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Household Formation and Tenure Choice: Did the great Irish housing bust alter consumer behaviour?

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Abstract: This paper analyses the household formation and tenure choice decisions of different age cohorts in the Irish market. We use data covering the years 2001 to 2011, a period which encompasses the boom, bubble and collapse in the Irish housing market. We find that the household formation decision is affected by the rent-to-income ratio while tenure choice depends upon the difference between rent and the user cost of housing, a notional cost of services derived from owning a home. After the crash, the balance of these costs favoured renting, resulting in a decrease in owner occupancy. In addition, we find that falling average rents caused entry to the housing market to become more affordable, and that this is linked to significantly higher household formation rates.

Keywords: Households, Housing, Demographics

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1 Introduction

The Irish housing market has experienced an exceptional roller-coaster ride over the last fifteen years. Between 2000 and the peak of the housing boom in 2007 prices rose by 100%, while they subsequently fell by approximately 50% in the period to 2013, taking them back to the level that they were at in 2000. The factors driving the boom and subsequent collapse in house prices have been analysed by a number of authors (Murphy [2005], Conefrey and FitzGerald [2010] and McQuinn and O'Reilly [2006]).

There were some exceptional factors that facilitated the growth of a bubble in the housing market in the period to 2007. The ready availability of low cost funding on the interbank market allowed the financial sector in Ireland to fund the boom. This capital inflow was not checked by appropriate regulatory action by the authorities in the Central Bank (Honohan et al. [2010]). In addition, fiscal policy, which could have acted to deflate the growing bubble, served to make things worse (Conefrey and FitzGerald [2010]). A consequence of the bubble bursting has been a collapse in the domestic financial system, which has directly cost the taxpayer approximately 40% of GDP.

The factors driving the boom in house prices in Ireland were similar to those that resulted in housing market bubbles in other developed economies (Muellbauer and Murphy [2008]). However, as discussed in Conefrey and FitzGerald [2010], in the case of Ireland and Spain demographic factors contributed to the rapid rise in household numbers. This reflected the fact that there was a much greater need for additional housing in these economies than was the case in other mature economies, such as the UK and Germany.

Identifying the effects of demographic change on the housing market in Ireland has proved difficult using aggregate time series data. However, the very big turnaround in underlying economic circumstances that resulted from the economic crisis in 2008 and, in particular, the dramatic change in the cost of housing, provides a natural experiment, facilitating examination of the factors driving household formation and tenure choice. In this paper we use data over the period 2001-2011 for a large sample of individuals aged between 20 and 39 to model how demographic pressures have affected the decision of individuals to set up an independent household. We also analyse the factors that determine the tenure choice of these households.

The housing market behaviour of young people in Ireland has traditionally resembled more closely behaviour seen in Southern European countries than in Northern and Western Europe. Irish households tend to be larger and young people delay setting up their own households, independent of the parental home, until later ages. Iacovou [2010] provides descriptive statistics on the percentages of young men and women living with their parents for a range of European countries (1994-2001). Among men aged 24-26, for instance, 73% live in the parental home in Ireland while 42% and 28% live at home in the United Kingdom and the Netherlands, respectively.

However, since the crisis, individuals have begun to form independent households at earlier ages in Ireland. By contrast, recent years have seen a trend in many countries of people delaying forming independent households, as noted by Cobb-Clark [2008] in a survey of the household formation literature.

Given that most new entrants to the housing market tend to be renters, the cost of renting should

play an important role in determining whether a person chooses to enter the market. Since Ireland's housing market crash in 2008, average rents have fallen considerably. In this paper we analyse how favourable movements in affordability, measured by the ratio of rent to income, have driven the increase in the rate of household formation.

2 Methodology

In modelling household formation behaviour we focus on an individual's independence of their parental home rather than the more usual approach of focusing on the behaviour of the designated "head" of a household (Painter and Yu [2013], Nygaard [2011] and Paciorek [2013]). Headship rates, as used in these studies, are defined as the proportion of a particular age-group who are "heads of household", i.e. the Household Reference Person (HRP) or main respondent to a Census or Household Survey.

As discussed in Duffy et al. [2014], headship rates suffer from biases and they are an unsatisfactory measure of independent living by individuals. Gender bias is a common feature of headship rates. While statistical agencies may no longer employ a general rule of selecting the eldest male as the head of household, response bias still remains. Within a household, the selection of a respondent may be determined based on cultural norms or tradition. For instance, in Duffy et al. [2014] we show that the distribution of household heads is more skewed towards males in France than it is in Ireland. The headship rate terminology thus renders potential cross-country comparisons of young people's housing behaviour difficult. We also observe that, across a number of countries, the gender balance is more uneven the older the household considered.

Here our focus is on the extent to which young people engage with the housing market by leaving their parental home. Each household in a household survey has a unique HRP, so a household comprising of numerous individuals thus makes the same contribution to the aggregate number of HRPs as an individual living alone. However, individuals forming larger households, rather than splitting into smaller ones, also lower the aggregate headship rate for the cohort. All the while, the headship rate terminology misses out on the fact that all of these individuals are active in the housing market and independent of their family home. This is particularly relevant to our study, given our focus on younger age-groups, where it is common for individuals to share accommodation.

Another well-known feature of the Irish housing market is the high share of owner-occupiers; the homeownership rate derived from the Census of 2002 was 77.4%. This fell to 73.1% and 69.7% in the Censuses of 2006 and 2011 respectively, but it still remains among the highest rates of owner occupation in Europe. Andrews and Sánchez [2011] and Earley [2004] find high homeownership rates for Southern Europe (e.g. 83% for Spain), with lower rates in the United Kingdom (71%), United States (69%) and Northern Europe (e.g. 52% in Denmark and 41% in Germany). Using Quarterly National Household Survey (QNHS) data from 2004, Duffy [2007] finds high levels of homeownership even among young Irish people; 68% of individuals aged 25-34 were owner-occupiers.

Many explanations have been offered for the high rate of owner-occupancy in Ireland. Norris and Winston [2011] note a cultural inclination in Ireland to owner-occupation, but focus on the impact of governmental policy in supporting this tenure. Policies include support for first-time buyers, provision

of loans to buyers, giving the “right to buy” to those in social housing, the lack of a property tax¹ and exemption from capital gains tax for owner-occupiers upon sale. Rae and van den Noord [2006] also point to incentives from the taxation system for homeownership. Duffy [2010] and McCarthy and McQuinn [2013] draw attention to Ireland’s adoption of the euro; accession to the European Monetary Union lowered interest rates, lowering the cost of owner-occupation during Ireland’s housing boom. In addition, lower interest rates, increased competition between Irish banks and population dynamics proved conducive to rapid credit growth in Ireland. Ortalo-Magne and Rady [1999] highlight the importance of liberalisation of credit conditions on younger age-groups. Younger and less affluent sections of society tend to benefit disproportionately from credit growth in terms of homeownership. During the housing boom owner-occupancy grew among younger Irish people. Young Irish people may now be credit-constrained post-crash, with difficulty in accessing mortgage lending potentially providing one explanation for the rise in renting at the expense of homeownership.

Social housing and private renting provide the alternatives to owner-occupation. The counterpart to a high ownership rate is a low rental rate, and Conefrey and FitzGerald [2009] discuss the thinness of the Irish rental market. They link a post-2009 shift of housing stock to the rental market with falling rents and increasing affordability as factors aiding an increase in the rate of household formation.

In examining the choice of housing tenure by younger Irish households, we thus consider three possible tenure types; owner-occupation, private renting and social housing. Nygaard [2011], in a paper focusing on the United Kingdom, suggests treating social housing as a tenure choice in its own right, separate from the private rental market. This is a consideration we feel to be relevant to studying housing demand in Ireland, also. By contrast, studies of the US housing market, such as Painter and Lee [2013] and Yu and Myers [2010], do not draw this distinction.

We consider the extent to which tenure choice can be explained by the difference between the user cost of housing and average rents. The user cost of housing expresses the notional cost to an individual from the “housing services” provided by owning a dwelling². The user cost measure incorporates taxation, depreciation, mortgage costs and price expectations. Price expectations are represented as a four-quarter moving average of housing price changes³. Including price expectations means that the expected user cost of housing can be negative, reflecting an expected capital gain.

The absolute difference between the user cost and average rents represents the relative cost of owner-occupation and renting: when rents are greater than the user cost, owner-occupancy is preferred to renting. Post-crisis, rents fell and were exceeded by the user cost, which rose, predominantly due to a shift in price expectations. We thus expect to find a positive relationship between renting and the difference between user cost and rents.

We use a Heckman-style selection model for our tenure choice problem for two reasons. Firstly, in a multinomial setting we find significant gender differences in tenure choice when one does not control for household formation. In Ireland, females tend to form independent households younger and at a greater rate than do males. This result is particularly striking when using our measure of household formation which, as discussed above, removes reporting bias which favours males. When controlling for household formation, no significant gender difference in tenure choice remains.

¹Local Property Tax was introduced in Ireland in 2013.

²The approach used here follows that in Murphy [2005].

³Experience suggests that backward looking expectations have characterised behaviour in the Irish housing market.

Secondly, it is intuitive that there may be selection effects between household formation and the tenure choices, particularly in favour of renting. Indeed, we do find strong evidence for this; Irish young people tend to form independent households as (private) renters in the first instance. Increasing household formation should thus also lower the observed homeownership rate, given the marginal entrant to the housing market is likely to be a renter. We follow a literature including Haurin et al. [1996], Åsberg [1999], Haurin and Rosenthal [2007] and Painter and Lee [2013] which accounts for the influence of selection effects on housing tenure. To the best of our knowledge, this is the first time that selection effects in housing demand in Ireland have been examined.

We estimate our models based on pooled data from 2001 to 2011. While the micro-data we use is available up to and including 2013, we are constrained by availability of our macro data, particularly on regional disposable income: Ireland's Central Statistics Office (CSO) produces regional accounts for which the most recent edition is 2011. We proceed by describing our data and providing descriptive statistics relating to the housing market in Ireland, then we show the results of our formation and selection models before concluding.

3 Data and Descriptive Statistics

We use data from the Quarterly National Household Survey (QNHS) produced by the CSO. The QNHS is Ireland's Labour Force Survey; a nationwide survey of households which is used to calculate official labour statistics such as employment and unemployment. All private households in the State are targeted by the CSO. The survey is a rolling panel with households remaining in the sample for five quarters. The QNHS has had a high response rate of approximately 85% in recent years⁴. 26,000 households are interviewed per quarter. The size of the sample provided by the QNHS is a key feature for our study, given that we are focusing on the housing market behaviour of young Irish people. As discussed further below, our strategy will also involve the segmentation of the sample further by five-year age-groups, enabled by the large sample from the QNHS. While longitudinal data are available, we focus on pooled estimations for two reasons. First, the data do not allow us to separately identify a young person's transition from the parental home to an independent household from them exiting the panel. Second, the rolling panel structure does not pick up a high volume of housing transitions within four quarters.

Figure 1 shows the percentage of individuals who live independently of their parental home for each year from 1998 to 2013, differentiated by five-year age-groups. As mentioned above, here we focus on whether the individual has formed or joined an independent household, not whether they are the head of such a household. The formation rates among the 20-24 and 35-39 age-groups do not show much change over the period; they remain relatively constant at 35% and 90% respectively. For the 25-29 and 30-34 age-groups there appears to be strong growth from 2008 onwards. Among those aged 25-29, there was a ten percentage point increase from the earlier years to the peak of 73% in 2009 and 2010. Formation rates among the 30-34 group grew by seven percentage points. Both series, however, show falls in formation in 2013, hinting at the impact of housing affordability (via a return to increasing rents) on these formation rates.

⁴Kelly et al. [2013] report this figure based on information from the CSO.

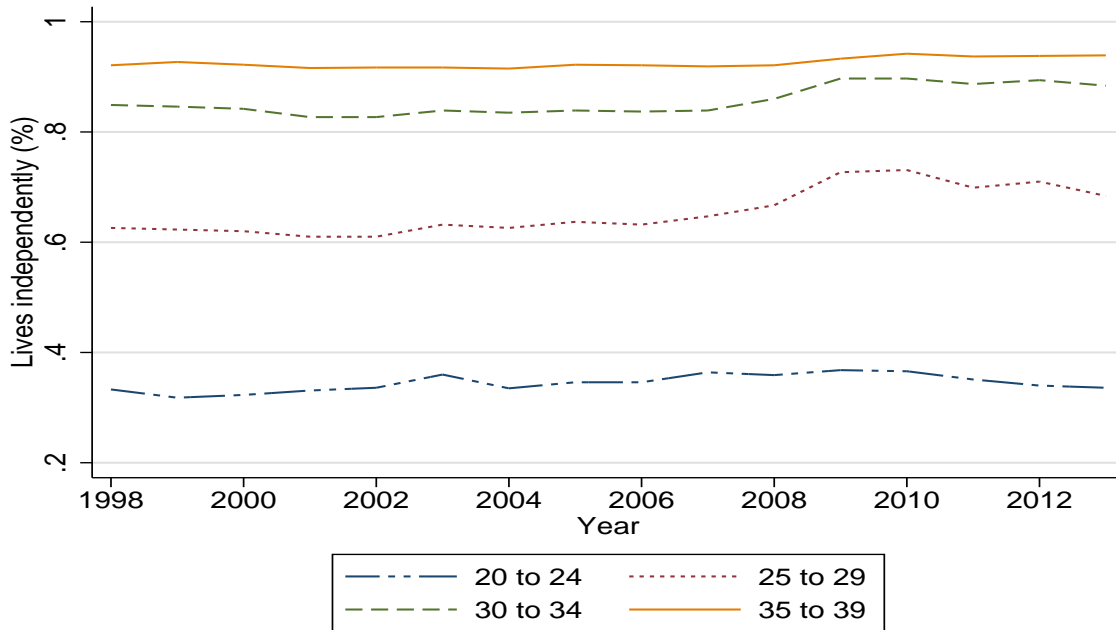


Figure 1: Household formation by age-group, 1998-2013

Figure 2 plots the expected annual user cost of housing⁵ against the average annual cost of renting from 2001 to 2013. With a brief exception in 2002, the user cost curve lay below zero prior to 2008. This meant that the user cost was rather a user benefit, being driven by the expected capital gain from purchasing a house. Post-crash, the user cost curve rose sharply. As of the fourth quarter of 2013, the user cost remains higher than the annual average cost of renting, providing an incentive to rent. We include the difference of the two series shown in Figure 2 as a parameter of interest in our tenure equation. We argue that there should be a negative relationship between this variable and demand for owner-occupied housing, i.e. demand for housing should be decreasing in the user cost and increasing in rents.

Figure 3 shows the tenure proportions of individuals aged 25 to 29, conditional on having formed an independent household⁶. Figures 4, 5 and 6 in the Appendix show tenure choice through time for the other age-groups on which we focus. Across all age-groups, there has been a shift away from owner-occupation and toward renting, particularly after 2008. The proportion who rent from a Local Authority has remained relatively constant across years, however. Table 1 provides descriptive statistics on the 2012 occupancy patterns of the four age-groups we examine. While each age-group has seen an increasing percentage renting, traditionally only the 20-24 group had renting as the majority tenure. During the last decade, the 25-29 age-group also moved to a renting majority, while there is now only approximately a ten percentage point difference between the owning and private renting groups among the 30-34 group. Owner-occupancy rates have fallen by approximately 15 percentage points among those aged 20-24 and aged 35-39, and by 25 percentage points in both the 25-29 and

⁵Both series use quarterly data. Calculations derived in “The Expected User Cost of Housing” by D. Duffy in Duffy et al. [2013]

⁶Figure 3 expresses tenure as a proportion of those who have left their parental home, rather than as a proportion of the entire cohort of that age.

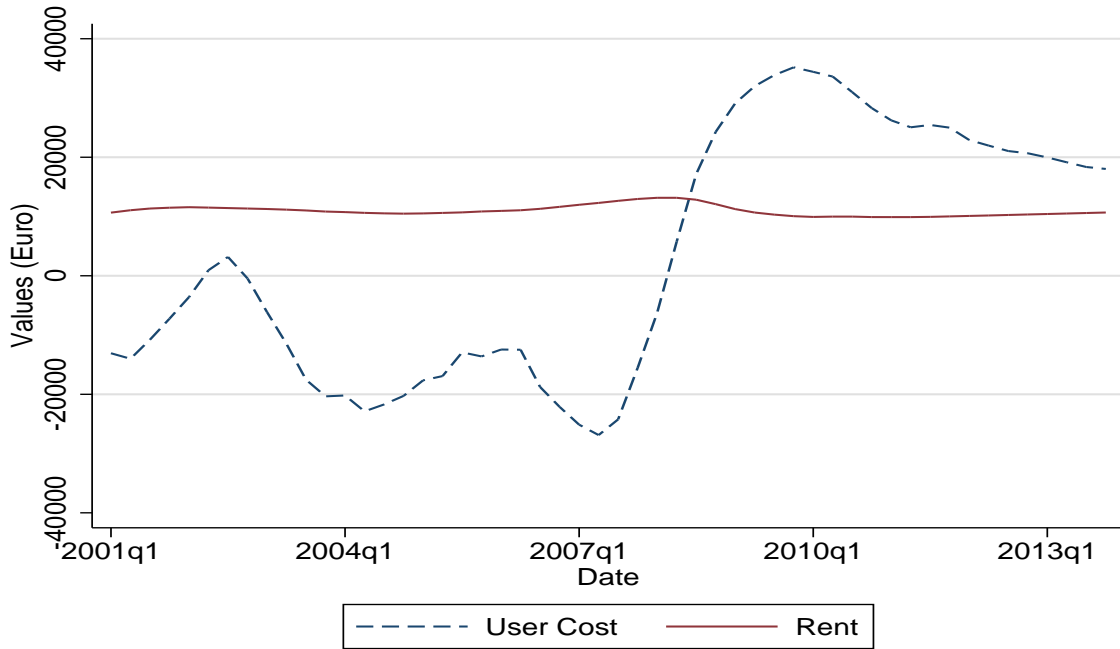


Figure 2: User cost of housing and average rents, 2001-2013

30-34 age-groups.

Table 1: Tenure by age, 2012

Age	Tenure (%)		
	Owner	Local Authority	Private Renter
20-24	11.8	8.4	79.8
25-29	26.2	9.5	64.3
30-34	51.4	9.6	39.0
35-39	69.1	9.4	21.5

As outlined above, for each household surveyed under the QNHS a Household Reference Person is nominated. Using information on the relationships of the other members to the HRP, we construct our outcome variable for independent household formation. Our formation variable shows a success if the individual is a HRP or partner of the HRP. We treat HRPs and partners equally, again eliminating the scope for gender bias to enter in this way. If an individual is a child of a HRP, or an antecedent relative of the HRP, then our left-hand side variable shows a failure. Finally, in the results we provide, we treat “others” and “other relatives” as successes. It is likely that the “others” are predominantly unrelated housemates with whom the HRP shares accommodation, meaning that they have left the parental home and thus should be treated as successes in our investigation. Nonetheless, we have examined treating either or both of these groups as failures in our estimations and our results are robust to these variations.

In the formation equation, our main focus is the relationship between affordability and the probability of household formation. Our affordability measure is the ratio of average rents to Personal

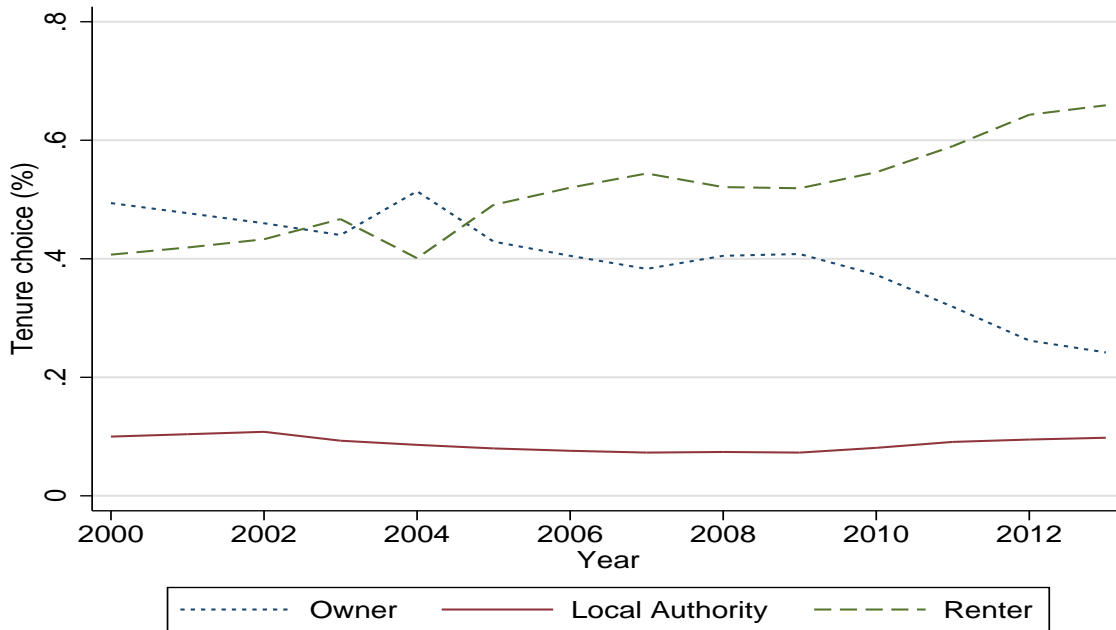


Figure 3: Tenure choice of 25-29 age-group, 2000-2013

Disposable Income, at NUTS3 regional level⁷. Our user cost measures, employed in the tenure choice equation, are also at NUTS3 level.

We then control for a vector of explanatory variables taken from the QNHS, including sex, marital status, family status, educational attainment, main labour status, nationality and years resident in Ireland. From the first quarter of 2009, the QNHS has included decile of income for employees, based on monthly take-home pay. This omits both the self-employed and those who are neither employed nor self-employed but have an alternative source of income. The lack of data between 2001 and 2009, coupled with the low response rate after the question's implementation, renders this variable unusable for our purposes.

We thus use education level to proxy for income, capturing the extent to which individuals have the means to afford to form a household. The education variable we use describes the highest level of education attained, and we form five groups from the responses to the survey⁸. These are No Formal Education, Primary or Lower Secondary (including Junior Certificate), Upper Secondary (Leaving Certificate), Post-Leaving Certificates and Third Level (Higher Degree). Table 2 shows the percentages with each level of education in 2011, by age-group.

⁷The NUTS3 regions for Ireland are Dublin, Mid-East, Mid-West, South-East, South-West, Border, Midland and West. Rents are taken from the CSO and daft.ie, Personal Disposable Income is taken from the CSO Regional Accounts. We take the log of the ratio of rent to PDI. The user cost measure is constructed using data from the CSO and the Department of the Environment, Communities and Local Government.

⁸Educational attainment in the QNHS uses the ISCED classification from UNESCO. The Junior Certificate is a State examination taken at ages 14/15, while the Leaving Certificate takes place at the end of Secondary schooling; at ages 17/18.

Table 2: Educational attainment by age, 2011

Age	Educational attainment (%)				
	No Formal	Primary/Junior Cert.	Leaving Cert.	Post-Leaving Cert.	Third Level
20-24	2.4	10.5	51.3	19.7	16.2
25-29	3.7	11.7	24.1	30.3	30.2
30-34	4.0	10.6	22.6	32.2	30.6
35-39	4.6	13.0	21.8	32.1	28.4

4 Results

4.1 Household Formation

We use a probit model to estimate household formation pooled over 2001-2011, by age-group. We separate the sample by age-group to better identify behaviours specific to each age-group. In the first instance, we limited our focus to younger people (20-39) in Ireland as it is in those age-groups that most household formation takes place. Behaviour can also differ quite significantly by age within this sample however, as evidenced by Figure 1 and Table 1. We thus use the finest divisions of age available to us; five-year age-groups.

Table 3 provides the probit results for the four age-groups. These results represent the first stage in the Heckman model; providing the household formation estimates to the tenure choice estimations in the second stage. For the 25-29, 30-34 and 35-39 age-groups, the coefficient on rent to Personal Disposable Income shows the expected negative sign and is significant at the 1% level. Intuitively, when rent increases or income falls, household formation becomes a less affordable prospect and the formation rate falls. The results support the view that increasing household formation in Ireland is attributable to the fall in rents after the housing price crash.

In terms of the other covariates, the coefficient representing the difference between women and men proves to be positive and significant across all age-groups; women form independent households at a greater rate and at earlier ages than men do. This result replicates that of studies from other countries. The impact of family formation is also apparent; single people form households at a lower rate than those who are married/in a partnership.

We take those in employment as our reference group for the Main Labour Status variables. Unemployed individuals are significantly less likely to form households, as are those who are classified as unable to work due to disability or illness. Students in the 25-29 and 30-34 age-groups also have a significantly lower formation rates, likely reflecting lower means as a result of being out of gainful employment. In separate estimations by year, we note that the magnitude of this unemployment effect for those 25-39 has risen through time, likely to do with the scale of the negative labour market outcomes in Ireland post-crash. In earlier years the effect was either smaller or insignificant.

The coefficients on our migration variables provide support for previous findings in the literature, such as in Duffy [2007]. Migrants have higher household formation rates than the native Irish population across all age-groups and years. Recent migration is also associated with higher formation rates, with the difference between migrants and natives disappearing with longer time in residence in

the country. Regional dummies show that formation rates are significantly lower in the Dublin region than elsewhere, particularly in the 25-29 age-group, likely reflecting relative costs.

Upper Secondary education is taken as the reference group for the educational attainment variables, giving two lower and two higher categories. Both lower and higher levels of educational attainment are associated with significantly higher formation rates than the reference group, although we interpret this as picking up on two different effects. Those with higher education, particularly Third Level education, have greater means than the other groups, increasing the ability to afford the cost of household formation.

Those with lower education have, by definition, left the education system at earlier ages and are also likely to enter the labour market and form families at earlier ages; these are life-stage effects. While those in the higher educational groupings have likely delayed both of these things to later ages, the greater returns from higher education dominate the life-stage effects in the older age-groups.

Table 4: Average Marginal Effects by age, 2001-11

Age	$\frac{Rent}{PDI}$	Education level			
		No Formal	Primary/Junior Cert.	Post-Leaving Cert.	Third Level
20-24	0.029***	0.041***	0.033***	0.036***	0.115***
25-29	-0.178***	0.038***	0.044***	0.041***	0.087***
30-34	-0.145***	0.011***	0.020***	0.033***	0.070***
35-39	-0.063***	-0.001	0.004***	0.020***	0.043***

p-values: * = 0.1, ** = 0.05, *** = 0.01

Table 4 shows Average Marginal Effects for affordability on formation rates. An increase of one percentage point in the log ratio of rent to Personal Disposable Income is associated with a fall of 0.18 percentage points in the formation rate among those aged 25-29. The marginal effects of education, proxying income, should be interpreted as the additive increase in the probability of household formation associated with having a given education level, compared with having Upper Secondary educational attainment. Thus, for example, on average the probability that an individual aged 25-29 with Third Level education is in an independent household is 8.7 percentage points higher than that of a person with Upper Secondary education.

4.2 Change in Formation Rates

As we have seen, household formation rates increased over the decade we study. One must discern whether this can be attributed to changes in the distribution of the characteristics of our sample (e.g. more people having higher education) or changes in the coefficients on those characteristics (e.g. a stronger impact of higher education). We thus perform non-linear Blinder-Oaxaca decompositions⁹ of our probit models for tenure, which quantify the relative importance of the “endowments effects” and “coefficients effects” just mentioned.

Higher level educational attainment grew greatly in Ireland in the last 20 years. In 2001, 31% of

⁹We use the normalizations proposed by Gardeazabal and Ugidos [2004] to overcome the identification issues with categorical variables, outlined by Oaxaca and Ransom [1999].

those aged 30-34 in Ireland had third level education, compared with the European Union average¹⁰ of 23%. While the EU average had grown to 35% in 2013, the figure for Ireland had grown to 50%, the highest in the EU, causing the endowment of higher education to grow. Table 5 separates the contribution of this from the contribution of a change in coefficients, i.e. a change in behaviour of those with higher education.

The overall difference in formation rates between 2006 and 2011 was positive for each age-group. The coefficients effect is positive and, in fact, greater than the overall difference in all cases. For example, the formation rate rose by 5.3 percentage points for those 30-34, but would have risen by 7.2 percentage points had there been no other effects. The coefficients effect is statistically significant for all but the 20-24 age-group, whereas the endowments effect is not significant in any age-group. The coefficients effect is thus the main driver of the increase in formation between these years, rather than a change in endowments¹¹.

Table 5: Oaxaca decompositions of changes in formation rates, by age

	Change in formation rates (pp)			
	20-24	25-29	30-34	35-39
2006-2011				
Overall Difference	2.0	7.4	5.3	1.7
Endowments Effect	-2.1	2.1	0.1	-1.3
Coefficients Effect	5.8	16.1	7.2	3.9
Interaction	-1.7	-10.8	-2.0	-0.9
2001-2006				
Overall Difference	0.4	1.9	1.2	0.6
Endowments Effect	5.2	1.6	-1.0	-0.4
Coefficients Effect	1.1	-5.1	0.2	2.4
Interaction	-5.9	5.4	1.9	-1.4

The second panel of Table 5 shows the decomposition of the change in formation rates between 2001 and 2006. The overall increase in formation is lower than between 2006 and 2011 in every age-group. The endowments effect plays the dominant role in the formation growth this period; it is statistically significant in all but the 35-39 age-group. The coefficients effect is noticeably weaker than in the later period and is not significant in any age-group between 2001 and 2006. Thus we conclude that behaviour, rather than changes in the structure of the population, drove the increase in formation post-2006. Change in the characteristics of the population was the main driver of the weaker growth in formation pre-2006. The results from our Oaxaca decomposition support the view that the housing market changed for younger Irish people post-crash, with increasing household formation the result of changing behaviour.

¹⁰Source: Eurostat. Tertiary educational attainment by sex, age group 30-34; table t2020_41.

¹¹The interaction effect allows for simultaneous changes in both endowments and coefficients. It is statistically significant in the 25-29 age-group only (2006-11).

4.3 Tenure Choice

We proceed to model tenure choice by age-group for the years 2001 to 2011. We incorporate our household formation estimations as a control in a Heckman¹² model in which the second stage is a probit model for a given tenure choice¹³. Our selection model effectively deals with a form of omitted variable bias; the formation stage. It also seeks to estimate the preference for each tenure type when the preference is not observed for every individual. We assume that the errors in the formation and tenure equations are normally distributed¹⁴ and test for a correlation between them; a selection effect. If there is a non-zero correlation then estimation of the second stage alone would give biased results. In Tables 6, 7 and 8, the sign and significance of the coefficients on the selection terms reveals the importance, or otherwise, of selection effects.

We estimate each tenure choice separately, by age-group. With regard to private renting, for each age-group the coefficient on the selection effect is positive and significant. This implies a positive correlation between household formation and renting. This result emphasises the importance of renting as an entry point for new individuals in the housing market. New entrants to the housing market rent accommodation before potentially proceeding to buy a property at a later date. Furthermore, negative and significant selection effects exist for both owning and renting from a Local Authority across age-groups, with the exception of a positive selection effect for owning among those aged 35-39. Separately estimating the selection model by year reveals that the positive renting selection effect holds in each year, while pre-crash there had been some positive owning selection effects. These became negative and significant post-crisis.

The result for the interaction of household formation and tenure in Ireland contrasts with Yu and Myers [2010], in which the authors attribute the recent increasing homeownership rate in the United States to falling household formation. They argue that new households forming are more likely to be renters, and thus lower household formation misleads an observer into a belief that homeownership is increasing. Adverse movements in affordability in the U.S. drove down the household formation rate, increasing the proportion of homeowners. As we have shown, increasing affordability since the advent of the financial crisis has resulted in household formation increasing rather than decreasing in Ireland, lowering the homeownership rate.

Our variable of interest, the user cost less average rents, is significant and shows the expected positive sign in Table 6. Thus, for every age-group, the impact of the relative costs of the tenure choices is as we expect; when owning becomes more costly or renting becomes cheaper, the preference for renting increases. Similarly, the results for owning in Table 7 show that for those under the age of 30 there is the expected negative and significant coefficient on the balance of incentives. These results shows a responsiveness to economic incentives in the tenure choice decision for young Irish people.

The long-standing preference for owner-occupied housing is likely attributable to the previously-noted incentives offered for owner-occupation and the lack of supply of rental market, for instance, which meant that owning was more attractive than renting. As shown in Figure 2, the falling user

¹²We also estimate a Multinomial Probit model for tenure choice, i.e. without controlling for formation. The intuition derived from the Heckman remains robust to this alternate specification.

¹³Tables 6, 7 and 8 report results from a Heckman Probit, however we also find the same results when using a Heckman two-step estimator with a linear second stage.

¹⁴We also used a Bivariate Probit estimator to allow for joint distribution of household formation and tenure choices.

cost from 2012 onward likely implies a return to demand for owner-occupied housing. Estimating the number of current households with rented tenure who would rather own a home is an avenue of ongoing research for the authors in Byrne et al. [2014c].

In terms of our other controls, the impact of family formation on tenure choice decisions is immediately apparent. Single people are significantly more likely to rent privately or from a Local Authority, whereas there is a negative and significant effect on owning. Similarly, those who are separated or widowed are more likely to rent (either tenure choice) and less likely to own. There is a positive and significant effect of having children for owning and for renting from the Local Authority, with a significantly negative association with private renting.

We use gender as part of the identification of the first stage (formation) and not in the second stage estimates, as we separately find that gender has no effect on the latter. Our migration variables (nationality and length of residence in Ireland) show significantly positive effects for renting and negative effects for owning, even controlling for the differentially higher formation rates among migrants. This is intuitive; given the longer-term nature of purchasing a house, migrants may be less likely than the native Irish population to do so. This holds even more so for recent migrants.

The coefficients on education show that those with higher education (Third Level) are significantly more likely to rent privately across all age-groups. We find that the sign of the effect of higher education on the probability of owning changes at age 30, emphasising the need to separately identify effects by age-group. For the two age-groups younger than 30, higher education has a negative and significant effect. For the older two age-groups, it has a positive effect. This likely implies a shift in behaviour of those with greater means as they reach their thirties. Higher education has a negative and significant effect on the probability of renting from a Local Authority across all ages, while lower education is associated with this tenure choice.

5 Conclusion

The scale of the Irish property crash of the late 2000s was exceptional by international standards. The very rapid rise and subsequent fall in property prices provides a natural experiment, facilitating the examination of how the cost of accommodation affects household formation and tenure choice.

In this paper, we examine how Irish people, aged between 20 and 39, respond to cost incentives; the shift away from traditional owner-occupation in recent years can be explained by the relative movement in the user cost of housing and rents. Furthermore, higher rates of household formation in recent years can be explained by an increase in affordability in the rental market; rents fell sufficiently post-crash to increase the household formation rate in Ireland towards levels more typically seen in other countries.

We construct a measure of household formation, concentrating on the behaviour of individuals, rather than focusing on the households which they form. This measure captures more fully the behaviour of young Irish people, as individuals leaving the family home may form a new household containing one or more members. Using this approach we remove the scope for gender-bias in the reporting of formation rates, and we then capture a gender effect in formation. We show that Irish women form households at a higher rate, and at earlier ages, than do Irish men. We use this fact as

part of our identification strategy for later selection models.

We model household formation rates as a function of affordability in the rental market and of individual characteristics. We show that falling rents are linked with an increased rate of household formation. We then identify different channels through which the household formation rates of young Irish people are affected. We use education as a proxy for income and, using this measure, we find contrasting effects of greater means/income with life-stage effects.

Higher levels of educational attainment increase the ability of individuals to finance household formation, at the expense of being older when they enter the housing market (and indeed the labour market). However, individuals who leave the education system earlier are likely to enter the labour market earlier and form a family earlier, increasing their formation rate. These contrasting effects are noticeable at the youngest age-groups, while the higher education effect dominates as individuals get older, raising household formation rates. We identify other important factors in household formation, including family formation, labour market status and migration.

We use decomposition methods to show that the increase in household formation rates over the period 2001-2011 was due to changing behaviour rather than a shift in the structure of the population of younger people, again supporting the affordability argument. The greater supply of rental housing in Ireland post-crash likely played an important part in the decline in rents. Ireland has a thin rental market, as discussed in FitzGerald [2005]. After the crash, whether accommodation was intended to be provided for rent, or merely offered to rent due to an inability to sell the property outright, the stock of rental accommodation was significantly enhanced.

We then use selection models to examine tenure choice, using household formation as the selection equation. To the best of our knowledge, this is the first time that housing selection effects have been estimated in Ireland. We identified the tenure equation using the difference of the user cost and rents, i.e. the relative cost of owning a home and renting. We find that the shift from owner-occupation to renting among younger people in Ireland can be explained, in part, by movement in the relative costs of the two tenures.

A natural follow-up question to this research is the likely future path for demand for owner-occupied housing compared with demand for rental accommodation over the rest of the decade. We have shown a significant responsiveness to the relative costs of owning and renting. We also note that the user cost has fallen since the end of our estimation period, being particularly driven by a turnaround in price expectations. The user cost becomes less onerous the greater the expected capital gain from a house purchase. Coupled with recent increases in average rents, owning is likely to become relatively more attractive if house prices continue to rise, due to the prospect of a capital gain from purchasing a dwelling. This will lead to an increased demand for owner-occupation. However, there remains the possibility that the scarring effect of the recent crash could have a longer-term effect on preferences for homeownership. Today, with few new houses being built but continuing demographic pressures and a buoyant labour market, rents are rising. Rising rents are likely to reduce household formation rates until there is a supply response.

A Appendix

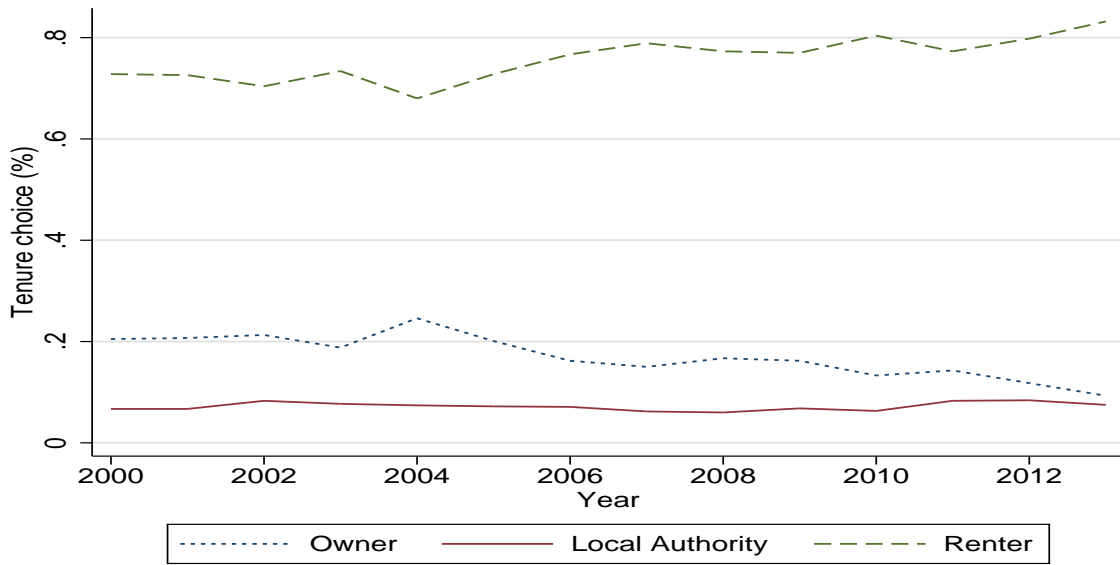


Figure 4: Tenure choice of 20-24 age-group, 2000-2013

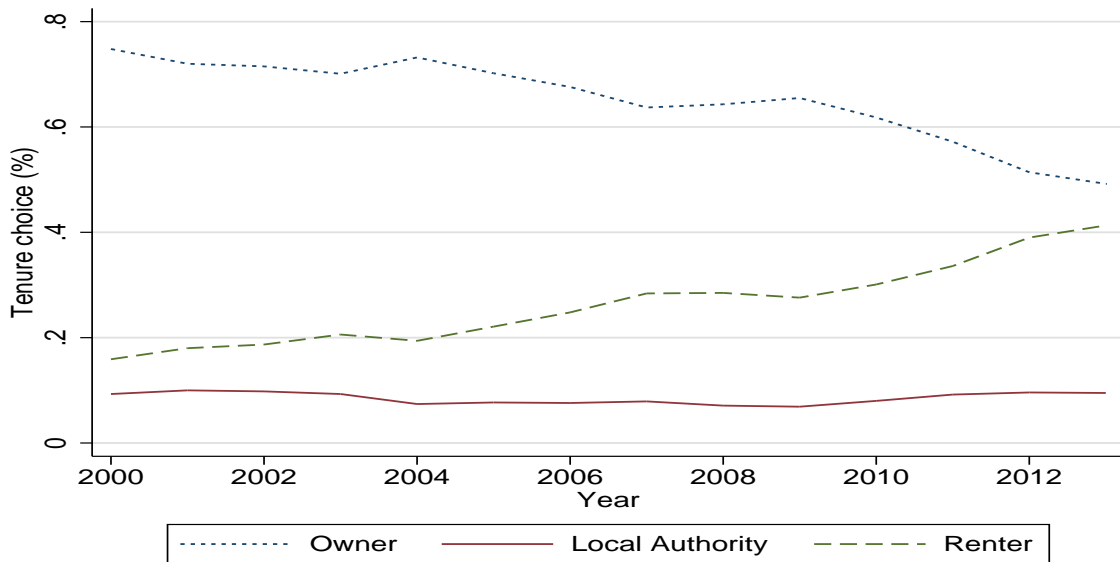


Figure 5: Tenure choice of 30-34 age-group, 2000-2013

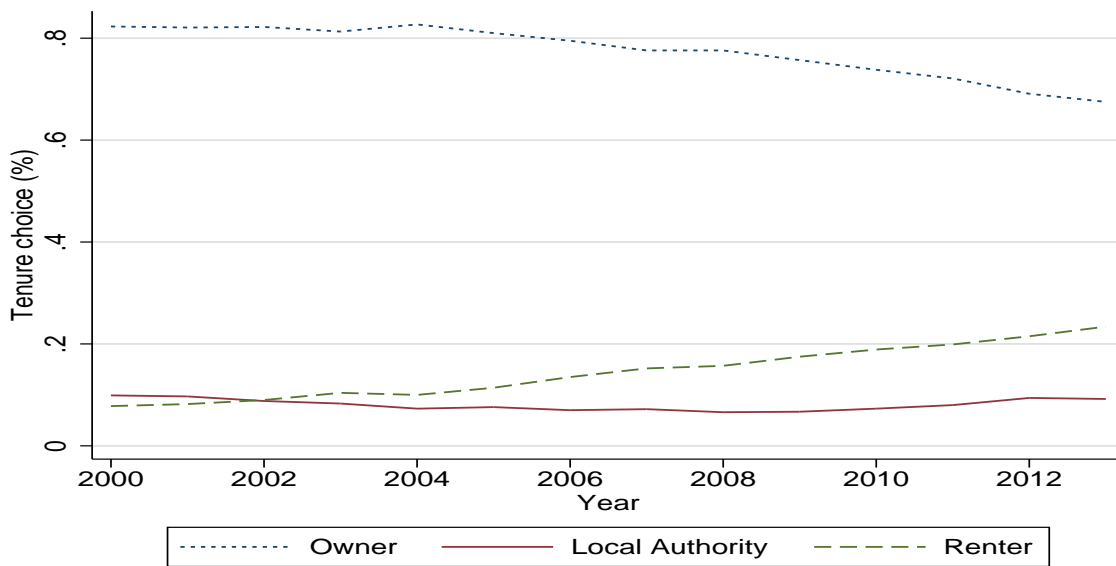


Figure 6: Tenure choice of 35-39 age-group, 2000-2013

B Bibliography

- D. Andrews and A. C. Sánchez. The evolution of homeownership rates in selected oecd countries: Demographic and public policy influences. *OECD Journal: Economic Studies*, 1, 2011.
- P. Åsberg. Housing decisions of young swedish adults. *Journal of Housing Economics*, 8(2):116–143, 1999.
- D. A. Cobb-Clark. Leaving home: What economics has to say about the living arrangements of young australians. *Australian Economic Review*, 41(2):160–176, 2008.
- T. Conefrey and J. FitzGerald. Managing housing bubbles in regional economies under emu: Ireland and spain. *ESRI Working Paper*, (315), 2009.
- T. Conefrey and J. FitzGerald. Managing housing bubbles in regional economies under emu: Ireland and spain. *National Institute Economic Review*, 211(1):R27–R44, January 2010. URL <http://ideas.repec.org/a/sae/niesru/v211y2010i1pr27-r44.html>.
- D. Duffy. The housing tenure of immigrants in ireland: Some preliminary analysis. *ESRI Working Paper* 188, 2007.
- D. Duffy. Negative equity in the irish housing market. *Economic & Social Review*, 41(1), 2010.
- D. Duffy, J. FitzGerald, K. Timoney, and D. Byrne. Quarterly economic commentary. *ESRI Quarterly Economic Commentary Series*, Autumn, 2013.
- D. Duffy, D. Byrne, and J. FitzGerald. Alternative scenarios for new household formation in ireland. *Special Article in Quarterly Economic Commentary, ESRI*, Spring, 2014.

- F. Earley. What explains the differences in homeownership rates in europe. *Housing Finance International*, 19:25–30., 2004.
- J. FitzGerald. The irish housing stock: growth in number of vacant dwellings. *Quarterly Economic Commentary*, 24:1–22, 2005.
- J. Gardeazabal and A. Ugidos. More on identification in detailed wage decompositions. *The Review of Economics and Statistics*, 86(4):1034–1036, 2004.
- D. R. Haurin and S. S. Rosenthal. The influence of household formation on homeownership rates across time and race. *Real Estate Economics*, 35(4):411–450, 2007.
- D. R. Haurin, P. H. Hendershott, and S. M. Wachter. Borrowing constraints and the tenure choice of young households. Technical report, National bureau of economic research, 1996.
- P. Honohan, D. Donovan, P. Gorecki, and R. Mottiar. The irish banking crisis: Regulatory and financial stability policy. *MPRA Paper, University Library of Munich, Germany*, (24896), May 2010.
- M. Iacovou. Leaving home: independence, togetherness and income. *Advances in life course research*, 15(4):147–160, 2010.
- E. Kelly, S. McGuinness, P. O’Connell, D. Haugh, and A. G. Pandiella. Transitions in and out of unemployment among young people in the irish recession. *ESRI Working Paper Series*, (466), 2013.
- Y. McCarthy and K. McQuinn. Credit conditions in a boom and bust property market. *Central Bank of Ireland Research Technical Papers*, 08/RT/13, 2013.
- K. McQuinn and G. O’Reilly. Assessing the role of income and interest rates in determining house prices. *Central Bank of Ireland Research Technical Papers*, (15/RT/06), Dec 2006.
- J. Muellbauer and A. Murphy. Housing markets and the economy: the assessment. *Oxford Review of Economic Policy*, 24(1):1–33, 2008.
- A. Murphy. Modelling irish house prices: A review and some new results. *Nuffield College Oxford. mimeo.*, 2005.
- M. Norris and N. Winston. Transforming irish home ownership through credit deregulation, boom and crunch. *European Journal of Housing Policy*, 11(1):1–21, 2011.
- C. Nygaard. International migration, housing demand and access to homeownership in the uk. *Urban Studies*, 48(11):2211–2229, 2011.
- R. L. Oaxaca and M. R. Ransom. Identification in detailed wage decompositions. *The Review of Economics and Statistics*, 81(1):154–157, 1999.
- F. Ortalo-Magne and S. Rady. Boom in, bust out: Young households and the housing price cycle. *European Economic Review*, 43(4-6):755–766, April 1999.

- A. D. Paciorek. The long and the short of household formation. Technical report, Board of Governors of the Federal Reserve System (US), 2013.
- G. Painter and K. O. Lee. What happens to household formation in a recession? *Journal of Urban Economics*, 2013.
- G. Painter and Z. Yu. Caught in the housing bubble: Immigrants' housing outcomes in traditional gateways and newly emerging destinations. *Urban Studies*, 2013.
- D. Rae and P. J. van den Noord. Ireland's housing boom: What has driven it and have prices overshot? *OECD Economics Department Working Papers*, (492), 2006.
- Z. Yu and D. Myers. Misleading comparisons of homeownership rates when the variable effect of household formation is ignored: Explaining rising homeownership and the homeownership gap between blacks and asians in the us. *Urban Studies*, 47(12):2615–2640, 2010.

Table 3: Household formation (Heckman first stage) 2001-2011

	20-24 Probit	25-29 Probit	30-34 Probit	35-39 Probit
Marital Status (Ref: Married)				
Single	-1.333*** (-45.50)	-1.958*** (-111.86)	-2.117*** (-135.07)	-2.336*** (-122.78)
Separated/Widowed	-0.874*** (-7.71)	-1.072*** (-19.39)	-1.273*** (-40.16)	-1.220*** (-42.52)
Gender (Ref: Male)				
Female	0.233*** (36.95)	0.250*** (38.52)	0.254*** (29.62)	0.328*** (28.48)
Educational Attainment (Ref: Leaving Cert)				
No Formal Education	0.143*** (7.86)	0.155*** (9.11)	0.0766*** (4.42)	0.00168 (0.09)
Primary/Junior Cert	0.114*** (10.80)	0.165*** (14.60)	0.126*** (9.68)	0.0486*** (3.11)
Post-Leaving Cert (Levels 6 and 7)	0.121*** (14.97)	0.142*** (16.55)	0.204*** (18.27)	0.220*** (14.42)
Third Level Education	0.362*** (42.10)	0.280*** (31.92)	0.427*** (34.48)	0.519*** (28.91)
Nationality (Ref: Irish)				
United Kingdom	0.210*** (6.08)	0.206*** (5.15)	0.112** (2.57)	0.399*** (8.21)
Rest of Europe	0.781*** (23.48)	0.956*** (23.91)	0.859*** (16.30)	1.038*** (12.80)
Rest of World	0.798*** (21.62)	1.047*** (20.49)	0.857*** (12.86)	0.670*** (7.92)
Main Labour Status (Ref: Employed)				
Unemployed	-0.121*** (-11.08)	-0.272*** (-23.35)	-0.300*** (-20.48)	-0.158*** (-8.54)
Student	0.0618*** (8.60)	-0.186*** (-12.60)	-0.224*** (-8.13)	-0.178*** (-4.02)
On home duties	1.284*** (70.45)	1.067*** (50.64)	0.831*** (34.53)	0.620*** (22.47)
Unable to work	-0.398*** (-13.08)	-0.717*** (-28.57)	-0.754*** (-32.94)	-0.517*** (-22.17)
Other	-0.310*** (-7.78)	-0.426*** (-10.02)	-0.442*** (-8.55)	-0.431*** (-7.68)
Years resident in Ireland (Ref: Irish-born)				
1 to 2 years	1.456*** (48.36)	1.244*** (34.98)	1.106*** (24.74)	0.911*** (15.16)
3 to 9 years	0.186*** (5.08)	0.795*** (17.48)	0.931*** (16.88)	0.608*** (9.41)
10 or more	0.0969*** (4.66)	0.185*** (8.42)	0.214*** (9.58)	0.162*** (6.67)
Rent to PDI	0.187*** (9.69)	-0.536*** (-25.97)	-0.895*** (-33.37)	-0.703*** (-20.28)
Regional Dummies	Yes	Yes	Yes	Yes
Intercept	0.612*** (18.17)	1.333*** (53.29)	1.527*** (55.25)	1.984*** (56.32)
N	219402	201738	213799	223972

Note: p-values: *=0.10, **=0.05, ***=0.01

Table 6: Selection model for Private Renting by age, 2001-2011

	20-24 Heckman Probit	25-29 Heckman Probit	30-34 Heckman Probit	35-39 Heckman Probit
Marital Status (Ref: Married)				
Single	-0.0316 (-1.20)	0.291*** (26.32)	0.504*** (50.05)	0.525*** (37.52)
Separated/Widowed	-0.267*** (-2.69)	0.472*** (11.78)	0.554*** (25.41)	0.700*** (44.33)
Educational Attainment (Ref: Leaving Cert)				
No Formal Education	-0.216*** (-8.70)	-0.0441** (-2.41)	-0.0185 (-1.08)	0.0143 (0.84)
Primary/Junior Cert	-0.122*** (-7.67)	-0.0417*** (-3.27)	-0.0448*** (-3.53)	-0.00625 (-0.47)
Post-Leaving Cert (Levels 6 and 7)	0.0250** (1.98)	0.0396*** (4.12)	-0.000948 (-0.09)	-0.000627 (-0.05)
Third Level Education	0.360*** (25.97)	0.275*** (28.27)	0.129*** (11.93)	0.0982*** (7.91)
Nationality (Ref: Irish)				
United Kingdom	0.0354 (0.88)	0.0998*** (3.20)	0.0789*** (3.05)	0.114*** (4.77)
Rest of Europe	0.648*** (18.47)	0.992*** (39.40)	1.112*** (50.05)	1.188*** (51.36)
Rest of World	0.376*** (10.00)	0.668*** (24.54)	0.896*** (37.91)	1.001*** (42.94)
Main Labour Status (Ref: Employed)				
Unemployed	-0.0384** (-2.18)	0.0766*** (5.18)	0.204*** (13.17)	0.349*** (21.08)
Student	0.347*** (27.89)	0.286*** (15.93)	0.419*** (15.95)	0.443*** (13.41)
On home duties	0.731*** (28.44)	0.444*** (31.41)	0.204*** (16.57)	0.118*** (9.62)
Unable to work	-0.226*** (-4.28)	-0.141*** (-3.83)	0.0769** (2.32)	0.172*** (5.81)
Other	-0.220*** (-4.02)	-0.00484 (-0.11)	-0.0318 (-0.71)	0.225*** (5.01)
Years resident in Ireland (Ref: Irish-born)				
1 to 2 years	0.741*** (19.23)	0.822*** (33.94)	1.002*** (47.60)	1.083*** (51.31)
3 to 9 years	0.298*** (6.42)	0.551*** (19.01)	0.572*** (24.45)	0.634*** (27.48)
10 or more	0.0845*** (2.76)	0.184*** (8.28)	0.134*** (7.64)	0.0727*** (4.36)
Has Children				
	-0.458*** (-29.02)	-0.354*** (-39.03)	-0.319*** (-36.77)	-0.334*** (-31.89)
User Cost - Rent†				
	0.0291*** (14.27)	0.0255*** (18.77)	0.02*** (13.56)	0.0281*** (16.65)
Regional Dummies				
	Yes	Yes	Yes	Yes
Intercept				
	-0.507*** (-13.79)	-0.925*** (-63.75)	-1.303*** (-96.67)	-1.508*** (-96.65)
Selection				
	0.783*** (17.58)	1.060*** (24.42)	0.731*** (16.76)	0.387*** (8.86)
<i>N</i>	219402	201738	213799	223972

t-statistics in parentheses. *p*-values: * = 0.1, ** = 0.05, *** = 0.01

†Coefficients scaled by 10^5 for space reasons.

Table 7: Selection model for Owner Occupancy by age, 2001-2011

	20-24 Heckman Probit	25-29 Heckman Probit	30-34 Heckman Probit	35-39 Heckman Probit
Marital Status (Ref: Married)				
Single	-0.271*** (-7.39)	-0.571*** (-36.90)	-0.812*** (-62.34)	-0.909*** (-55.51)
Separated/Widowed	0.220** (2.05)	-0.739*** (-17.28)	-0.853*** (-40.93)	-0.884*** (-63.94)
Educational Attainment (Ref: Leaving Cert)				
No Formal Education	-0.210*** (-6.72)	-0.518*** (-25.32)	-0.702*** (-44.49)	-0.817*** (-61.67)
Primary/Junior Cert	-0.0305 (-1.61)	-0.216*** (-16.38)	-0.280*** (-25.25)	-0.315*** (-30.34)
Post-Leaving Cert (Levels 6 and 7)	0.0772*** (4.93)	0.0416*** (4.05)	0.0996*** (10.42)	0.0688*** (6.97)
Third Level Education	-0.258*** (-13.23)	-0.151*** (-13.88)	0.0754*** (7.25)	0.139*** (12.66)
Nationality (Ref: Irish)				
United Kingdom	0.0239 (0.49)	-0.0678** (-2.03)	-0.00425 (-0.17)	-0.0138 (-0.63)
Rest of Europe	-0.518*** (-11.76)	-0.954*** (-34.57)	-1.053*** (-46.19)	-1.085*** (-47.41)
Rest of World	-0.449*** (-9.44)	-0.724*** (-24.09)	-0.926*** (-38.05)	-1.073*** (-46.59)
Main Labour Status (Ref: Employed)				
Unemployed	-0.184*** (-8.03)	-0.349*** (-20.45)	-0.479*** (-31.54)	-0.579*** (-39.81)
Student	-0.498*** (-32.43)	-0.487*** (-23.20)	-0.620*** (-22.37)	-0.584*** (-18.66)
On home duties	-0.863*** (-22.03)	-0.679*** (-44.87)	-0.438*** (-40.84)	-0.250*** (-25.96)
Unable to work	-0.0945 (-1.37)	-0.247*** (-5.52)	-0.545*** (-16.72)	-0.553*** (-22.38)
Other	0.256*** (4.06)	-0.264*** (-5.06)	-0.303*** (-6.58)	-0.427*** (-9.76)
Years resident in Ireland (Ref: Irish-born)				
1 to 2 years	-0.443*** (-8.29)	-0.713*** (-26.81)	-0.866*** (-40.70)	-0.906*** (-44.58)
3 to 9 years	-0.264*** (-4.46)	-0.372*** (-11.83)	-0.353*** (-15.05)	-0.473*** (-21.39)
10 or more	0.0197 (0.53)	-0.124*** (-5.20)	-0.0949*** (-5.83)	-0.0864*** (-6.26)
Has Children				
	0.269*** (16.39)	0.0674*** (7.34)	0.0214*** (2.60)	0.0139 (1.49)
User Cost - Rent†				
	-0.0116*** (-4.85)	-0.0047*** (-3.11)	-0.0000932 (-0.07)	0.00235 (1.64)
Regional Dummies				
	Yes	Yes	Yes	Yes
Intercept				
	0.0228 (0.46)	0.713*** (48.58)	1.047*** (83.38)	1.259*** (93.34)
Selection				
	-0.327*** (-6.51)	-0.511*** (-20.08)	-0.202*** (-7.97)	0.167*** (5.02)
<i>N</i>	219402	201738	213799	223972

t-statistics in parentheses. *p*-values: * = 0.1, ** = 0.05, *** = 0.01

†Coefficients scaled by 10^5 for space reasons.

Table 8: Selection model for renting from Local Authority by age, 2001-2011

	20-24 Heckman Probit	25-29 Heckman Probit	30-34 Heckman Probit	35-39 Heckman Probit
Marital Status (Ref: Married)				
Single	0.350*** (8.65)	0.702*** (28.29)	0.917*** (43.58)	1.046*** (50.72)
Separated/Widowed	0.427*** (3.45)	0.575*** (11.99)	0.825*** (32.98)	0.805*** (47.99)
Educational Attainment (Ref: Leaving Cert)				
No Formal Education	0.520*** (16.24)	0.630*** (28.69)	0.851*** (48.58)	1.056*** (67.97)
Primary/Junior Cert	0.310*** (13.54)	0.388*** (23.13)	0.482*** (34.12)	0.543*** (40.49)
Post-Leaving Cert (Levels 6 and 7)	-0.177*** (-8.05)	-0.213*** (-13.24)	-0.236*** (-16.28)	-0.131*** (-9.04)
Third Level Education	-0.554*** (-17.81)	-0.561*** (-25.35)	-0.676*** (-31.51)	-0.660*** (-30.27)
Nationality (Ref: Irish)				
United Kingdom	-0.117* (-1.66)	-0.0752 (-1.33)	-0.117*** (-2.71)	-0.0887** (-2.57)
Rest of Europe	-0.360*** (-5.61)	-0.233*** (-4.83)	-0.189*** (-4.67)	-0.0257 (-0.66)
Rest of World	-0.209*** (-3.08)	-0.00163 (-0.03)	0.0777* (1.87)	0.490*** (13.74)
Main Labour Status (Ref: Employed)				
Unemployed	0.395*** (16.14)	0.503*** (25.00)	0.615*** (34.00)	0.612*** (35.95)
Student	-0.209*** (-8.74)	0.242*** (7.62)	0.532*** (14.71)	0.575*** (14.91)
On home duties	-0.152*** (-3.14)	0.315*** (14.40)	0.446*** (30.66)	0.318*** (25.61)
Unable to work	0.634*** (9.91)	0.617*** (12.60)	0.808*** (23.75)	0.739*** (28.40)
Other	0.280*** (3.37)	0.407*** (6.50)	0.591*** (11.01)	0.368*** (6.76)
Years resident in Ireland (Ref: Irish-born)				
1 to 2 years	-0.771*** (-11.25)	-0.411*** (-8.70)	-0.364*** (-9.41)	-0.444*** (-12.25)
3 to 9 years	0.0231 (0.33)	-0.182*** (-3.55)	-0.148*** (-3.66)	-0.0625* (-1.75)
10 or more	-0.0246 (-0.50)	-0.0933** (-2.40)	0.0705*** (2.89)	0.144*** (7.60)
Has Children				
	0.764*** (29.39)	0.965*** (58.34)	0.985*** (59.13)	0.783*** (44.70)
User Cost - Rent†				
	-0.00277 (-0.85)	-0.00628** (-2.54)	0.0113*** (5.17)	0.00383* (1.89)
Regional Dummies				
	Yes	Yes	Yes	Yes
Intercept				
	-1.171*** (-16.18)	-2.165*** (-75.91)	-2.454*** (-104.26)	-2.502*** (-106.18)
Selection				
	-0.551*** (-9.56)	-0.299*** (-7.94)	-0.279*** (-7.26)	-0.443*** (-11.47)
<i>N</i>	219402	201738	213799	223972

t-statistics in parentheses. *p*-values: * = 0.1, ** = 0.05, *** = 0.01

†Coefficients scaled by 10^5 for space reasons.

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