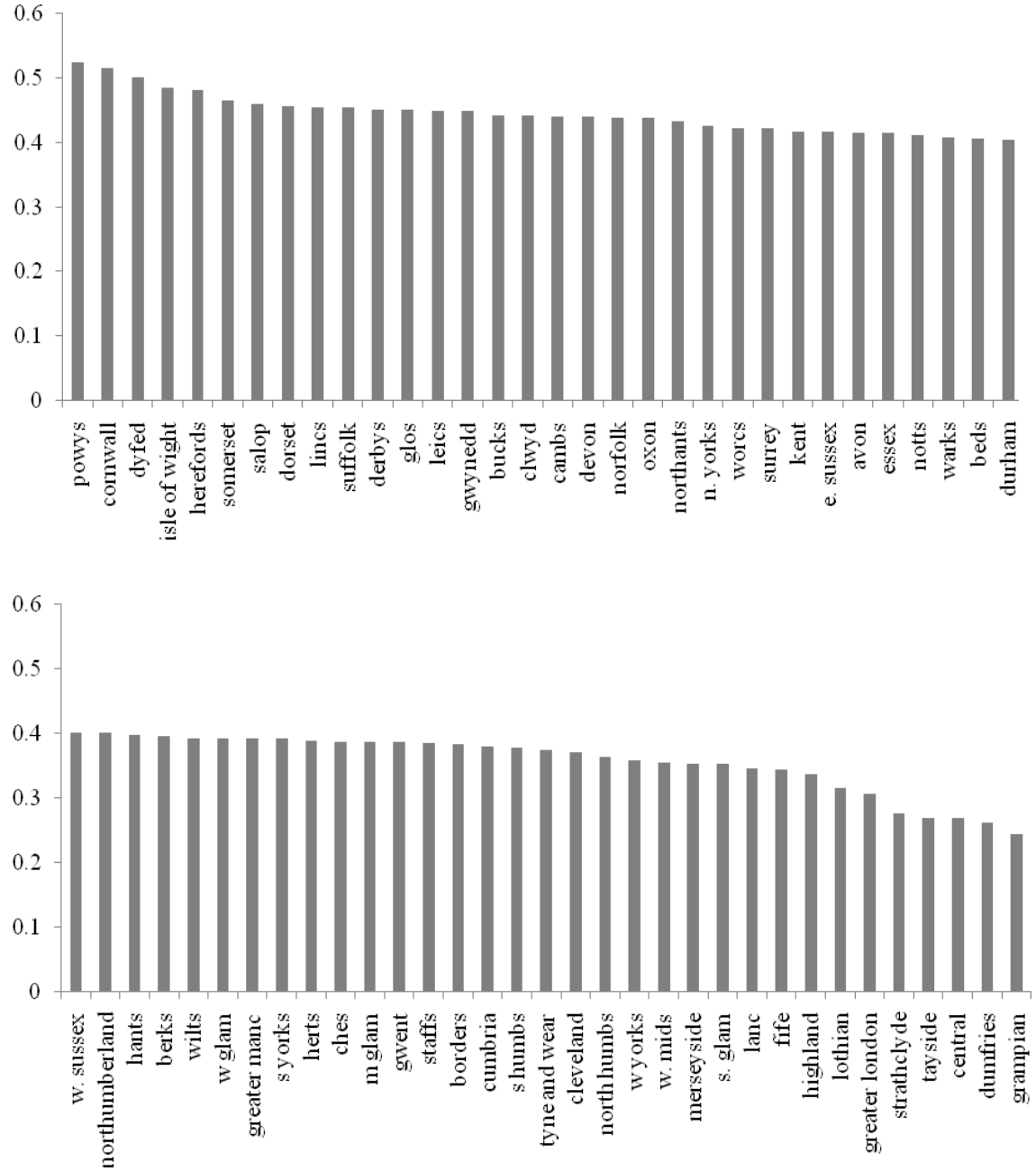

Table 3
Income Uncertainty, House Price Uncertainty and Transition into Homeownership
Random Effects Probit Estimates for 22,799 Household-Year Observations
BHPS 1991-2006

Variable	(1) Income Uncertainty Only	(2) House Price Uncertainty Only	(3) Income and House Price Uncertainty
Income Uncertainty	-4.35** (1.51)	-	-3.15** (1.03)
House Price Uncertainty	-	0.34** (0.08)	0.36 (0.28)
Household Income	0.0001** (0.00002)	0.0001** (0.00002)	0.0001** (0.00002)
Head Self-Employed	0.05** (0.007)	0.05** (0.07)	0.05** (0.002)
Age of Head	-0.007** (0.001)	-0.008** (0.001)	-0.08** (0.01)
Male Head	-0.009 (0.04)	0.01 (0.03)	0.004 (0.03)
Married Head	-0.02 (0.04)	-0.04 (0.05)	-0.04 (0.05)
Number of Children	-0.06** (0.02)	-0.07** (0.02)	-0.07** (0.02)
Spouse Employed	0.03** (0.004)	0.03** (0.004)	0.03** (0.003)
Head has Degree	0.05** (0.006)	0.05** (0.007)	0.05** (0.005)
Head has A-levels	0.04** (0.005)	0.04** (0.005)	0.04** (0.005)
Head has O-levels / GCSEs	0.002** (0.004)	0.002 (0.004)**	0.002 (0.004)
No of Observations	22,799	22,799	22,799
No. Groups	7048	7048	7048
Avg. Obs Per Group	4.4	4.4	4.4
Wald χ^2	748.03	707.29	709.59
Prob > χ^2	0.0000	0.0000	0.0000
Log Likelihood	-6415.14	-5853.91	-5851.92
Baseline Prediction	0.048	0.045	0.048

Notes to Table 3: Statistical significance at *=5%, **=1% level. Dependent variable takes a value of 1 if the head of household (or spouse) becomes a home owner in the next year and a value of 0 otherwise. Individual characteristics identified off head of household. Household monthly gross income is sum of incomes of head of household and spouse/partner (where applicable). 'Married', 'Divorced' and 'Education' variables are all 1/0 dummy variables. No. Dependent Children is the number of dependent children within the household. 'Baseline prediction' is average predicted value of dependent variable across all household-years.

Table 4
Income Uncertainty, House Price Uncertainty and Transition into Homeownership
Fixed-Effects Probit Estimates for 1197 Households who Enter Homeownership, BHPS 1991-2006

Variable	(1) Income Uncertainty Only	(2) House Price Uncertainty Only	(3) Income and House Price Uncertainty
Income Uncertainty	-8.29* (3.15)	-	-8.10* (3.28)
House Price Uncertainty	-	0.46* (0.24)	0.38 (0.25)
Household Income	0.0002** (0.00009)	0.0003** (0.00009)	0.0003** (0.00009)
Head Self-Employed	0.09** (0.03)	0.07** (0.03)	0.07** (0.03)
Age of Head	0.04** (0.02)	0.04* (0.02)	0.04* (0.02)
Married Head	0.07** (0.02)	0.06* (0.02)	0.06* (0.02)
Number of Children	0.05 (0.09)	0.04 (0.10)	0.04 (0.10)
Spouse Employed	0.05** (0.02)	0.05** (0.02)	0.05** (0.02)
Head has Degree	0.04 (0.06)	0.04 (0.06)	0.04 (0.06)
Head has A-levels	0.05 (0.06)	0.05 (0.06)	0.05 (0.06)
Head has O-levels / GCSEs	0.05 (0.06)	0.05 (0.06)	0.05 (0.06)
No of Observations	5,626	5,626	5,626
No. Groups	1,292	1,292	1,292
Avg. Obs Per Group	4.7	4.7	4.7
LR- χ^2	762.37	740.19	743.30
Prob > χ^2	0.0000	0.0000	0.0000
Log Likelihood	-1319.76	-1230.03	-1229.48
Baseline Prediction	0.17	0.16	0.16

Notes to Table 4: Statistical significance at *=5%, **=1% level. Dependent variable takes a value of 1 if the head of household (or spouse) becomes a home owner in the next year and a value of 0 otherwise. Fixed effects estimates based on 1,292 renting households who become homeowners (observed over an average of 4.7 years in the panel). Individual characteristics identified off head of household. Household monthly gross income is sum of incomes of head of household and spouse/partner (where applicable). 'Married', 'Divorced' and 'Education' variables are all 1/0 dummy variables. No. Dependent Children is the number if dependent children within the household. 'Baseline prediction' is average predicted value of dependent variable across all household-years.

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06/01	Sarah Bridges, Richard Disney & John Gathergood	Housing Wealth and Household Indebtedness: Is There a 'Household Financial Accelerator'?

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