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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 was linked to significantly higher household formation rates.

I INTRODUCTION

The Irish housing market has experienced exceptional volatility over the last 15 years. Between 2000 and the peak of the housing boom in 2007, average house prices in Ireland rose by 100 per cent, while they subsequently fell by approximately 50 per cent in the period to 2013, taking them back to the level that they were at in 2000. Since then they have once again risen rapidly. The factors driving the boom

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and subsequent collapse in house prices have been analysed by a number of authors (Murphy, 2005; McQuinn and O'Reilly, 2006; Addison-Smyth *et al*., 2009; Conefrey and FitzGerald, 2010; and Lyons and Muellbauer, 2015).

The rapid growth in prices and output in the housing market in the period to 2007 was facilitated by a number of factors. 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). 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. The substantial turnaround in underlying economic circumstances that resulted from the economic downturn in 2008 and, in particular, the dramatic change in the cost of housing, facilitates examination of the factors driving household formation and tenure choice in Ireland.

This paper analyses the household formation and tenure choice decisions of different age cohorts in the Irish market and how these decisions were affected by the changing cost of accommodation in the period to 2011. Identifying the effects of demographic change on the housing market in Ireland using aggregate time series data has proved difficult. Instead, in this paper we use data for individual households covering the years 2001 to 2011, a period which encompasses the boom, bubble and collapse in the Irish housing market, with widely fluctuating rents and house prices. We examine how the household formation decision was affected by the rent-to-income ratio, which varied widely over the economic cycle. We also consider tenure choice, which depends upon the difference between rent and the user cost of housing, a notional cost of services derived from owning a home.

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 fell considerably to 2012. Data from the Residential Tenancies Board show that rents fell by over 25 per cent from their peak in Quarter 4, 2007 to their trough in the first quarter of 2012. Of course, since 2013 there has been a reversal in these post-crash trends: rents and house prices have risen strongly.

In this paper, we analyse how favourable movements in affordability in the immediate post-crash period, measured by the ratio of rent to income, drove the increase in the rate of household formation. We also examine how changes in the relative cost of owning and renting affected tenure choice.

Section II of this paper discusses the relevant literature while Section III describes the data used for the analysis. The methodology adopted is set out in

Section IV and descriptive statistics are given in Section V. The results are described in Section VI. Finally Section VII draws conclusions.

II LITERATURE REVIEW

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 per cent live in the parental home in Ireland while 42 per cent and 28 per cent live at home in the United Kingdom and the Netherlands, respectively.

However in the period after the crisis, individuals began to form independent households at earlier ages in Ireland. By contrast, many countries have seen a trend of people delaying forming independent households, as noted by Cobb-Clark (2008) in a survey of the household formation literature.

The tenure choice decision is the result of a wide range of influences (Andersen, 2011; McKee, 2012; and Clark *et al*., 2003). As well as economic factors, tenure choice can be influenced by changes in life cycle – for example the arrival of children, while Kemp and Keoghan (2001) highlight the role of personal relationships. In an Irish context, widespread negative equity and mortgage arrears, as well as uncertainty about the future direction of house prices, will also have had an influence on tenure choice. The crash could also have had a longer-term scarring effect on the preference for homeownership.

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; 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, Duffy *et al*. (2014) 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.

A 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 per cent. This fell to 73.1 per cent and 69.7 per cent in the Censuses of 2006 and 2011 respectively, but it still remains among the highest rates of owner occupation in Northern Europe.[1] Andrews and Sanchez (2011) and Earley (2004) find high homeownership rates for Southern Europe (e.g., 83 per cent for Spain), with lower rates in the United Kingdom (71 per cent), United States (69 per cent) and Northern Europe (e.g. 52 per cent in Denmark and 41 per cent in Germany). Many explanations have been offered for the high rate of owner-occupancy in Ireland. Norris and Winston (2011) suggest the insecurity of rental tenure, but also focus on the impact of government policy in supporting homeownership. 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 tax[2] 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. There was a major liberalisation of the mortgage market in the mid-1980s. As a result, financial institutions were able to increase the amount of lending to the household sector with little upward pressure on the interest rate. However, it was in the years after 2000 that there was a particularly large increase in lending to the property market. The housing market boom of the early 2000s saw the development of financial products which encouraged or facilitated homeownership. Mortgage products with repayment terms longer than the traditional 20 years were introduced. Loan-to-value (LTV) ratios increased and a 100 per cent mortgage product was introduced, compared to the previous maximum of 92 per cent for most borrowers. Lending criteria moved from income multiples to a limit based on the ratio of mortgage service cost to income. Interest-only and tracker mortgages were introduced.

McCarthy and McQuinn (2013) examine the relationship between the credit market and the Irish property cycle. They find that credit constraints in Ireland eased during the boom period, with first-time buyers particularly benefiting. Honohan (2010), in a review of the banking crisis, found that

> "the four last years of the boom, from late 2003 onwards, were clearly bank-led, as new entrants and incumbents competed aggressively, stimulating demand with innovations such as 100 per cent mortgages".

[1] Eurostat Data show that Ireland had the fifth highest rate of homeownership in the EU15 in 2016, with the countries with higher rates being Italy, Portugal, Greece and Spain.

[2] Local Property Tax was introduced in Ireland in 2013.

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 the number of younger Irish people in owner-occupancy grew. In the latter stages of the boom, the "bubble period", the homeownership rate showed some signs of decline. While the numbers in owner occupancy continued to grow, the shift towards other tenures meant a decline in the proportion in homeownership. In the aftermath of the crisis, young Irish people may have been credit-constrained, with difficulty in accessing mortgage lending potentially providing one explanation for the rise in renting at the expense of homeownership. In a 2014 survey of tenants in the Irish private rented sector, 17.2 per cent gave one of their reasons for renting as the inability to get a mortgage due to an insufficient deposit,[3] while 14.9 per cent of responses gave the inability to get a mortgage due to insufficient earnings or job instability (DKM *et al*., 2014).

Social housing and private renting provide the alternatives to owner-occupation. Social housing is affordable rented housing for people on low incomes. It is provided by local authorities and housing associations. With the decline in local authority construction, social renting increasingly moved from local authority-owned to private sector accommodation, assisted by a number of rent support schemes (NESC, 2014). In contrast to some US studies, (Painter and Lee, 2013; and Yu and Myers, 2010), 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.

The counterpart to a high ownership rate is a low rental rate, and Conefrey and FitzGerald (2009) discuss the small size of the Irish rental market. They link a post-crisis 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. Irish Census data show that in 2002, 11 per cent of households were in private rented accommodation which declined slightly in the 2002 to 2006 period, to reach 9.9 per cent. In 2011, the proportion of households in the private rented sector reached 18.5 per cent or 305,377 households, which corresponds to 160,060 additional households since Census 2006 (Central Statistics Office, 2012). The proportion of households renting in 2016 was similar to that in 2011 at 18.2 per cent.

Consumers' expectations of future house price changes are based on past experience. Murphy and Muellbauer (1997) provide evidence of this in the UK housing market, Case and Schiller (2003) and Piazzesi and Schneider (2009) show its presence in the US housing market, while Lunn (2011) shows evidence for the Irish housing market. Lyons and Muellbauer (2015), also develop a measure of house price expectations based on past trends.

[3] The survey was undertaken prior to the introduction of new macro-prudential rules by the Central Bank of Ireland.

Including price expectations means that the expected user cost of housing can be negative, reflecting an expected capital gain. Haffner and Heylen (2011) calculate a user cost for Flanders and the Netherlands and, using an average of price changes over the preceding five years, they find that the expected capital gain plays an important role in the difference between costs faced by homeowners and tenants.

III DATA

We use data from the Quarterly National Household Survey (QNHS) produced by Ireland's Central Statistics Office. 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, with 26,000 households interviewed per quarter. The size of the sample provided by the QNHS is a key feature of our study, given that we are focusing on the housing market behaviour of young Irish people. While longitudinal data are available, we focus on pooled estimations for two reasons. First, the data do not allow us to distinguish between a young person exiting the panel and their transition from the parental home to an independent household. Second, the rolling panel structure does not pick up a high volume of housing transitions per individual within four given quarters, as is intuitive.

For each household surveyed under the QNHS a Household Reference Person (HRP) is nominated. Using information on the relationships of the other members to the HRP, we construct our outcome variable for independent household formation. Our household formation variable takes a value of 1 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 takes a value of 0. Finally, in the results we provide, we give "others" and "other relatives" a value of 1. 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 given a value of 1 in our investigation.[4]

As a measure of the affordability of rental accommodation, we take the ratio of average rents to personal disposable income, at NUTS3 regional level.[5] To look

[4] Nonetheless, we have examined giving either or both of these groups value of 0 in our estimations and our results remain robust.

[5] The 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. Personal disposable income includes wages, self-employed income, distributed profits and transfers and it excludes personal taxes and social insurance contributions paid by households. 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.

at the incentive for homeownership, we use a measure of the user cost of housing. The user cost of housing expresses the notional cost to an individual from the "housing services" provided by owning a dwelling.[6] The user cost of housing is given by the following formula which aims to capture the costs, and any offsetting benefits, from homeownership.

$$\text{User cost of housing} = [(\alpha ib + (1 - \alpha)\, im)\,(1 - \tau) + \delta - \pi eH\,]^{*}PH \qquad (1)$$

where α is the downpayment as a fraction of the purchase price, ib is the nominal rate of interest on large deposits, im is the nominal rate of interest on mortgages, τ is the marginal tax rate,[7] δ is a depreciation rate, πeH is the expected rate of house price change, and PH is the purchase price of the house. For simplicity, this formulation does not take account of maintenance costs arising from homeownership or of the risks arising from the volatility of house prices. Our user cost measures is constructed at the NUTS3 level.

In our analysis we are able to use regional variation in house prices, but data are not available to capture variation in house prices by age of purchaser. In an Irish context, Barham (2004) gives a detailed account of the variables involved in the construction of the user cost of housing. Price expectations are represented as a four-quarter moving average of housing price changes, in other words consumers' expectations of future house price changes are based on past experience. Lyons and Muellbauer (2015) also model price expectations based on past trends.

The QNHS also provides us with data on demographic and household-specific factors 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. However, these data are not available prior to 2009. 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. Instead, as a proxy for income we use level of educational attainment, 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 survey. These are No Formal Education, Primary or Lower Secondary (including Junior Certificate), Upper Secondary (Leaving Certificate), Post-Leaving

[6] As this is not observable it must be imputed. There is extensive literature on this topic and its calculation. In an Irish context see Roche (1999), Barham (2004), Murphy (2005) Duffy (2011) and Browne *et al.* (2013).

[7] This formulation takes account of the fact that mortgage interest relief on taxation, which had been important in earlier decades, was not a major factor affecting the cost of homeownership in the period analysed in this paper.

Certificates and Third Level (Higher Degree). As an illustration, Table 1 shows the percentages with each level of education in 2011, by age-group.

Durkan *et al.* (1999), Barrett *et al.* (2000), McGuinness *et al*. (2009), and Kelly *et al.* (2009) all show that earnings in Ireland are positively correlated with the level of education.

Table 1: Educational Attainment by Age, 2011

	Educational attainment (%)				
Age	*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

Source: Authors' calculations.

IV METHODOLOGY

The focus of this paper is on the extent to which young people engage with the housing market by leaving their parental home and, having formed an independent household, what determines their choice of tenure. We model this as a two stage process: the first of which determines household formation and the second determines tenure choice.

To examine the decision to leave the parental home, our interest is in the relationship between affordability of accommodation and the probability of household formation. We focus on the cost of rental accommodation for a number of reasons. While, in principle, a person could form their first new household as a homeowner, the majority of new persons entering the housing market do so as renters. This is particularly the case if young people wish to form independent households earlier in their life cycle than the point at which they can feasibly afford the deposit for a mortgage. As such, changes in household formation rates are unlikely to be materially determined by changes in the cost of owned accommodation. Instead, changes in the cost of renting a property, relative to incomes, are likely to affect the rate at which young people leave the home. As a result, we use the measure of affordability of rented accommodation to identify our household formation equation.

For the second stage, looking at tenure choice by younger Irish households, we consider three possible tenure types: owner-occupation, private renting and social housing. Following Nygaard (2011), we include social housing as a tenure in its own right. 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, when compared with the rent prices, reveals the opportunity cost of the homeownership. An increase in the user cost, with rent held constant, makes homeownership relatively more expensive, and thus should make it relatively less attractive. While the affordability of rental accommodation is important for considering household formation, it cannot explain changes in the incentive for homeownership. We identify the choice between owning and renting accommodation with the relative prices of these tenures.

Following Van den Ven and Van Pragg (1981), we estimate Heckman selection (probit) models to account for sample selection bias. With regard to owner occupancy as a tenure choice, for instance, individuals have a censored underlying propensity to be a homeowner, based on a vector of explanatory variables X, which we call y_i^{OCC*}:

$$y_i^{OCC*} = X_i\ \beta + \varepsilon_{1i}. \tag{2}$$

The observed indicator of owner occupancy status is

$$y_i^{OCC} = \begin{cases} 1\ if\ y_i^{OCC*}\ \geq 0 \\ 0\ if\ y_i^{OCC*} < 0. \end{cases}$$

However, we do not always observe the dependent variable, i.e., the tenure choice. Instead, we only observe the dependent variable if the individual has formed an independent household. Household formation can also take a latent variable representation based on some explanatory variables *Z*. We say that individual *i* forms a household, or, $y_i^{S*} = 1$, if Equation (3) yields a positive value.

$$y_i^{S*} = Z_i\gamma + \varepsilon_{2i}. \tag{3}$$

We assume that the error terms in Equations (2) and (3) follow standard normal distributions, and we allow for correlation between ε_{1i} and ε_{2i}.

$$\begin{gathered} \varepsilon_{1i} \sim N(0, 1) \\ \varepsilon_{2i} \sim N(0, 1) \\ Corr\ (\varepsilon_{1i}, \varepsilon_{2i}) = \rho. \end{gathered}$$

If the correlation between the error terms is non-zero, this implies that a probit for tenure choice, which does not account for household formation, yields biased results. We estimate both the tenure choice and household formation decisions based on vectors of explanatory variables containing individual characteristics such as marital status, education, family composition and employment status. We also include regional and year-fixed effects in all specifications, to account for spatial

and time heterogeneity. We expect to find a negative relationship between rental affordability and household formation in the first stage: when the ratio of rents to income rises, household formation should fall. In the second stage, we expect to find a negative relationship between the relative price of owning and ownership as a tenure choice, i.e., if the user cost rises relative to rents, the homeownership rate should fall.

We estimate our formation and tenure choice models separately by five-year age-groups, the most granular divisions of age available to us, between the ages 20 and 39. We focus on these age-groups, given they are the age-groups in which formation and tenure choice decisions are mostly decided. Behaviour can differ quite significantly by age within this sample however, as evidenced by the data shown in Figure 1 and Table 2 in the next section. We use pooled cross-sectional estimations, based on data from 2001 to 2011.

We also perform Blinder-Oaxaca decompositions of the changes in household formation rates over the period to extract the driving factors behind the increasing formation rates we observe. This allows us to quantify the contributions of changes in behaviour (greater preference for household formation), from changes in the distributions of characteristics of individuals in the sample, which could result in greater household formation. This first effect is known as the "coefficients effect", implying that the coefficients on the explanatory variables have changed. The second effect is known as the "endowments effect", and implies that the vector of explanatory variables has changed, while the coefficients have not.

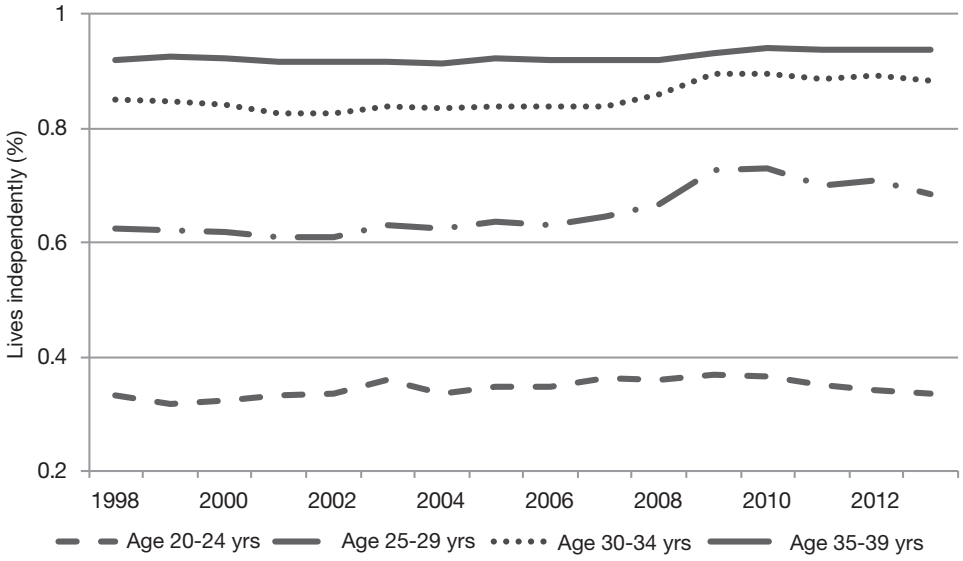
V DESCRIPTIVE STATISTICS

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 per cent and 90 per cent 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 per cent in 2009 and 2010. Formation rates among the 30-34 year old age-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.

Figure 2 plots the expected annual user cost of housing[8] against the average annual cost of renting from 2001 to 2013. With a brief exception in 2002, the user

[8] Both series use quarterly data. Calculations derived in "The Expected User Cost of Housing" by D. Duffy in Duffy *et al*. (2013) using the formula shown earlier.

Figure 1: Household Formation by Age-Group, 1998-2013



Source: CSO, Authors' calculations.

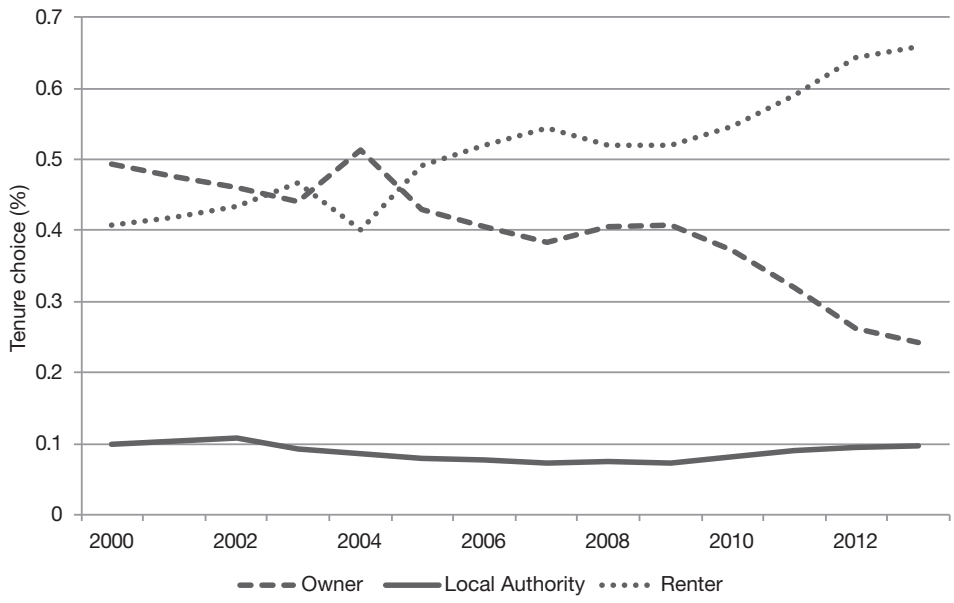
Figure 2: User Cost of Housing and Average Rents, 2001-2013

Source: CSO; daft.ie; and Duffy, D., (2011), "User Cost and Irish House Prices", *Quarterly Economic Commentary,* Special Article, Autumn 2011.

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. The size of user cost or benefit, arising primarily from the expectation of a capital loss or gain, dwarfs the amount of rent paid and so masks the fluctuations that occurred in average rents over the period. From the beginning of 2002 rents declined until the end of 2004, by about 10 per cent over the period. Between end-2004 and mid-2008, rents increased by 25 cent. However, this increase was wiped out during the housing market crash with a decline of just under 25 per cent. Since mid-2011 rents have begun to increase again, although over the time-period of our analysis they remain lower than those experienced prior to the crash. As of the fourth quarter of 2013, the graph of the user cost relative to the annual average cost of renting suggested that there was a significant 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. the demand for owner-occupied housing should be decreasing as the user cost rises and it should increase as rents rise.

Figure 3 shows the tenure proportions of individuals aged 25 to 29 years, conditional on having formed an independent household. In other words, tenure is expressed as a proportion of those who have left their parental home, rather than as a proportion of the entire cohort of that age. Figures A.1, A.2 and A.3 in the

Figure 3: Tenure Choice of 25-29 Age-Group, 2000-2013



Source: CSO, Authors' calculations.

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 the years. Table 2 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 at the end of the sample there was 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 30-34 age-groups.

Table 2: Tenure by Age, 2012

	Tenure (%)		
Age	*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

Source: Authors' calculations.

VI RESULTS

Household Formation

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 per cent 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.

Table 3: Household Formation (Heckman First Stage) 2001–2011

	20–24 yrs Probit	*25–29 yrs Probit*	*30–34 yrs Probit*	*35–39 yrs Probit*
Marital Status (Ref: Married)				
Single	–1.333***	–1.958***	–2.117***	–2.336***
	(–45.50)	(–111.86)	(–135.07)	(–122.78)
Separated/Widowed	–0.874***	–1.072***	–1.273***	–1.220***
	(–7.71)	(–19.39)	(–40.16)	(–42.52)
Gender (Ref: Male)				
Female	0.233***	0.250***	0.254***	0.328***
	(36.95)	(38.52)	(29.62)	(28.48)
Highest Educational Attainment (Ref: Leaving Cert)				
No Formal Education	0.143***	0.155***	0.0766***	0.00168
	(7.86)	(9.11)	(4.42)	(0.09)
Primary/Junior Cert	0.114***	0.165***	0.126***	0.0486***
	(10.80)	(14.60)	(9.68)	(3.11)
Post–Leaving Cert (Levels 6 and 7)	0.121***	0.142***	0.204***	0.220***
	(14.97)	(16.55)	(18.27)	(14.42)
Third–Level Education	0.362***	0.280***	0.427***	0.519***
	(42.10)	(31.92)	(34.48)	(28.91)
Nationality (Ref: Irish)				
United Kingdom	0.210***	0.206***	0.112**	0.399***
	(6.08)	(5.15)	(2.57)	(8.21)
Rest of Europe	0.781***	0.956***	0.859***	1.038***
	(23.48)	(23.91)	(16.30)	(12.80)
Rest of World	0.798***	1.047***	0.857***	0.670***
	(21.62)	(20.49)	(12.86)	(7.92)
Main Labour Status (Ref: Employed)				
Unemployed	–0.121***	–0.272***	–0.300***	–0.158***
	(–11.08)	(–23.35)	(–20.48)	(–8.54)

Table 3: Household Formation (Heckman First Stage) 2001–2011 (Contd.)

	20–24 yrs Probit	*25–29 yrs Probit*	*30–34 yrs Probit*	*35–39 yrs Probit*
Student	0.0618***	–0.186***	–0.224***	–0.178***
	(8.60)	(–12.60)	(–8.13)	(–4.02)
On home duties	1.284***	1.067***	0.831***	0.620***
	(70.45)	(50.64)	(34.53)	(22.47)
Unable to work	–0.398***	–0.717***	–0.754***	–0.517***
	(–13.08)	(–28.57)	(–32.94)	(–22.17)
Other	–0.310***	–0.426***	–0.442***	–0.431***
	(–7.78)	(–10.02)	(–8.55)	(–7.68)
Years resident in Ireland (Ref: Irish–born)				
1 to 2 years	1.456***	1.244***	1.106***	0.911***
	(48.36)	(34.98)	(24.74)	(15.16)
3 to 9 years	0.186***	0.795***	0.931***	0.608***
	(5.08)	(17.48)	(16.88)	(9.41)
10 or more	0.0969***	0.185***	0.214***	0.162***
	(4.66)	(8.42)	(9.58)	(6.67)
Rent to PDI	0.187***	–0.536***	–0.895***	–0.703***
	(9.69)	(–25.97)	(–33.37)	(–20.28)
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Intercept	0.612***	1.333***	1.527***	1.984***
	(18.17)	(53.29)	(55.25)	(56.32)
N	219,402	201,738	213,799	223,972
t statistics in parentheses				

Source: Authors' calculations.
Notes: t statistics in parentheses. p–values: =* p<0.10 ** p<0.05 *** p<0.01.

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 income 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 aged 25-39 years 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 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 years. 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.

Table 4: Average Marginal Effects by Age, 2001-2011

		Education Level			
Age (yrs)	*Rent/PDI*	*No Formal*	*Primary/ Junior Cert.*	*Post-Leaving Cert.*	*Third Level*
20-24	0.029***	0.041***	0.033***	0.036***	0.015***
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***

Source: Authors' calculations.
Note: p-values: *=0.1, **=0.05, ***=0.01

Change in Formation Rates

Higher level educational attainment grew greatly in Ireland in the last 20 years. In 2001, 31 per cent of those aged 30-34 in Ireland had third-level education, compared with the European Union average[9] of 23 per cent. While the EU average had grown to 35 per cent in 2013, the figure for Ireland had grown to 50 per cent, the highest in the EU. Table 5 separates the contribution of rising educational attainment 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. This implies that it was behaviour which changed in this period, leading to greater household formation rates, rather than the structure of the population changing.

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 in 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,

[9] *Source:* Eurostat. Tertiary educational attainment by sex, age-group 30-34; table t2020_41.

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

Source: Authors' calculations.

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.

Tenure Choice

We proceed to model tenure choice by age-group for the years 2001 to 2011, using a probit model with sample selection.[10] These results are included in Tables 6, 7 and 8.[11] 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 distributed[12] 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.

[10] We also estimate a Multinomial Probit model for tenure choice, i.e. without controlling for formation. The intuition derived from the probit models with sample selection remains robust to this alternate specification.

[11] We also find that our results are robust to using a Heckman selection model with a linear second stage.

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

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 US 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.

Table 6: Selection Model for Private Renting by Age, 2001-2011

	20-24 yrs Heckman Probit	*25-29 yrs Heckman Probit*	*30-34 yrs Heckman Probit*	*35-39 yrs Heckman Probit*
Marital Status (Ref: Married)				
Single	–0.0316	0.291***	0.504***	0.525***
	(–1.20)	(26.32)	(50.05)	(37.52)
Separated/Widowed	–0.267***	0.472***	0.554***	0.700***
	(–2.69)	(11.78)	(25.41)	(44.33)
Highest Educational Attainment (Ref: Leaving Cert)				
No Formal Education	–0.216***	–0.0441**	–0.0185	0.0143
	(–8.70)	(–2.41)	(–1.08)	(0.84)
Primary/Junior Cert	–0.122***	–0.0417***	–0.0448***	–0.00625
	(–7.67)	(–3.27)	(–3.53)	(–0.47)
Post–Leaving Cert	0.0250**	0.0396***	–0.000948	–0.000627
(Levels 6 and 7)	(1.98)	(4.12)	(–0.09)	(–0.05)
Third–Level Education	0.360***	0.275***	0.129***	0.0982***
	(25.97)	(28.27)	(11.93)	(7.91)
Nationality (Ref: Irish)				
United Kingdom	0.0354	0.0998***	0.0789***	0.114***
	(0.88)	(3.20)	(3.05)	(4.77)
Rest of Europe	0.648***	0.992***	1.112***	1.188***
	(18.47)	(39.40)	(50.05)	(51.36)
Rest of World	0.376***	0.668***	0.896***	1.001***
	(10.00)	(24.54)	(37.91)	(42.94)

Table 6: Selection Model for Private Renting by Age, 2001-2011 (Contd.)

	20-24 yrs Heckman Probit	*25-29 yrs Heckman Probit*	*30-34 yrs Heckman Probit*	*35-39 yrs Heckman Probit*
Main Labour Status (Ref: Employed)				
Unemployed	–0.0384**	0.0766***	0.204***	0.349***
	(–2.18)	(5.18)	(13.17)	(21.08)
Student	0.347***	0.286***	0.419***	0.443***
	(27.89)	(15.93)	(15.95)	(13.41)
On home duties	0.731***	0.444***	0.204***	0.118***
	(28.44)	(31.41)	(16.57)	(9.62)
Unable to work	–0.226***	–0.141***	0.0769**	0.172***
	(–4.28)	(–3.83)	(2.32)	(5.81)
Other	–0.220***	–0.00484	–0.0318	0.225***
	(–4.02)	(–0.11)	(–0.71)	(5.01)
Years resident in Ireland (Ref: Irish–born)				
1 to 2 years	0.741***	0.822***	1.002***	1.083***
	(19.23)	(33.94)	(47.60)	(51.31)
3 to 9 years	0.298***	0.551***	0.572***	0.634***
	(6.42)	(19.01)	(24.45)	(27.48)
10 or more	0.0845***	0.184***	0.134***	0.0727***
	(2.76)	(8.28)	(7.64)	(4.36)
Has Children	–0.458***	–0.354***	–0.319***	–0.334***
	(–29.02)	(–39.03)	(–36.77)	(–31.89)
User Cost – Rent(a)	0.0291***	0.0255***	0.02***	0.0281***
	(14.27)	(18.77)	(13.56)	(16.65)
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Intercept	–0.507***	–0.925***	–1.303***	–1.508***
	(–13.79)	(–63.75)	(–96.67)	(–96.65)
Selection	0.783***	1.060***	0.731***	0.387***
	(17.58)	(24.42)	(16.76)	(8.86)
N	219,402	201,738	213,799	223,972

Source: Authors' calculations.

Notes: (a) coefficients scaled by 105 for space reasons. t statistics in parentheses. P-values: * = 0.1, ** = 0.05, *** = 0.01.

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 choice 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 show a responsiveness to economic incentives in the tenure choice decision for young Irish people.

Table 7: Selection Model for Owner Occupancy by Age, 2001–2011

	20-24 yrs Heckman Probit	*25-29 yrs Heckman Probit*	*30-34 yrs Heckman Probit*	*35-39 yrs Heckman Probit*
Marital Status (Ref: Married)				
Single	–0.271***	–0.571***	–0.812***	–0.909***
	(–7.39)	(–36.90)	(–62.34)	(–55.51)
Separated/Widowed	0.220**	–0.739***	–0.853***	–0.884***
	(2.05)	(–17.28)	(–40.93)	(–63.94)
Highest Educational Attainment (Ref: Leaving Cert)				
No Formal Education	–0.210***	–0.518***	–0.702***	–0.817***
	(–6.72)	(–25.32)	(–44.49)	(–61.67)
Primary/Junior Cert	–0.0305	–0.216***	–0.280***	–0.315***
	(–1.61)	(–16.38)	(–25.25)	(–30.34)
Post-Leaving Cert	0.0772***	0.0416***	0.0996***	0.0688***
(Levels 6 and 7)	(4.93)	(4.05)	(10.42)	(6.97)
Third-Level Education	–0.258***	–0.151***	0.0754***	0.139***
	(–13.23)	(–13.88)	(7.25)	(12.66)
Nationality (Ref: Irish)				
United Kingdom	0.0239	–0.0678**	–0.00425	–0.0138
	(0.49)	(–2.03)	(–0.17)	(–0.63)
Rest of Europe	–0.518***	–0.954***	–1.053***	–1.085***
	(–11.76)	(–34.57)	(–46.19)	(–47.41)
Rest of World	–0.449***	–0.724***	–0.926***	–1.073***
	(–9.44)	(–24.09)	(–38.05)	(–46.59)
Main Labour Status (Ref: Employed)				
Unemployed	–0.184***	–0.349***	–0.479***	–0.579***
	(–8.03)	(–20.45)	(–31.54)	(–39.81)
Student	–0.498***	–0.487***	–0.620***	–0.584***
	(–32.43)	(–23.20)	(–22.37)	(–18.66)
On home duties	–0.863***	–0.679***	–0.438***	–0.250***
	(–22.03)	(–44.87)	(–40.84)	(–25.96)
Unable to work	–0.0945	–0.247***	–0.545***	–0.553***
	(–1.37)	(–5.52)	(–16.72)	(–22.38)
Other	0.256***	–0.264***	–0.303***	–0.427***
	(4.06)	(–5.06)	(–6.58)	(–9.76)

Table 7: Selection Model for Owner Occupancy by Age, 2001–2011 (Contd.)

	20-24 yrs Heckman Probit	*25-29 yrs Heckman Probit*	*30-34 yrs Heckman Probit*	*35-39 yrs Heckman Probit*
Years resident in Ireland (Ref: Irish-born)				
1 to 2 years	–0.443***	–0.713***	–0.866***	–0.906***
	(–8.29)	(–26.81)	(–40.70)	(–44.58)
3 to 9 years	–0.264***	–0.372***	–0.353***	–0.473***
	(–4.46)	(–11.83)	(–15.05)	(–21.39)
10 or more	0.0197	–0.124***	–0.0949***	–0.0864***
	(0.53)	(–5.20)	(–5.83)	(–6.26)
Has Children	0.269***	0.0674***	0.0214***	0.0139
	(16.39)	(7.34)	(2.60)	(1.49)
User Cost – Rent(a)	–0.0116***	–0.047***	–0.0000932	0.00235
	(–4.85)	(–3.11)	(–0.07)	(1.64)
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Intercept	0.0228	0.713***	1.047***	1.259***
	(0.46)	(48.58)	(83.38)	(93.34)
Selection	–0.327***	–0.511***	–0.202***	0.167***
	(–6.51)	(–20.08)	(–7.97)	(5.02)
N	219,402	201,738	213,799	223,972

Source: Authors' calculations.
Notes: (a) coefficients scaled by 105 for space reasons, t statistics in parentheses. P-values: * = 0.1, ** = 0.05, *** = 0.01.

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 in the rental market, for instance, which meant that owning was more attractive than renting. As shown in Figure 2, the falling user cost from 2012 onward likely implies a return to demand for owner-occupied housing.

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.

Table 8: Selection Model for Renting from Local Authority by Age, 2001-2011

	20-24 yrs Heckman Probit	*25-29 yrs Heckman Probit*	*30-34 yrs Heckman Probit*	*35-39 yrs Heckman Probit*
Marital Status (Ref: Married)				
Single	0.350***	0.702***	0.917***	1.046***
	(8.65)	(28.29)	(43.58)	(50.72)
Separated/Widowed	0.427***	0.575***	0.825***	0.805***
	(3.45)	(11.99)	(32.98)	(47.99)
Highest Educational Attainment (Ref: Leaving Cert)				
No Formal Education	0.520***	0.630***	0.851***	1.056***
	(16.24)	(28.69)	(48.58)	(67.97)
Primary/Junior Cert	0.310***	0.388***	0.482***	0.543***
	(13.54)	(23.13)	(34.12)	(40.49)
Post-Leaving Cert	–0.177***	–0.213***	–0.236***	–0.131***
(Levels 6 and 7)	(–8.05)	(–13.24)	(–16.28)	(–9.04)
Third-Level Education	–0.554***	–0.561***	–0.676***	–0.660***
	(–17.81)	(–25.35)	(–31.51)	(–30.27)
Nationality (Ref: Irish)				
United Kingdom	–0.117*	–0.0752	–0.117***	–0.0887**
	(–1.66)	(–1.33)	(–2.71)	(–2.57)
Rest of Europe	–0.360***	–0.233***	–0.189***	–0.0257
	(–5.61)	(–4.83)	(–4.67)	(–0.66)
Rest of World	–0.209***	–0.00163	0.0777*	0.490***
	(–3.08)	(–0.03)	(1.87)	(13.74)
Main Labour Status (Ref: Employed)				
Unemployed	0.395***	0.503***	0.615***	0.612***
	(16.14)	(25.00)	(34.00)	(35.95)
Student	–0.209***	0.242***	0.532***	0.575***
	(–8.74)	(7.62)	(14.71)	(14.91)
On home duties	–0.152***	0.315***	0.446***	0.318***
	(–3.14)	(14.40)	(30.66)	(25.61)
Unable to work	0.634***	0.617***	0.808***	0.739***
	(9.91)	(12.60)	(23.75)	(28.40)
Other	0.280***	0.407***	0.591***	0.368***
	(3.37)	(6.50)	(11.01)	(6.76)
Years resident in Ireland (Ref: Irish-born)				
1 to 2 years	–0.771***	–0.411***	–0.364***	–0.444***
	(–11.25)	(–8.70)	(–9.41)	(–12.25)

Table 8: Selection Model for Renting from Local Authority by Age, 2001-2011 (Contd.)

	20-24 yrs Heckman Probit	*25-29 yrs Heckman Probit*	*30-34 yrs Heckman Probit*	*35-39 yrs Heckman Probit*
3 to 9 years	0.0231	–0.182***	–0.148***	–0.0625*
	(0.33)	(–3.55)	(–3.66)	(–1.75)
10 or more	–0.0246	–0.0933**	0.0705***	0.144***
	(–0.50)	(–2.40)	(2.89)	(7.60)
Has Children	0.764***	0.965***	0.985***	0.783***
	(29.39)	(58.34)	(59.13)	(44.70)
User Cost – Rent(a)	–0.00277	–0.00628**	0.0113***	0.00383*
	(–0.85)	(–2.54)	(5.17)	(1.89)
Regional Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes
Intercept	–1.171***	–2.165***	–2.454***	–2.502***
	(–16.18)	(–75.91)	(–104.26)	(–106.18)
Selection	–0.551***	–0.299***	–0.279***	–0.443***
	(–9.56)	(–7.94)	(–7.26)	(–11.47)
N	219,402	201,738	213,799	223,972

Source: Authors' calculations.
Notes: (a) coefficients scaled by 105 for space reasons. t statistics in parentheses. P-values: * = 0.1, ** = 0.05, *** = 0.01.

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 (tenure choice). 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.

Higher education has a positive effect on the probability of renting, in 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 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 effect on the probability of renting from a Local Authority across all ages, while lower education is associated with this tenure choice.

VII CONCLUSION

The scale of the Irish property crash of the late 2000s was exceptional by international standards as measured by the change in prices. The very rapid rise and subsequent fall in property prices facilitates the examination of how the cost of accommodation affects household formation and tenure choice.

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 people in Ireland, 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.

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 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 in the years immediately after the crash probably played an important part in the decline in rents. In turn, higher rates of household formation in the post-crash 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 northern European countries.

More recently, with the economic turnaround, rents have risen rapidly, reflecting rising demographic and income pressures and a very weak supply response. The rising real cost of renting is discouraging individuals from forming independent households ensuring that the rising population "fits into" the highly constrained housing stock. This is consistent with the findings of this paper.

We 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 in the immediate post-crash period among younger people in Ireland can be explained, in part, by movement in the relative costs of the two tenures.

In this paper, we examine how decisions on household formation and tenure for Irish people aged between 20 and 39 respond to cost incentives; the shift away from traditional owner-occupation in the years after the crash can be explained by the relative movement in the user cost of housing and rents. However, the reversal of this trend for the relative cost of owning since 2013 is producing a return to owner-occupation as the preferred choice.

A natural follow-up question to this research is the likely 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 has become relatively more attractive as 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.

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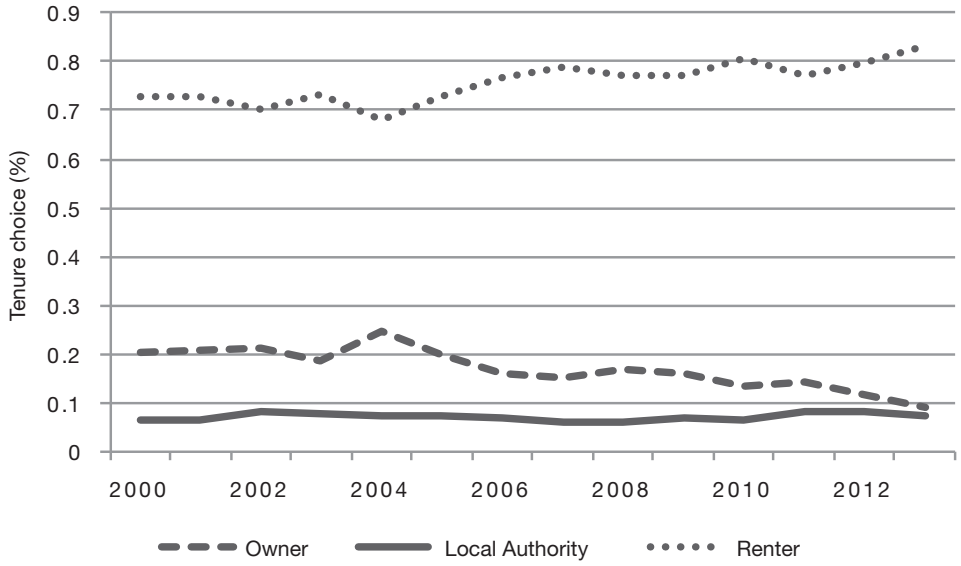
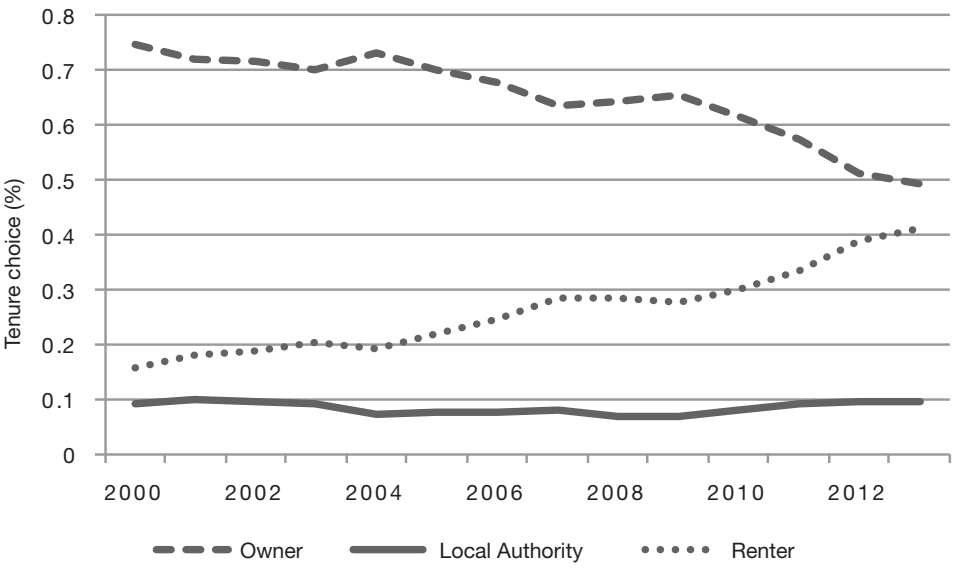
APPENDIX

Figure A.1: Tenure Choice of 20-24 Age-Group, 2000-2013



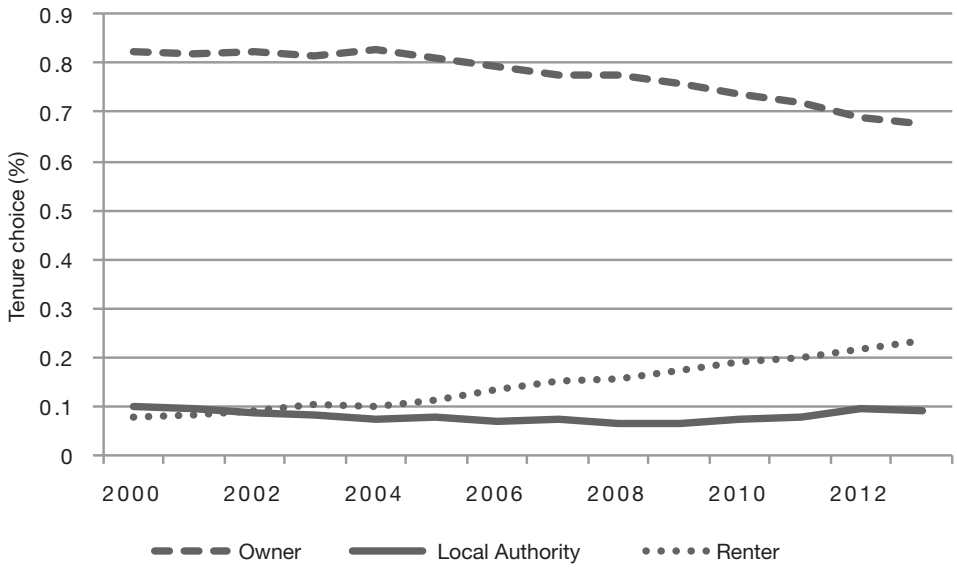
Source: CSO, Authors' calculations.

Figure A.2: Tenure Choice of 30-34 Age-Group, 2000-2013



Source: CSO, Authors' calculations.

Figure A.3: Tenure Choice of 35-39 Age-Group, 2000-2013



Source: CSO, Authors' calculations.