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Great expectations: the role of experiences in Irish house price expectations formation

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Non-Technical Summary

House prices are important to home owners, renters and policymakers. Households' beliefs about the outlook for house prices may influence their consumption, investment and saving decisions, and therefore have the potential to affect the overall economy and housing market. As a result, an increasing number of studies explore how house price expectations are formed, complementing the vast research on inflation expectations.

Focusing on the main residence of a household, this paper uses data from the 2018 wave of the Household Finance & Consumption Survey (HFCS) to examine the determinants of Irish home-owning households' short-term (12 month ahead) house price expectations. We focus on the role of three experiences related to the acquisition of the home. The first of these is *personal experience*, measured as the perceived average yearly returns on one's home since acquisition (also commonly referred to as "[own] house price perceptions"). Research to date suggests that households tend to extrapolate from their perceived house price inflation when forming their expectations of future house price growth (in line with the literature on inflation expectations). The other two experiences we explore are *local experience* of house price developments (proxied by the region the home is located in) and *housing acquisition experience* (which captures whether the household experienced above or below average growth in the housing market at time of acquisition, as identified by the year the home was acquired).

The paper provides a novel contribution to the existing literature. It is the first Irish-specific study of the link between house price perceptions and expectations. Further, by leveraging the boom and bust of house prices in Ireland over the 2000-2018 period, we provide unique insight into how experiencing a highly volatile housing market relates to house price expectations. We also analyse the effects of additional explanatory variables, including the ownership of other property and perceiving income over the past year to be lower than normal. In addition, the modelling approach we use enables time of acquisition and location to be disentangled from house price perceptions. This is important as these two variables are arguably subset experiences, which are also relevant to the returns on one's home.

The main results – while not causal – show that experiences matter to the formation of house price expectations. Specifically, we find a positive association between perceived [own] house price returns and expected house price growth over the next year, with some tentative evidence that the effect is state dependent and varies by time of acquisition. *Local experience* is important too, with higher expectations associated with homeowners living in the Eastern & Midlands region (containing Dublin). Irish homeowners also appear to extrapolate from their experience of large price movements in the housing market (*housing acquisition experience*). If a household acquired their home after 2008, then house price expectations tend to be higher. We provide evidence that this experience operates through the mechanism of home acquisition occurring during a period of above or below average growth in national house prices, rather than reflecting cumulative growth in real house prices between year of home acquistion and survey year. In contrast, holding other property, being risk averse and perceiving household income to be lower than normal are associated with lower expectations. There appears to be little role for socio-demographics after controlling for experiences.

Great expectations: the role of experiences in Irish house price expectations formation

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Abstract

Households' beliefs about house prices have the potential to impact market and aggregate outcomes. As such, it is important to understand what determines them. Using 2018 data from the HFCS, we show that Irish homeowners extrapolate from their *personal experience* of own house price growth to date when forming their beliefs about how house prices could change in the near future. In addition, *local experience* of house prices (captured by the location of the home) and *housing acquisition experience* (identified by the year the home was acquired) also appear to be important and distinct determinants of house price expectations. Households who perceive higher returns on their home, are located near Dublin or who acquired their home from 2008 onwards are more optimistic about future house prices. Meanwhile, risk aversion, ownership of other property and perceiving household income over the past year to be lower than normal are associated with more pessimistic expectations.

JEL classification: D84, G5, R2.

Keywords: expectations, experiences, beliefs, house prices, surveys, household analysis.

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1 Introduction

Current prices and their future path are important to homeowners, renters and policymakers. Purchasing a house is one of the most important financial decisions people make in their lifetime. The home typically represents the largest asset of Irish households, accounting for around two thirds of the median Irish households' total assets (CSO, 2018). Therefore, both homeowners and renters face incentives to inform themselves of house price developments. In turn, households' beliefs about house prices have implications for the aggregate economy, the accuracy of forecasts (e.g. Brandao-Marques et al. 2023) and the calibration of macroeconomic models (e.g. Kaplan, Mitman & Violante, 2017). Shifts in house price expectations could influence property prices and construction activity (Ben-David et al., 2024) or feed into general price expectations (Dhamija, Nunes & Tara, 2023). Overly optimistic expectations may induce house price overvaluation (Duca, Muellbauer & Murphy, 2021) and contribute to housing booms (Landvoigt, Piazzesi & Schneider, 2015), while pessimistic views can reduce households' perceived wealth, lead to more risk aversion and lower consumption (Mian & Sufi, 2013).

In recent years, the literature on the formation and determinants of general price inflation expectations has expanded significantly (see D'Acunto et al., 2024 for a review). In contrast, there has been much less focus on house price expectations so far, especially in European countries. This is despite a recognition of the channels that affect house price expectations being key to improving our understanding of how expectations affect real economic outcomes. Using data from the 2018 wave of the Household Finance & Consumption Survey (HFCS), this paper seeks to address this gap by providing the first Irish specific study examining the determinants of homeowners' short-term house price expectations, with a focus on the link between house price perceptions and expectations. Ireland provides an interesting case given its housing market has gone through a very large boom and bust cycle over the past two decades (Figure 1). House prices fell by a cumulative 53 per cent between 2008 and 2013 before more than doubling between 2013 and 2023. Ireland's house price growth over this period was only eclipsed in the euro area by Estonia, Lithuania and Portugal (Eurostat, 2024).

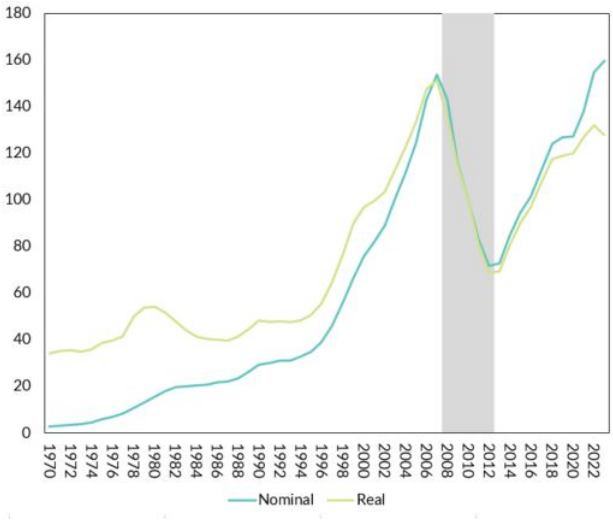
Existing studies on the determinants of house price expectations find evidence that households may extrapolate from their experience of house price developments – whether actual or perceived – when thinking about how house prices may change in the future (e.g., Bover, 2015; Bielskis, 2023). Therefore, our analysis includes a particular focus on the role of experiences. Specifically, this paper seeks to answer the following three research questions:

1. Do Irish households extrapolate from their perceived *personal experience* of own house price growth to date when forming their short-term (12 month ahead) expectations for house prices?

2. Is there a role for other experiences in the expectation formation process, namely: *local experience* of price developments near the home and/or the *housing acquisition experience* of households?

3. After controlling for experiences, to what extent do socio-demographic or other characteristics play a role?

Figure 1: Residential property price index (RPPI) for Ireland (1971-2023)



Source: CSO and the Irish Department of Environment, Heritage & Local Government (accessed via the Federal Reserve Bank of St Louis)
Note: Base=2010=100. Data is annual and not seasonally adjusted. Grey block reflects the housing bust following the Global Financial Crisis (GFC).

We use "perceived average yearly returns on one's home since acquisition" as our measure of *personal experience* (also often referred to as "[own] house price perceptions"). We proxy for *local experience* using the NUTS2 region that the home is located in. While in the case of *housing acquisition experience* (which refers to the households' experience of above or below average growth in the housing market at the time of acquiring their current property), we use the year the home was acquired to identify this type of experience.

Our work is closely related to that of Bielskis (2023), who also uses HFCS data to examine the determinants of house price expectations of European countries, in aggregate, with a focus on personal experiences. However, our paper considers additional variables, including the role of other property ownership and a broader range of experience variables. By leveraging the boom and bust of house prices in Ireland over 2000-2018, we also provide a unique contribution to the literature around the role of experiencing a high amplitude housing market, which could have a long-lasting effect on how households think about future price changes. Another difference between our work and Bielskis (2023) is that we apply a different definition of *personal experience* and a different methodology, specifically a two-stage estimation procedure which purges our *personal experience* variable of the effect of location and time of acquisiton. This enables the time of acquisition and location experiences to be disentangled from [own] house price perceptions and is important given the two variables are arguably subset experiences which are also relevant to the returns on one's home.

The key findings can be summarised as follows:

1. *Personal experiences* matter for house price expectations in Ireland. Households who perceive higher average annual returns on their home since acquisition have more optimistic expectations about their home's value over the next 12 months.

2. We also find a role for *local experience* and *housing acquisition experience*. Households with homes located in the Eastern & Midlands region (near Dublin) or those who acquired their home after 2008 (and therefore experienced a large house price collapse or recovery around the time they acquired their home) seem to be more optimistic about future house price growth than those located elsewhere or who acquired their homes prior to the Global Financial Crisis (GFC).

3. There is some tentative evidence for potential state dependency in the effect of house price perceptions. Negative perceptions potentially have a different impact on expectations depending on if the home was bought recently.

4. Controlling for our three types of experience, we find little role for socio-demographics, aligning with the strand of literature that finds no role for demographics in determining expectations.

5. However, holding other property, being risk averse or perceiving the household income over the past year to be lower than normal are all found to be associated with households having more pessimistic future house price expectations.

6. The results hold across much of the distribution of expected house prices. This implies that the determinants identified can be considered generally important to Irish households' expectations formation, but there also remains a large unexplained component.

The effects reported in our analysis should not be interpreted as causal. Nevertheless, they point to interesting potential mechanisms that are in line with the existing literature and of interest to policymakers. It should be noted that due to data limitations, the analysis excludes renters and does not consider longer-term expectations. It also does not explore the accuracy of households' expectations or perceptions (which is difficult to assess without actual data on the realised returns of a given household's home) or the implications of house price expectations on economic behaviour.

The remainder of this paper is structured as follows. Section 2 describes the existing literature to date. Section 3 defines the key variables of interest, with associated descriptives. Section 4 presents our empirical methodology and results. Section 5 discusses the results and finally, Section 6 concludes.

2 Literature review

The literature on household inflation expectations has expanded substantially in recent years (see D'Acunto et al. (2024) for a review). Many studies have documented systematic demographic differences in inflation expectations. For example, they tend to be higher for females, those with lower income, lower level of education or lower financial literacy.

Consumers strongly extrapolate into the future based on their perceptions about price changes today, which reflects their individual experiences with inflation. More salient prices (such as prices of groceries, fuel and energy) play a big role in determining inflation expectations. As consumption baskets of households are heterogeneous, differences in

the price signals experienced may lead to quite different inflation perceptions and expectations across households. Similarly, lifetime inflation experience and extreme price developments also matter for inflation expectations (e.g., Malmandier & Nagel, 2016).

Furthermore, survey respondents may rely on prices not covered by consumer price indices, such as house prices, when thinking about future inflation. Research also shows that people notice price increases more than price decreases and inflation expectations may be influenced by information other than direct exposure to prices, such as media coverage of inflation news or psychological factors (bad economic outcomes typically associated with higher inflation).

In contrast, the literature on households' house price expectations is more scant, although it has started growing in recent years. In line with the inflation expectations literature, house price expectations have been shown to be strongly associated with actual past house price growth and perceived house price inflation. Some studies find systematic differences across socio-demographic characteristics, but the evidence is somewhat mixed.

Earlier studies on households' house price expectations predominantly focused on the US. Niu & van Soest (2014) extend pioneering work by Case and Shiller[1], using a representative sample of US households, to analyse the determinants of house price expectations of homeowners. The findings show that short-term house price expectations are positively associated with recent state-level house price changes and are negatively related to changes in the state-level unemployment rate. Living in a state that suffered greatly from a real estate crash is associated with higher short-term and long-term house price expectations, implying a mean-reversion in expectations. Economic sentiment also matters; respondents with upbeat economic sentiment report higher expected house price growth.

Numerous later studies also reported that house price expectations of US households are strongly associated with past house price growth, i.e. households extrapolate from past experience when forming expectations about house prices over both the short and longer term (Armona et al., 2019; Kuchler and Zafar, 2019; De Stefani, 2021). More recent, local house price changes appear to affect house price expectations more than later experiences, while the experience of more volatile house price changes locally is associated with more uncertainty in expectations (Kuchler and Zafar, 2019). Armona et al. (2019) report causal evidence showing that information about actual past house price changes affect short-term and long-term house price expectations. In another survey experiment, Fuster et al., (2022) find about half of survey participants prefer to receive backward-looking information on house prices as opposed to expert forecasts when forming their own house price expectations. Housing market experiences by one's social network may also affect housing market expectations (Bailey, Cao, Kuchler & Stroebel, 2018).

The findings in relation to socio-demographic characteristics are less conclusive overall. US house price expectations vary substantially over time and across households but

[1]See Case and Shiller (1988), Case and Shiller (2003) and Case et al. (2012).

basic demographic characteristics explain only a small share of the cross-sectional variation (Kuchler, Piazzesi & Stroebel, 2023). In the aforementioned work by Niu & van Soest (2014), socio-demographic characteristics were found to be somewhat relevant. Respondents living in more expensive housing or those with higher income as well as younger, male and higher educated respondents were shown to tend to be more optimistic about future house prices. However, evidence regarding statistical significance is mixed. D'Acunto, Malmendier & Weber (2020) similarly find that income is positively related to house price expectations; but they find females are more optimistic than males and a higher level of numeric skills or financial literacy is associated with lower expectations. While Kuchler, Piazzesi & Stroebel (2023) confirm their finding regarding education and numeracy, they find no role for income once other characteristics are controlled for. Older respondents tend to have higher house price expectations and there seem to be systematic differences in expectations depending on the geographical location (Kuchler, Piazzesi & Stroebel, 2023). Some other factors, such as race and presidential elections, are found to be associated with differences in house price expectations across households (D'Acunto, Malmendier & Weber, 2020; De Stefani, 2021).

The first empirical paper documenting households' house price expectations for a European country – Spain – also finds that geographical location is very important for house price expectations (Bover, 2015). The location at the postcode level is an important source of variation in expectations and reflects local house price growth and labour market conditions. Respondents in areas with higher past returns on housing expect higher price growth in the future. Further, a higher (local) unemployment rate is associated with lower house price expectations. The author also finds that women feel more optimistic about future house prices than men and blue collar workers and respondents who recently bought a house are also significantly more optimistic. While evidence for the role of age, wealth or income of respondents in explaining mean house price expectations is rather weak, older people and those in the middle to upper part of wealth distribution are shown to be less uncertain about future house prices (Bover, 2015).

Since then, more research has been done to explain house price expectations in European countries. In Sweden, age, home tenure, and gender are found to be relevant determinants of households' house price expectations (Hjalmarsson and Osterholm, 2020). Younger respondents have much higher expectations, particularly those who reach adulthood at the same time as observing strong house price increases, suggesting a role for lifetime experiences. Renters and females are more optimistic compared to homeowners and males. However, Hjalmarsson and Osterholm (2020) do not find convincing evidence that income or education are significantly related to house price expectations when other characteristics are controlled for. In line with US and Spanish evidence, house price expectations are strongly associated with past house price inflation.

Other studies highlight the importance of past house price changes (whether perceived or actual) for house price expectations in Germany (Gohl et al., 2022; Kindermann et al., 2024), and a group of European countries (Bielskis, 2023). Gohl et al. (2022) also presents a negative relationship between an index of housing supply and longer-term house price expectations. Generally, socio-demographic characteristics appear to matter, albeit modestly. Better-educated respondents, those with higher financial literacy and females have lower expectations (Gohl et al., 2022). Gluszak and Rymarzak (2019)

use a survey of potential homebuyers in and around Krakow, a city in Poland, and show that neither age nor income help explain forecast errors of respondents. Kindermann et al. (2024) find that renters have significantly higher (and on average more accurate) expectations for house prices compared to homeowners in Germany. This could be explained by renters (owners) having better knowledge about rents (house prices) but knowing less about house prices (rents). They show that once information about housing tenure and geographical location is included in the model of house price expectations, there is no evidence of significant effects of other characteristics such as age, wealth, income, risk aversion, and financial literacy. Nevertheless, the size of the city seems to matter, with large city dwellers expecting higher price growth (Kindermann et al., 2024).

Two recent studies analyse house price expectations for a group of European countries. While both have Ireland in the dataset, the focus is on aggregate European results. Bielskis (2023) examines the role of (i) local (country-level) experience with house prices and income; and (ii) personal (individual-level) experience with own home price changes and household income changes.[2] At both levels, past house price growth is found to be an important determinant of house price expectations over the next year, while income growth is typically not relevant. Bielskis also shows that higher educated and risk averse respondents have significantly higher house price expectations. The main results also seem to depend on income and wealth distributions. Verma & McQuinn (2024) focus on the role of economic fundamentals and report a significant positive effect of expected income growth on house price expectations and a significant negative effect of expected real interest rates. McQuinn, Monteiro & O'Toole (2021) provide an Irish specific case study and show that region-specific unemployment rates are negatively and significantly associated with house price expectations of Irish households, but otherwise, the literature on house price expectations of Irish households is very scant.

This paper aims to fill this gap and examine the determinants of house price expectations in Ireland, focusing on the role of experiences. The next section describes in more detail the data we use to do this and how we define and measure both expectations and experiences.

3 Data and definitions

To explore the determinants of Irish house price expectations, we use data from the Household Finance and Consumption Survey (HFCS). The HFCS collects granular and comparable information on households' balance sheets across the euro area as part of a Eurosystem project coordinated by the European Central Bank (ECB). In total, three waves of data are available for Ireland, collected in 2013, 2018 and 2020 by the Central Statistics Office (CSO).[3] Each wave provides a representative sample of the Irish population at that given point in time.

[2] Bielskis (2023) used the percentage change in the value of the average home in a given country between 2014 and 2017 as a measure of "*local experience*" of house price growth. Similarly, the percentage change in a respondent's home (using the HFCS panel component) measures "*personal experience*".

[3] An earlier wave 1 was conducted in 2010 in some countries. The official ECB HFCS release refers to wave 3 as "HFCS 2017". However, as this paper focuses on Ireland and the Irish data was collected between April 2018 and January 2019, we refer to wave 3 as "2018" in this paper. Further details on fieldwork periods are available in the ECB's HFCS Wave 3 Methodological Report.

The HFCS questions of most interest to our analysis are the questions about expectations for the future value of the household main residence (HMR) (HBZ010x), perceived current value of the HMR (HB0900[4]), its value at the time of acquisition (HB0800), the region where the HMR is located (DHREGION) and the year the HMR was acquired (HB0700). However, as information for Ireland on expectations is only available in 2018, we use data from this cross-section only.[5] Furthermore, as renters do not own their HMR, the Irish HFCS does not ask them about their expectations or perceptions of the HMR's value. Thus, we only consider the responses of homeowners.

3.1 House price expectations

The house price expectations question in the HFCS questionnaire (HBZ010x) is a probabilistic question[6], where the household's main respondent is asked how the *price of the residence she/he is currently living in* might change over the next 12 months. Respondents have to allocate a total of 10 points among five "bins", representing five possible price change scenarios, assigning more points to more likely scenarios:[7]

1. Decrease by more than 5 per cent
2. Decrease by 2 per cent to 5 per cent
3. No more than 2 per cent increase or decrease ("middle bin")
4. Increase by 2 per cent to 5 per cent
5. Increase by more than 5 per cent

In 2018, Irish households assigned the probability of 57 per cent to house price inflation above 2 per cent over the next year, while the reported probability of house price decreases of more than 2 per cent was less than 10 per cent (Figure 2). Survey responses revealed a relatively large probability of 35 per cent was assigned to the middle bin, capturing small house price changes on either side of zero.

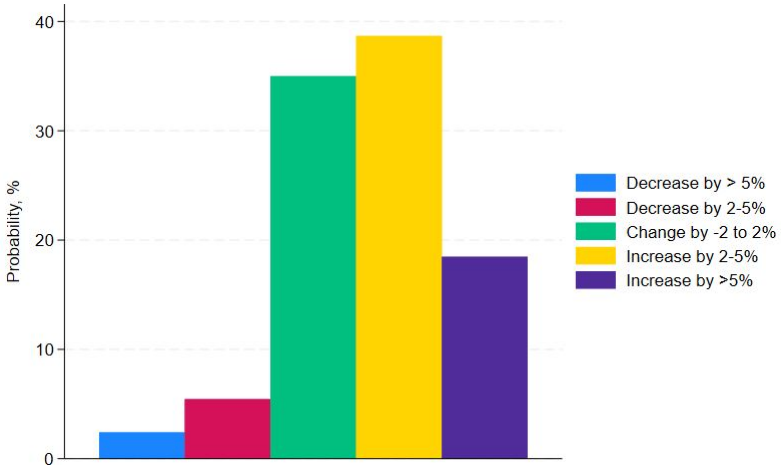
[4]Some variables in the HFCS can be missing and therefore need to be imputed. This imputation process applies to variable HB0900 (perceived current value of the home). Specifically, self-reported responses to HB0900 are checked for consistency against the State's property price register as well as other publicly available data. Any missing observations after this process are imputed using a combination of inflation-adjusted values for how much the HMR was worth at time it was acquired or by using a multiple imputation process. The imputation process results in five "implicates" being available for a given observation in the HFCS. In this paper, we use only the first implicate. Le Roux & Roma (2019) follow a different approach, computing the median of the 5 implicates.

[5]The COVID-19 pandemic disrupted data collection for the most recent 2021 wave of the HFCS. This included many countries changing survey mode from CAPI to CATI, which in turn, meant many countries (including Ireland) were unable to collect data on house price expectations in this wave.

[6]This type of question allows researchers to elicit not only mean expectations but also higher moments of the distribution, for example the standard deviation of expectations which can capture subjective uncertainty. However, it may also be more difficult to answer compared to a simpler point forecast question.

[7]Most countries use the 5% threshold in 2018 wave, but it is set to 4% in Germany and 6% in Spain.

Figure 2: Aggregate distribution of one-year-ahead house price expectations (IE, 2018)



Source: HFCS (weighted) and author's own calculations.
Note: Distribution based on the first implicate of weighted HFCS data from wave 3.

As the question does not provide point estimates of expectations, we calculate each household's implied mean expectation by taking a sum of the bins' mid-points multiplied by the probability assigned to each respective bin.[8] We fix the end-points of the first and last open-ended bins at -15 and +15 per cent respectively. The choice of the end-points is subjective, however it is in line with actual house price inflation in Ireland which has recorded values of between +/-10 and +/-20 per cent for some years. Pooled, weighted data from the ECB's Consumer Expectations Survey (CES) covering April 2022 to November 2024 also shows that the top 25 per cent of Irish households' house price expectations relate to values above 9 per cent.[9] Our end-bins are thus wider than in Bielskis (2023) to allow for large expected changes.

In general, the survey question is not so well populated. Over half (59 per cent) of Irish homeowners either refused to answer the house price expectations question or provided a "don't know" response. This item non-response may be non-random in some cases; however, throughout our analysis we use the supplied survey weights to help alleviate this potential issue.[10] See Appendix A.2 for further information on the response patterns to the HFCS expectations question.

Looking at the final weighted implied mean house price expectations variable (HP_Exp), we observe that Irish households' house price expectations are positive on average (Table 1). In 2018, the average Irish household expected house prices to grow by 2.8 per cent. This is less than the median household's expectations of 3.4 per cent over the next 12 months, but is close to an actual outturn of 2.4 per cent for 2019.

[8] Mid-points are: -10, -3.5, 0, 3.5, 10. As a robustness check, we re-ran the main model using mid-points of +/-15 and +/- 20 to account for larger expectations in the tails and the results were qualitatively unchanged, with the coefficients increasing in magnitude and remaining as statistically significant as before. These results are not included in the paper for brevity but are available upon request.

[9] For further information on the CES, see ECB (2021); Georgarakos & Kenny (2022) and ECB (2024).

[10] To investigate item non-response, we compare the two groups of homeowners: those who responded to the house price expectations question and those that did not (see Table A.1 in the Appendix). A larger share of non-response is found among those with lower levels of educated attainment, that are older, have lower income and wealth, live further away from the capital city and are mortgage-free.

Table 1. Descriptive statistics of house price expectations (IE, 2018)

N	Mean	P50	Min	Max	SD	Variance	Skewness
2,247	2.8	3.4	-10.0	10.0	3.7	13.8	-0.2

Source: HFCS (weighted) and author's own calculations.
Note: Statistics based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners who responded to the question.

The results from simple Ordinary Least Squares (OLS) regressions of various socio-demographic characteristics on house price expectations (available in Appendix A.3) show that house price expectations do not vary significantly across socio-demographics. The key exception is wealth, where compared to households located in the bottom of the wealth distribution, wealthier households tend to have higher expectations. Overall, socio-demographics alone explain only around 2 per cent of the total variation in house price expectations. This suggests scope for the potential role of experiences. We discuss the variables we will use to explore this next.

3.2 Experience variables

In this study, we explore the role of three potential experience channels. The first – and the one of most interest in this paper – is perceived *personal experience* of own house price growth. This is often more commonly referred to as "[own] house price perceptions". To measure this, we follow the approach in Le Roux & Roma (2019) – first used by Albacete et al. (2016) – and define a variable containing the "Perceived Average Yearly Return" on the home since its acquisition ($PAYR$) calculated using the formula:

$$\boldsymbol{PAYR = ((\frac{Price\_now}{Value\_acq})^{\frac{1}{HFCS\_refyr-Acq-yr}} - 1) * 100}$$

where:

$HFCS\_Refyr - Acq\_yr$ = the difference between the year the household acquired their HMR and the year they were surveyed by the HFCS

$Value\_acq$ = how much the HMR was worth at the time a household acquired it

$Price\_now$ = reflects responses to a question asking households about the value of their HMR today.[11] Specifically, respondents are asked "If you could sell [your HMR] now, how much do you think would be the price of it?"

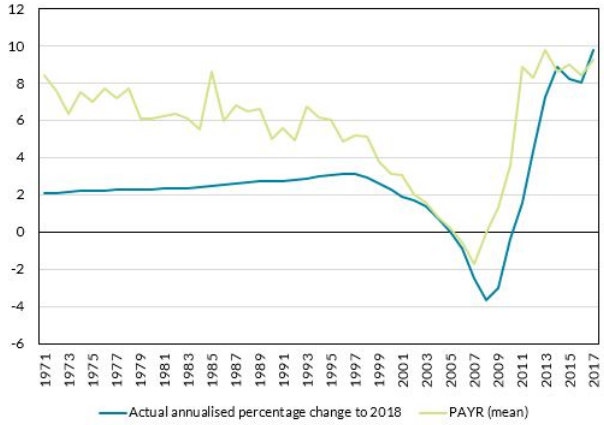
Some important features about our measure should be noted. First, our measure of *personal experience* (or "[own] house price perceptions") is different to that utilised by Bielskis (2023) who relied on: (i) the change in a country-level house price index over the three years preceding the HFCS; (ii) house price changes between two survey waves

[11] Le Roux & Roma (2019) find evidence that euro area homeowners overestimate the value of their properties by around 9% on average but there is significant cross-country heterogeneity and also differences by year of property acquisition. However, Lydon & McIndoe-Calder (2016) find that Irish HMR owners recall the value of their HMR well. The distribution of house prices and growth in mean house prices of their HFCS-simulation dataset closely follows the same series derived from the CSO residential property price index.

based on individual survey data aggregated at a country level; and (iii) house price changes between two waves for the panel households in the HFCS. The advantage of our measure is that it takes into account a longer history of housing experience at the individual level. Second, it is important to note that our measure reflects a household's perceptions of how the value of their home has changed over time. It does **not** reflect realised or actual returns. Though, given the importance of acquiring a house in one's life, it is reasonable to expect that many respondents remember the price they paid relatively accurately and therefore for some households, perceptions may closely equate to actual returns.

Indeed, Irish households' perceptions of house price growth appear to closely match actual aggregate house price growth in Ireland. This is illustrated in Figure 3 which plots two series. The first is the average PAYR associated with every possible year of acquisition between 1971 and 2017, which we derive from the 2018 HFCS weighted cross-sectional data (as described above). The second series is the actual average annualised change in Ireland's aggregate Residential Property Price index (RPPI) over 1971 to 2017.[12] The correlation between these two series is around 0.74. Generally, perceptions appear to be somewhat higher than actual outturn, with the exception of the most recent period related to the post-GFC recovery.

Figure 3. Perceived and actual average annualised returns on housing since acquisition to the date of interview by year of acquisition in Ireland (%)



Source: HFCS (weighted), RPPI and author's own calculations.
Note: Perceived average yearly return (PAYR) is calculated by the authors using HFCS data in accordance with the definition in Section 3. The data excludes observations with negative values for HMR purchase or current price; those who have owned their current home for less than one year and outlier observations with a PAYR > 100 per cent.
Actual annualised percentage change is calculated using data on residential property prices for Ireland (index 2010=100, not seasonally adjusted) from the Federal Reserve of St Louis. The series charted reflects the average per year change in the index compared to the index value in 2018, for each given year between 1971 and 2017.

It is likely that respondents find it more difficult to remember the exact value of their home at the time of acquisition if a property was acquired further back in time.[13] As Le Roux & Roma (2019) note, it is also possible that the gap associated with acquisitions further in the past relates to the change in the currency (from the national currency

[12] Several assumptions are in place to make this comparison as in Le Roux & Roma (2019). First, homeowners self-reported the original price of their home accurately. Second, house prices at the time of acquisition align with the national price index.

[13] For instance, people tend to believe they paid lower prices in the past compared to prices they actually paid, implying higher perceived inflation than actual experienced inflation (D'Acunto et al., 2024).

to the euro) distorting the reported acquisition value of the home in euros. Similarly, inaccuracies might arise if homes were self-built, since the RPPI excludes self-built dwellings.

The descriptive statistics for our *personal experience* variable are presented in Table 2. On average, the perceived average yearly return on the home since acquisition is 4.6 per cent. This is 1.8 percentage points higher than mean house price expectations. The variance of perceived average returns across home-owning Irish households is also much larger compared to expected house price inflation. This is demonstrated in the wider dispersion alongside a right skew and heavy tails. The top 10 per cent of the distribution includes values between 9.6 and 67.0 per cent. However, the differences in dispersion and skewness between expectations and perceptions are in part mechanical, driven by differences in the style of the HFCS questions for these variables. See Appendix A.4 and A.5 for kernel density plots of the distribution of our expectations and perceptions variables.

Table 2. Descriptive statistics of house price perceptions (IE, 2018)

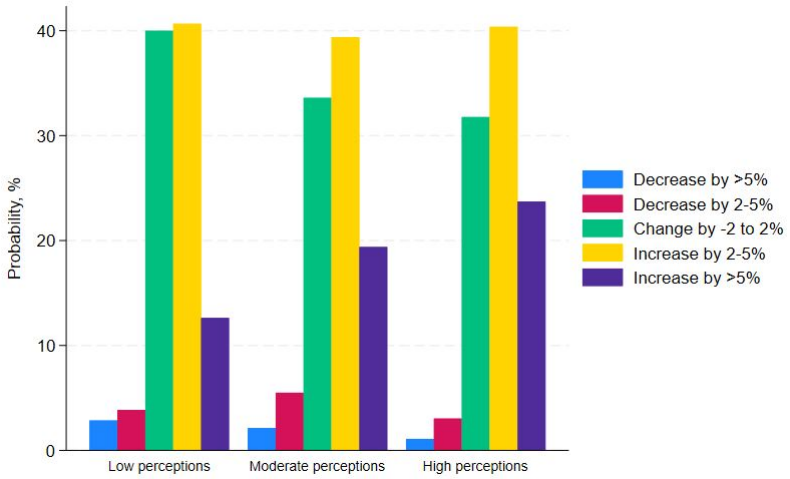
N	Mean	P50	Min	Max	SD	Variance	Skewness
3,112	4.6	4.3	-21.6	67.0	5.8	33.8	2.5

Source: HFCS (weighted) and author's own calculations.
Note: Statistics based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners. The sample excludes observations with negative values for HMR purchase or current price; those who have owned their current home for less than one year and outlier observations with a PAYR > 100 per cent.

Considering the variation in house price perceptions by socio-demographics (also available in Appendix A.3), we observe that homeowners who are working have lower house price perceptions than those not in work. Similarly, mortgaged homeowners have lower house price perceptions than outright owners. Wealth and age appear to be important sources of variation but there is little statistical significance for gender, education or income. Overall, socio-demographics alone explain only around 7 per cent of the total variation in house price perceptions.

Before describing the other two experience channels considered in this paper, we conduct a descriptive analysis around the relationship between house price expectations and perceptions. Plotting the share of households expecting the five different house price growth rates (offered as part of the HFCS probabilistic question on house price expectations) by whether the household is considered to have low, moderate or high house price perceptions, we observe a positive relationship (Figure 4).

Figure 4. Share of households expecting different house price growth rates – across different perception groups (IE, 2018)

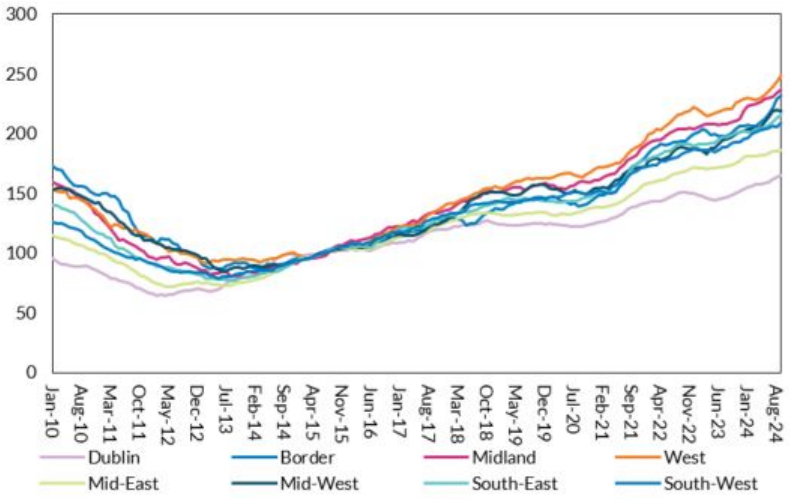


Source: HFCS (weighted) and author's own calculations.
Note: Results based on a sample of 2,004 households using the first implicate of weighted HFCS data from wave 3 who own their home and provided information on both their house price expectations and perceptions. Low perceptions is defined as households whose perceived return is less than the mean PAYR minus 1 standard deviation. High perceptions is defined as households whose perceived return is greater than the mean PAYR plus 1 standard deviation. While households are categorised as having moderate perceptions if they are between these two limits.

Among the homeowners with responses for both house price expectations and perceptions, the share of households expecting house price growth of more than 2 per cent over the coming year increases as PAYR increases. Mean house price expectations are 2.3 per cent in the low perceptions group. This compares to 2.9 and 3.6 per cent in the moderate and high perceptions groups respectively. The difference between groups is statistically significant. This signals that *personal experience* of house price developments as measured by perceived returns on housing may have an effect on expected future house price gains.

Another experience channel explored by this paper is households' *local experience* of price developments near their home. We proxy for this using information in the HFCS around the geographical location of the home. Specifically, we use dummy variables covering each of the three NUTS2 regions in Ireland: Eastern & Midlands, Southern and Northern & Western. Data from the CSO's Regional Population Projections shows these regions account for 33%, 49% and 18% of Ireland's population respectively. Given the Eastern & Midlands region contains Ireland's capital city (Dublin) and commands the highest median house price, we expect house price expectations to be higher in this region compared to the others. However, other regions have experienced larger house price changes over the past two decades (Figure 5).

Figure 5. RPPI (base: 2015=100) – by NUTS3 region (Jan 2010–Sep 2024)



Source: CSO.
Note: RPPI series reflects houses only – other residential property types (e.g. apartments) are excluded.

The final housing experience considered by the paper is what we term *housing acquisition experience*, reflecting whether the household experienced above or below average growth in the housing market at the time of acquiring their current property. We use the year the home was acquired to identify the house price variation experienced by a household around the time of home acquisition and categorise households into one of four groups as follows:

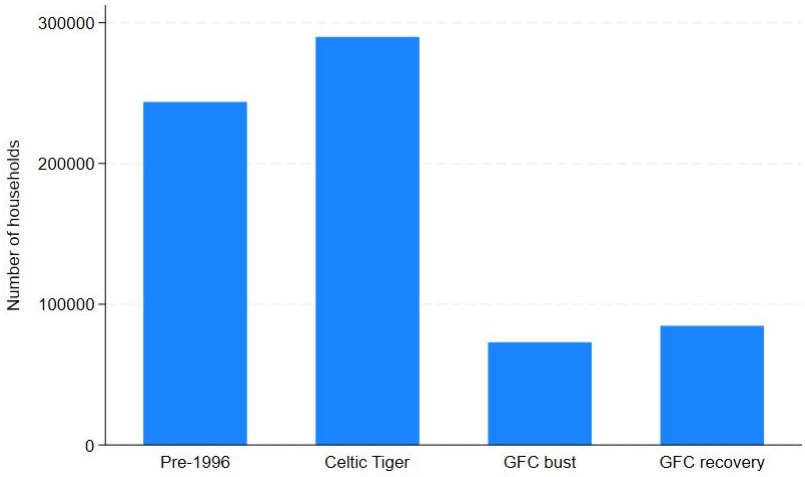
1. Pre-1996 – associated with steady, low house price growth
2. 1996-2007 – covering the strong house price growth of the Celtic Tiger era initially, followed by the property bubble broadly starting in 2002
3. 2008-2012 – covering the twin crises of the GFC and sovereign debt crisis, which was associated with sharp house price declines, and
4. 2013-2018 – associated with a strong recovery in the housing market.

For the remainder of this paper, we label and refer to these four periods as: "Pre-1996", "Celtic Tiger", "GFC Bust" and "GFC recovery".

According to the HFCS, 35 per cent of homeowners acquired their home before 1996 while a further 42 per cent acquired during the Celtic Tiger years (Figure 6). The remainder are split broadly equally between the GFC bust years (11 per cent) and GFC decline (12 per cent).[14]

[14] Note: these statistics are based on the homeowners who provided information on both house price expectations and perceptions (i.e. not the full sample of homeowners in the HFCS). The results for the full sample are: pre-1996 = 39%; Celtic Tiger = 39%; GFC bust = 11% and GFC recovery = 11%.

Figure 6. Distribution of HMR by year of acquisition (IE, 2018)



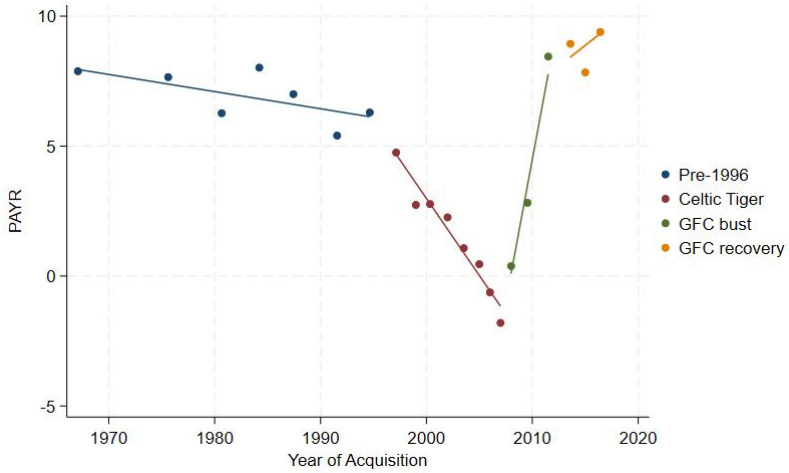
Source: HFCS (weighted) and author's own calculations.
Note: Chart based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners who reported information on both house price expectations and perceptions. This is the same sample used in the regression analysis, as described in Section 4. Celtic Tiger covers HMR acquisition during 1996-2007; GFC bust covers 2008-2012 and GFC recovery from 2013 onwards.

Importantly, it is not possible to directly identify in the HFCS whether the HMR reflects the household's first home or not. Therefore, it is possible that a household who acquired their HMR, for example in the GFC bust years, may have previously acquired a home in one of the other earlier time periods. As a result, we implicitly assume in our definition of *housing acquisition experience* that this reflects the conditions that a household either experienced at the time of or since acquisition of their current home, and this may be different to their overall lifetime experience of housing market conditions if the household had previously acquired an earlier home which they no longer live in.

In terms of how house price perceptions vary by our four time of acquisition groups, we observe that up to around the early 1990s, PAYR trends downward slightly from high positive rates, before falling more sharply between 2000 and 2007 (Figure 7). This is in line with a much lower, even if steadily rising, house price level in the 1990s relative to 2018 (when the RPPI was at the level seen in 2005, see Figure 1 in Section 1). It is also consistent with the sharp increase in house prices during the 2000s. While during the GFC and debt crisis period, average perceived returns are quite low, which is consistent with house prices falling from the high peak in those years.

Thus, those respondents who acquired their current home before the prices reached the trough, may perceive less gain on their housing in 2018 when surveyed by the HFCS. Whereas, between 2008 and the time of the survey, house prices in Ireland had been increasing strongly. This shows up in robust PAYR figures starting in 2013. This suggests that the timing of acquisition is an important determinant of house price perceptions; consistent with Le Roux & Roma's (2019) findings for the largest euro area countries. See Appendix Tables A.6 and A.7 for further descriptive statistics on house price expectations and perceptions by time of acquisition.

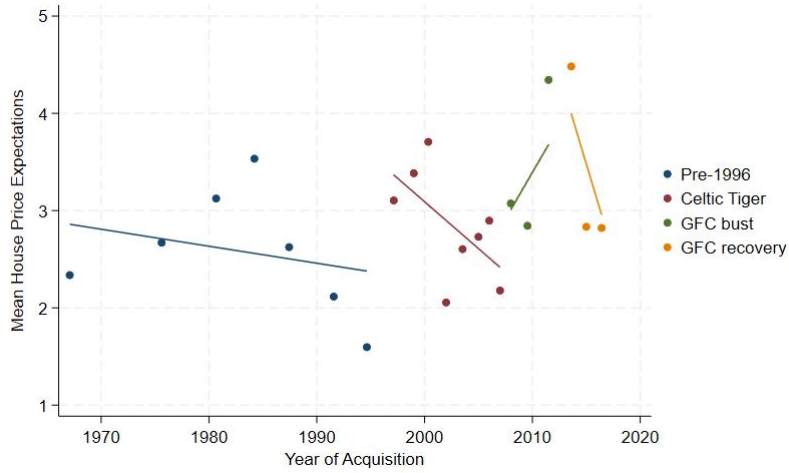
Figure 7. Binscatter plot of year of acquisition and PAYR on home



Source: HFCS (weighted) and author's own calculations.
Note: Chart based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners who reported information on both house price expectations and perceptions. This is the same sample used in the regression analysis, as described in Section 4.

The association between the time of acquisition and house price expectations is less obvious, although differences in expectations across different stages of the housing market can be noted (Figure 8). The patterns overall are similar to those shown for perceived returns, with an exception of the period since 2013. Nevertheless, each of the four periods used in our analysis reflect distinctive housing market conditions in Ireland, which may provide an important contextual reference point, particularly if the households' acquisition relates to a first-time purchase.

Figure 8. Binscatter plot of year of acquisition and mean house price expectations



Source: HFCS (weighted) and author's own calculations.
Note: Chart based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners who reported information on both house price expectations and perceptions. This is the same sample used in the regression analysis, as described in Section 4.

Recent work by Gennaioli, Leva, Schoenle & Shleifer (2024) points to the role of selective memory effects in expectation formation. Specifically, they argue there is evidence that – when households think about future inflation – there is a role for recency (whereby

it is easier to recall last year's inflation); primacy (easier to recall early-life inflation experiences) and numerical similarity (easier to recall experiences that are closer to a given cue). It is therefore possible similar, long-lasting memory effects associated with the conditions at time of acquisition are also at play when households form expectations about future house price growth. Consequently, incorporating this additional experience variable is a novel and interesting contribution to the literature.

3.3 Other variables

In addition to the variables described above, the analysis considers information on a range of socio-demographic characteristics. These include: gender, age, wealth, highest education level, work status, the ownership of other property and mortgage debt status.[15] Finally, we also exploit questions about a respondent's willingness to take financial risks (which allows us to account for risk aversion) and perceptions about their past household income growth (specifically drawing on HFCS question HG0700 which asks respondents whether they perceive their total household income over the past 12 months to be lower than "normal").

4 Empirical analysis

4.1 Methodology

To formally explore the determinants of house price expectations in Ireland (and in particular the role of experiences), we conduct a cross-sectional regression analysis using a sample of 2,004 home-owning households in the 2018 HFCS that reported information on both house price expectations and perceptions and have owned their current home for at least one year. To reduce the influence of outliers, we exclude observations with a PAYR above 100 per cent.[16] The sample represents around 690,000 households.[17]

To address the potential for multicollinearity and isolate the role of the three types of experiences (described in Section 3) in determining house price expectations, in particular isolating the role of *personal experience*, we apply a two-stage estimation procedure.

In the first stage, we regress our personal experience variable (proxied by PAYR) on dummies for time of acquisition and location. In the case of the former, we include dummies $celtic\_tiger$, $gfc\_decline$ and $gfc\_recovery$. The base category for these dummies is thus the pre-1996 period, selected as households who bought their current home before this date did not experience sharp housing market fluctuations while

[15] Ownership of other property is based on an HFCS question asking if the household owns any other properties, such as houses, apartments, garages, offices, hotels, other commercial buildings, farms or land.

[16] Only 4 observations exceed this threshold but we also drop 7 observations related to negative values of HMR purchase or current price, 8 observations where the years of acquisitions are inconsistent with the age of the household and a further 6 observations where we are missing information on the risk preferences of the household which is a control in our regression analysis.

[17] This is based on the application of household weights provided by the survey. The descriptive statistics for the sample are presented in Table A.8 in the Appendix. Reassuringly, the characteristics of the regression sample are similar to the full sample of Irish homeowners.

owning it. While for location, we include dummies $southern$ and $eastern$ and use the Northern & Western region as the base.

$$(1)PAYR_i = \beta_0 + \beta_1 celtic\_tiger_i + \beta_2 GFC\_decline_i + \beta_3 GFC\_recovery_i +$$
$$\beta_4 southern_i + \beta_5 eastern_i + \varepsilon_i$$

The residuals ε_i from this regression leaves us with perceived returns on housing that are **not** explained by the timing of HMR acquisition or local house price dynamics. We refer to these residuals as a new variable, $PAYR_i^*$. Thus, $PAYR_i^*$ could reflect differences in the type of housing (i.e., whether it is a detached or semi-detached house or an apartment, with or without outdoors space). Other differences captured in this purged PAYR variable include whether there has been any renovation or maintenance work done to the home since acquisition, such as energy efficiency upgrades or an extension.

In the second stage, we include PAYR* as the key independent variable in an OLS regression of house price expectations (Equation 2) alongside the same dummy variables for acquisition period and geographic location. This allows the effects from different types of experiences with the housing market to be better distinguished.

$$(2)HP\_Exp_i = \beta_0 + \beta_1 PAYR_i^* + \beta_2 celtic\_tiger_i + \beta_3 GFC\_decline_i +$$
$$\beta_4 GFC\_recovery_i + +\beta_5 southern_i + \beta_6 eastern_i + \beta_7 other\_prop_i +$$
$$\beta_8 mortgaged_i + \beta_9 wealth_i + \beta_{10} risk_i + +\beta_{11} income\_norm_i + \beta_{12} female_i +$$
$$\beta_{13} tertiary_i + \beta_{14} working_i + \beta_{15} aged\_60plus_i + \varepsilon_i$$

As discussed in Section 2, socio-demographic characteristics may be relevant for expectations, although to a lesser extent than perceived returns. We therefore control for gender, education, age, gross wealth, labour status and mortgage debt status. The gender dummy,$female$, takes the value of 1 if the household respondent is female and zero otherwise. We also include a dummy for whether the respondent has completed tertiary education, $tertiary$, as this could proxy for financial literacy,[18] and a binary age variable, $aged\_60plus$, reflecting whether the respondent is aged 60 years or over.[19] For wealth, we include a categorical variable for wealth quintiles, $wealth$, with the first quintile as the base.[20] To control for labour status we include a dummy variable for whether the household head is in work or not, $working$.[21] While a dummy variable for whether a household owns their home with a mortgage or not, $mortgaged$, captures the extent of households' indebtedness as it may be the case that those servicing a mortgage pay closer attention to the housing market.

[18] Three financial literacy questions are available for Ireland in the 2018 HFCS. However, many households elected to skip the financial literacy quiz. Therefore, to maintain sample size, we proxy with education instead. This is a common approach in the literature as financial literacy and highest obtained education level are positively correlated. In the HFCS, the pairwise correlation between the two is measured at 0.1884 significant at the five per cent level.

[19] In the version of the HFCS we use, a continuous age variable is not available. However, as a robustness check, we re-ran the model using a categorical age variable. See the Section 5 for further detail and the results.

[20] As a robustness check, we re-ran the model using continuous log gross wealth and a categorical variable for net wealth quintiles and the results did not significantly change. These results are not included in the paper for brevity but are available upon request.

[21] We do not control separately for income level since education and work status (closely related to income) are controlled for. Income was also found to be statistically insignificant in our analysis of the role of socio-demographics for house price expectations. The results of which are presented in Appendix A.3

Furthermore, we exploit information on some other questions in the HFCS. Like Bielskis (2023), we include risk aversion and income perceptions as potential determinants. Namely, the risk variable, $risk$, is equal to 1 if a respondent reports willingness to take any financial risk and zero otherwise. The income perceptions dummy, $income\_norm$, is 1 if a respondent self-reports their household's income over the last 12 months as being lower than normal and zero otherwise. Finally, we also control for holding other property. Owning other property may imply more housing market knowledge or closer attention to real estate price trends, which could influence expectations for future house prices.

Property characteristics such as neighbourhood, appearance and security might be relevant for house price expectations, but this information is not available in the HFCS.[22] To account for heteroskedasticity, we use robust standard errors in our Stage 1 regression and bootstrapped standard errors (based on 2000 replications) in our Stage 2 regression. Finally, before discussing the results, we reiterate that our analysis is on identifying the association between experiences and expectations. The results are therefore not to be interpreted as causal.

4.2 Results

Table 3 presents the results of the two-stage estimation, using the purged $PAYR_i^*$ as a measure of [own] house price perceptions. The first-stage results are reported in Column 1. Geographical location (a proxy for *local experience* of house prices), as well as the time of acquisition (a proxy for *housing acquisition experience*) are significant determinants of perceived average returns on housing.

The second-stage estimation results are shown in Column 2-7. Each column adds additional controls. The preferred model, with the full set of socio-demographic and other controls, is shown in Column 7. We find $PAYR_i^*$ – our proxy measure of *personal experience* of house prices – to be positively associated with house price expectations. The association is significant at the 5% level and robust to the inclusion of additional control variables. Holding all other explanatory variables constant, a one percentage point increase in $PAYR_i^*$ is associated with increasing mean house price expectations by around 0.04 percentage points, equivalent to approximately 1.4 per cent of the mean expected annual house price growth in Ireland. Alternatively, a one standard deviation increase in house price perceptions is associated with an increase in house price expectations by approximately 0.23 percentage points, equivalent to approximately 8.2 per cent of the mean expected annual house price growth in Ireland.

We also find *local experience* of house prices to be important. In particular, living in the Eastern & Midlands region (which contains the capital, Dublin) is associated with mean expectations that are around 1.3 percentage points higher than those of homeowners

[22] The only property characteristic provided in the Irish HFCS is a categorical variable for the size of the property (in square metres). As a robustness check, we included this variable and also a dummy reflecting whether the household expects their total income to go up by less than prices over the next year (which could proxy for price expectations) in our Equation 2 model, but both were statistically insignificant. These results are not included in the paper for brevity but are available upon request.

living in the Northern or Western region. This is significantly different to the coefficient for living in the Southern region, which is only statistically significant at the 10% level. The third experience considered – *housing acquisition experience* – also appears relevant. Acquiring your home during the bust period around the time of the GFC (in 2008-2012) or in the housing market recovery (commencing 2013 onwards) are both associated with around 0.8-0.9 percentage points' higher mean expectations than those who acquired pre-Celtic Tiger (before 1996).[23] This result is in line with Duca, Muellbauer & Murphy (2021) who find house prices can be affected by endogenous processes in particular that multi-year memory implies shocks can have long-lasting impact on house prices, irrespective of the dynamics of fundamentals. This may reflect the context surrounding the acquisition of a home holding primacy in a homeowner's mind at the expense of other data points or considerations.[24] Though, in hypothesis testing following the regressions, we fail to reject the null hypothesis that the coefficients on these variables are equal.

Table 3. Two stage estimation of mean house price expectations – where perceptions is measured as predicted errors from a first stage perceived returns regression

	Stage 1			**Stage 2**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
PAYR* (predicted errors)		0.0519**	0.0489**	0.0480**	0.0433**	0.0438**	0.0420**
		(0.021)	(0.022)	(0.021)	(0.020)	(0.020)	(0.020)
Acquired in Celtic Tiger	-5.255***		0.353	0.451	0.428	0.415	0.433
	(0.330)		(0.284)	(0.282)	(0.302)	(0.301)	(0.299)
Acquired in GFC Bust	-3.577***		0.766*	0.846**	0.837**	0.833**	0.874**
	(0.646)		(0.390)	(0.383)	(0.387)	(0.389)	(0.384)
Acquired in GFC Recovery	1.886**		0.934**	0.920**	0.884**	0.817**	0.831**
	(0.852)		(0.377)	(0.371)	(0.378)	(0.376)	(0.375)
Live in Southern region	0.518			0.711**	0.642*	0.662*	0.653*
	(0.421)			(0.346)	(0.345)	(0.345)	(0.347)
Live in Eastern & Midlands region	1.374***			1.556***	1.259***	1.299***	1.328***
	(0.442)			(0.331)	(0.333)	(0.334)	(0.335)
Has other property					-0.736**	-0.746**	-0.711**
					(0.302)	(0.299)	(0.298)
Risk averse						-0.494**	-0.500**
						(0.238)	(0.236)
Lower than normal income							-0.673***
							(0.257)
Constant	5.989***	2.906***	2.501***	1.383***	0.990*	1.413**	1.473***
	(0.408)	(0.332)	(0.426)	(0.508)	(0.546)	(0.573)	(0.572)
N	2,004	2,004	2,004	2,004	2,004	2,004	2,004
R-squared	0.238	0.008	0.013	0.037	0.048	0.051	0.055
Additional controls included *	N	Y	Y	Y	Y	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Robust standard errors in parentheses in Stage 1 (Column 1). Bootstrap standard errors (based on 2000 replications) in parentheses in Stage 2 (Columns 2-7).
*** p<0.01, ** p<0.05, * p<0.1
Results based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996) while the base for location is living in the Northern or Western region.
* Additional controls throughout the second stage include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over. From Column 5 onwards, a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

[23] While the Celtic Tiger coefficient is smaller than the GFC bust and recovery coefficients, its value is within the 95% confidence intervals of these coefficients.

[24] Recent work (around inflation expectations) by Gennaioli, Leva, Schoenle & Shleifer, (2024) explores this concept of primacy in more detail.

The factors associated with lower house price expectations include holding other property, being risk averse or perceiving your total household income over the last 12 months to be lower than normal. Ceteris paribus, a one percentage point increase in these variables is associated with lowering mean expectations by between -0.5 and -0.7 percentage points.

Mortgage participation does not appear to be an important determinant of house price expectations in Ireland. None of the core background controls are statistically significant either, with the exception of wealth where the coefficients for wealth quintiles (not shown) indicate a positive but not strongly monotonic relationship. This implies no "expectation premium" amongst the wealthiest households when compared to the first quintile.

The R squared measure indicates our specification only explains 5.5 per cent of the variation in mean 12 month ahead house price expectations. This is a lower R squared measure than that found by Bielskis (2023) but is more in line with other studies in the literature. For example, Kuchler, Piazzesi & Stroebel (2023) find only about 10 per cent of cross-sectional dispersion in expectations is jointly explained by controls for time, location and demographics.

4.3 Generalisability of Results

We check the robustness of our main results along several dimensions. First, we estimate the model using a simple OLS estimation without any first stage cleansing (Table A.9 in the Appendix). We find the coefficient of the perceptions variable closely matches the original results. Similarly, *local experience* (particularly living in the Eastern & Midlands region) is found to be a key determinant and the results around holding other property, being risk averse and perceiving income to be lower than normal are similar to before.

The coefficient for acquiring the home during the Celtic Tiger period is statistically significant at the 5% level. Further, the coefficient for the housing market bust period is larger than the recovery period. This implies that homeowners who acquired their home when prices were falling, or indeed had bottomed out, are more optimistic about future house prices than those homeowners who acquired more recently when house prices were rising. This is an interesting finding for two reasons. Firstly, because the literature suggests that households are more optimistic about future house price developments when positive growth has recently been observed (Kuchler, Piazzesi & Stroebel, 2023). Secondly, the descriptive analysis showed that the GFC bust period includes households who, on average, perceive negative average annual house price growth for their home. Therefore, our regression result implies that despite these perceived negative changes in their house value, they are optimistic about the future.

Next, we replace our original PAYR variable in the OLS estimation with a categorical variable reflecting whether the households' perceived returns are low, moderate or high.[25] The main results discussed above continue to hold (Table A.10 in the Appendix).

[25] Low perceptions are defined as PAYR that are one standard deviation or more lower than the mean; moderate perceptions are PAYR that are within one standard deviation of the mean and high perceptions are those that are one standard deviation or more higher than the mean.

Homeowners with moderate perceived returns have around 0.7 percentage points higher mean house price expectations compared to households with low perceived returns. In the case of high perceived returns, mean house price expectations are around 1.1 percentage points higher compared to the expectations of those with low perceptions. Both of these coefficients however are only statistically significant at the 10% level. The other coefficients show a similar association to the main results. The indicator for acquiring in the Celtic Tiger years is now marginally statistically significant. While the coefficient for the GFC recovery periods loses some statistical significance.

Moreover, we check an alternative definition for the year of acquisition. Specifically, instead of indicator variables, we re-run the two-stage estimation procedure with a continuous numeric variable containing the year the household acquired their home. This variable ranges from 1950 to 2017. Column 2 in Table A.11 (in the Appendix) presents the results compared with those of our main regression model in Column 1, inclusive of all controls. Under this alternative definition, the variables capturing *personal experience* and *local experience* retain their positive, statistically significant association at a similar economic magnitude. The coefficients for holding other property, risk aversion and income perceptions are also similar to before. However, the alternative year of acquisition variable is neither economically or statistically significant. This finding suggests that the relationship between when the home was acquired and house price expectations is less related to time and more reflective of circumstances or events experienced.

Finally, we repeat our analysis using an alternative age variable (which is categorical with five categories: <44, 45-54, 55-64, 65-74 and 75+) and under different approaches for handling outlier PAYR values, namely: excluding observations with a PAYR>120 per cent and winsorisng at the 2nd and 98th percentiles of the weighted PAYR distribution.[26] The results in all cases are qualitatively similar. See Appendix Tables A.12 and A.13 for the associated regression tables.

4.4 Distributional differences in expectations formation

The analysis so far has only considered the relationship from the perspective of the conditional mean of house price expectations. However, it is possible that the influence of the explanatory variables differs across the distribution of house price expectations. To explore if this is the case, we re-perform our stage 2 estimation procedure this time using quantile regressions (with robust standard errors) for the 25th, 50th (median) and 75th percentiles. This approach models the relationship between the predictive variables and these conditional quintiles of mean house price expectations.[27] The results of the second stage equation for the full models, inclusive of all controls, are presented in Columns 2 to 4 of Table 4, with the original (mean) model in Column 1 for comparison.

The quantile regressions show that *personal experience* of house prices and *local experience* are statistically significant determinants at the upper end of the distribution.

[26] Under the first approach, we drop 3 observations while the second approach changes 69 observations and narrows the PAYR distribution to a range of -4.7 to 17.6.

[27] It should be noted that around 24 per cent of the mean expectations variables are equal to zero. This is relevant as the quantile regression typically works best when the dependent variable does not have many zeros or bunching.

Living in the Eastern or Midlands region (containing Dublin) has a particularly large coefficient at the 50th and 75th percentiles, where it is associated with up to 1.8 percentage points higher house price expectations.

Housing market conditions experience, specifically acquiring during the GFC recovery period, is statistically significant at the 25th percentile but less at the 50th or 75th percentiles. Holding other property is statistically significant at the middle and lower end of the distribution. While risk aversion and the variable for income perceptions – specifically whether the household perceives their total household income to be lower today than 12 months ago – are statistically significant at the 75th percentile. In both cases, the coefficients are around 0.4 percentage points larger than under the mean regression.

Table 4. Quantile regression estimation of house price expectations

	(1) Mean	(2) 25th percentile	(3) Median	(4) 75th percentile
PAYR* (predicted errors)	0.0420**	0.0121	0.0417*	0.0732***
	(0.020)	(0.0188)	(0.0231)	(0.0220)
Acquired in Celtic Tiger	0.433	0.0328	0.192	0.118
	(0.299)	(0.129)	(0.273)	(0.306)
Acquired in GFC Bust	0.874**	0.290	0.588	0.237
	(0.384)	(0.235)	(0.374)	(0.366)
Acquired in GFC Recovery	0.831**	1.033**	0.559*	0.294
	(0.375)	(0.483)	(0.312)	(0.439)
Live in Southern region	0.653*	0.0599	1.479***†	0.367
	(0.347)	(0.120)	(0.338)	(0.407)
Live in Eastern & Midlands region	1.328***	0.351*†	1.835***	1.697***
	(0.335)	(0.215)	(0.295)	(0.421)
Has other property	-0.711**	-0.414*	-0.958***	-0.478
	(0.298)	(0.224)	(0.355)	(0.333)
Risk averse	-0.500**	-0.141	-0.158	-0.933***
	(0.236)	(0.149)	(0.233)	(0.252)
Lower than normal income	-0.673***	-0.312*	-0.339	-1.103***
	(0.257)	(0.169)	(0.383)	(0.223)
Constant	1.473***	-0.173†	0.821	4.264***†
	(0.572)	(0.253)	(0.606)	(0.694)
N	2,004	2,004	2,004	2,004
R-squared / Pseudo R-squared	0.055	0.005	0.021	0.049
Additional controls included *	Y	Y	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
† indicates if the coefficient is statistically significant at the 95% confidence level compared to the conditional mean regression. Results in Column 1 reflect our main results from Column 7 of Table 3. Results in Columns 2 to 4 are based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996) while the base for location is living in the Northern or Western region.
* Additional controls throughout the second stage include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over. There is also a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

However, few of the coefficients from the quantile regressions are statistically different to the coefficient of our main results. That is, the majority of the coefficients – including for house price perceptions – fall within the 95% confidence interval associated with our original two stage specification. Exceptions relate to location. Specifically, the coefficient on living in the Eastern & Midlands (Southern) region is statistically different

for the 25th (50th) percentile. All in all, the results suggest that the explanatory factors identified by our main analysis can be considered generally important determinants for Irish households' expectations formation and are particularly relevant for explaining the middle of the distribution of house price expectations.

4.5 Heterogeneity in expectations formation

A Dutch study by Galati, Teppa & Alessie (2011) highlighted heterogeneity and segmentation in subjective house prices, particularly with regards geographical region, degree of urbanization, funding conditions, and income expectations. Bielskis (2023) also argued cross-country heterogeneity in expectations could be explained by differences in tenure status and position along the income and wealth distributions.

However, as Kuchler, Piazzesi & Stroebel (2023) note, unless households differ in the nature of how they extrapolate, then extrapolation in and of itself should not explain heterogeneous expectations. It is therefore interesting to explore the extent to which the relationship between house price expectations and *personal experience* of house prices is dependent on another factor, in particular, if there is any state dependency in the relationship associated with other experiences. Therefore, we re-perform our two-stage procedure, but this time include several variables in the second stage reflecting interactions between our "purged" $PAYR_i^*$ variable and households' location, time of home acquisition, other property status and whether the household perceives their income over the past 12 months to be lower than normal. The regression results from the second stage are presented in Table 5.

Of the interactions considered, only the interaction between $PAYR_i^*$ and whether the household acquired their home during the post-GFC recovery is statistically significant at the 95% level. However, this result is sensitive to the empirical approach. For example, the statistical significance reduces to the 90% level when bootstrapped standard errors are used, while it becomes insignificant when we winsorise the PAYR variable as opposed to dropping outlier observations. For location, other property status and income normality, the interaction terms are insignificant but the main effects are. Overall, this suggests there is little evidence that the relationship between house price perceptions and expectations is dependent on another factor, with the exception of whether the home was acquired recently.

To better understand this potential state dependency further, we consider the marginal effects associated with time of acquisition. Figure 9 plots the average marginal effect for values of perceived returns ranging from -5 to 10 per cent by time of acquisition (using pre-1996 as the base). It shows that it is only when perceived returns are negative, that there is a potential dependency.

Table 5. Two stage estimation of mean house price expectations, using interaction terms

	(1)	(2)	(1)	(4)
PAYR* (predicted errors)	0.162**	0.086	0.051**	0.041**
	(0.074)	(0.0552)	(0.0236)	(0.0207)
Acquired in Celtic Tiger	0.363	0.464	0.438	0.433
	(0.297)	(0.296)	(0.299)	(0.300)
Acquired in GFC Bust	0.794**	0.844**	0.882**	0.874**
	(0.394)	(0.394)	(0.394)	(0.395)
Acquired in GFC Recovery	0.757**	0.872**	0.810**	0.832**
	(0.379)	(0.380)	(0.381)	(0.380)
Live in Southern region	0.650*	0.657*	0.654*	0.655*
	(0.340)	(0.341)	(0.342)	(0.342)
Live in Eastern & Midlands region	1.309***	1.330***	1.334***	1.331***
	(0.326)	(0.330)	(0.330)	(0.331)
Has other property	-0.672**	-0.720**	-0.722**	-0.709**
	(0.296)	(0.292)	(0.293)	(0.295)
Risk averse	-0.497**	-0.485**	-0.503**	-0.501**
	(0.234)	(0.234)	(0.234)	-0.234
Lower than normal income	-0.665**	-0.678***	-0.675***	-0.669***
	(0.258)	(0.258)	(0.259)	(0.259)
Acquired in Celtic Tiger*PAYR*	-0.088			
	(0.0842)			
Acquired in GFC Bust*PAYR*	-0.122			
	(0.0813)			
Acquired in GFC Recovery*PAYR*	-0.161**			
	(0.0768)			
Live in Southern region*PAYR*		-0.102		
		(0.0642)		
Live in Eastern & Midlands region*PAYR*		-0.025		
		(0.0609)		
Has other property*PAYR*			-0.040	
			(0.040)	
Lower than normal income*PAYR*				0.010
				-0.051
Constant	1.538***	1.431**	1.467***	1.472***
	(0.551)	(0.558)	(0.558)	(0.559)
N	2,004	2,004	2,004	2,004
R-squared	0.060	0.058	0.056	0.055
Additional controls included *	Y	Y	Y	Y

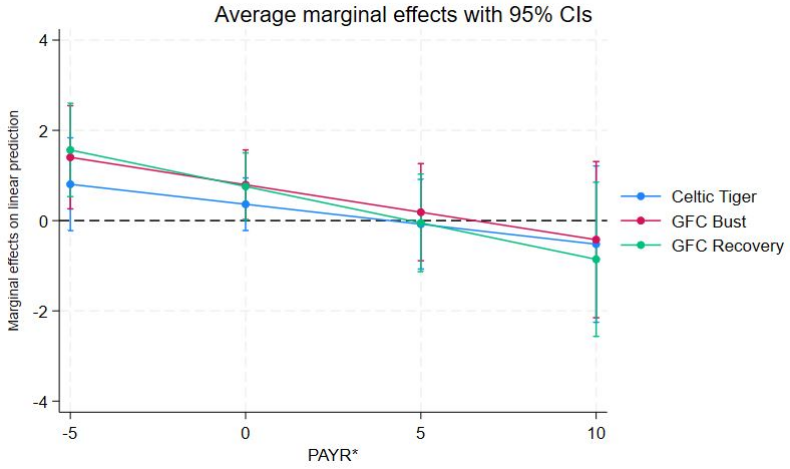
Source: HFCS (weighted) and author's own calculations.
Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1
Results based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996) while the base for location is living in the Northern or Western region.
* Additional controls throughout the second stage include dummy variables for household respondent being female; being in work; being tertiary educated and being aged 60 years or over. There is also a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

In this case, it is only when perceived returns are negative that perceived returns will have a statistically different effect on house price expectations depending on if the household acquired their home during either the GFC bust or recovery periods, compared to those who acquired their home before 1996. Put differently, if homeowners hold a negative *personal experience* of house price growth to date, then how this influences their beliefs about future house prices could vary depending on whether they have also experienced high amplitude in the housing market.

All in all, the results suggest that if a household has acquired their home more recently, then perceptions could have a significantly different impact on expectations when

perceived returns are negative. In contrast, for most values of perceptions, *local experience* (particularly living in the Eastern & Midlands region) is associated with higher future house price expectations, while holding other property or perceiving a negative income shock over the past year is associated with lower future house price expectations. See Appendix A.14 for the associated marginal effect plots.

Figure 9. Predictive average marginal effects of PAYR on house price expectations (with 95% confidence intervals) – by time of acquisition



Source: HFCS (weighted) and authors' calculations.
Note: Plot produced following regression with robust standard errors as per Table 5. The base period is observations who acquired their home pre-1996.

5 Discussion

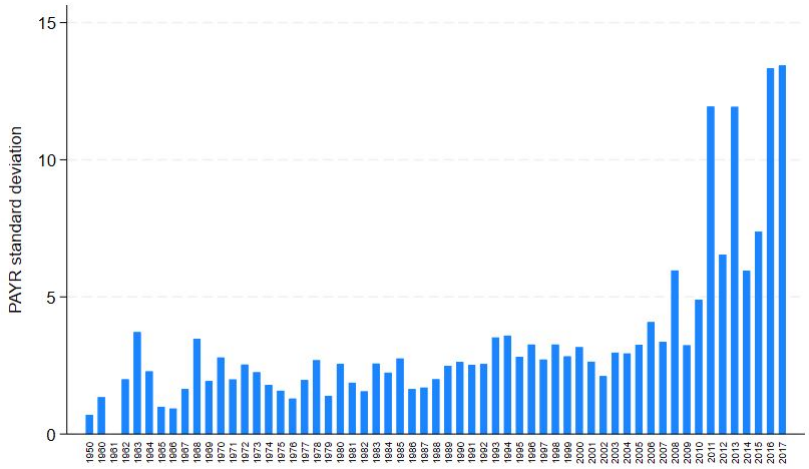
Overall, our analysis shows that experiences matter for the formation of house price expectations in Ireland. Crucially, the results indicate that *personal experience* (measured by own house price perceptions), *local experience* (measured at NUTS2 region) and *housing acquisition experience* (measured using period of acquisition) can be considered distinct from each other. We find only tentative evidence of a potential state dependency between perceptions and time of acquisition when households perceive a negative yearly return on the value of their home.

Furthermore, while the importance of the factors can vary somewhat depending on which part of the distribution of house price expectations is being analysed, we find they are relevant for the bulk of the middle of the distribution, and there was limited statistical difference against our analysis of the average household. This implies that the explanatory factors can be considered generally important determinants for Irish households' expectations formation. Although, we note that there still remains a large unexplained component, suggesting other factors not analysed are relevant.

The findings around *housing acquisition experience* are particularly interesting. One interpretation is that homeowners who acquired between 2008 and 2017 experienced a housing market undergoing large price changes, in the form of either a large house price collapse or large recovery. Experiencing such high amplitude in the housing market at time of acquisition may partly explain why the variability of [own] house price

perceptions in Ireland increases over this period (Figure 10). It is perhaps through this increased uncertainty that acquisition timing plays a role in expectation formation.

Figure 10. Standard deviation of house price perceptions – by year of acquisition (IE, 2018)



Source: HFCS (weighted) and authors' calculations.

However, homeowners who acquired during the Celtic Tiger years arguably also experienced high amplitude in the housing market, yet Figure 10 does not show high volatility in PAYR for these years. Further, our main regression results (Table 3) did not show significant differences in expectations from those who acquired pre-1996. An alternative interpretation of the results could be that the year of acquisition, tells us not just about the **point-in-time experience** of homeowners *at the time of* acquisition, but also the **cumulative experience** of homeowners *since* acquisition. Differences in this cumulative experience may produce differences in sentiment towards future house price developments, that could impact households' beliefs about the same.

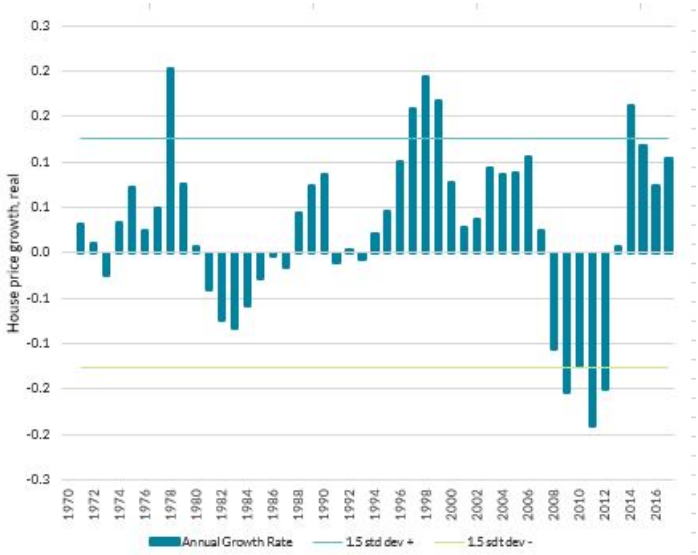
To understand how, consider the recent acquirers first, they have only experienced general house price gains since acquiring their home and therefore may be more optimistic about future gains (consistent with the literature to date, described in Section 2). Those who acquired during the GFC bust period, acquired when house prices were falling but will also have experienced a recovery in the housing market since, which could drive optimism for the future. In contrast, those who acquired their home during the Celtic Tiger years will have experienced a full cycle of house price growth, contraction and recovery. Some of these households may have experienced a difficult financial situation or negative equity, which could have had a scarring effect on their expectations of future growth. Finally, the pre-1996 acquirers are homeowners who will have observed the housing market over a long period of time (and while possibly less directly impacted by the GFC bust period, may still be aware of the negative experiences in this period) which could lead to more muted expectations.

Note, that cumulative experience in this instance is different from lifetime experience. The latter cannot be identified in our HFCS data because we do not know if the household has previously owned a home or not. Without further data, particularly on whether a household is a first time buyer or how many times they have moved or purchased property, it is difficult to pin-point more precisely the role of time of

acquisition.[28] It is also possible that the time of acquisition variables may be capturing other structural changes in the Irish economy affecting expectations that go beyond the state of the housing market.

In order to attempt to disentangle which of these two potential channels - point-in-time versus cumulative experience - is the most likely mechanism in our context, we conduct an analysis with measures for growth of real house prices. Specifically, for point-in-time experience, we calculate the growth rate in real house prices, at the aggregate level, by year of home acquisition for our HFCS households. We derive an indicator variable measuring 1 where the year of acquisition coincides with the growth in real house prices in the national housing market of at least 1.5 standard deviations larger than average real house price growth over the period 1970-2018, and zero otherwise (Figure 11).

Figure 11. Housing price growth – by year of acquisition (IE, 2018)



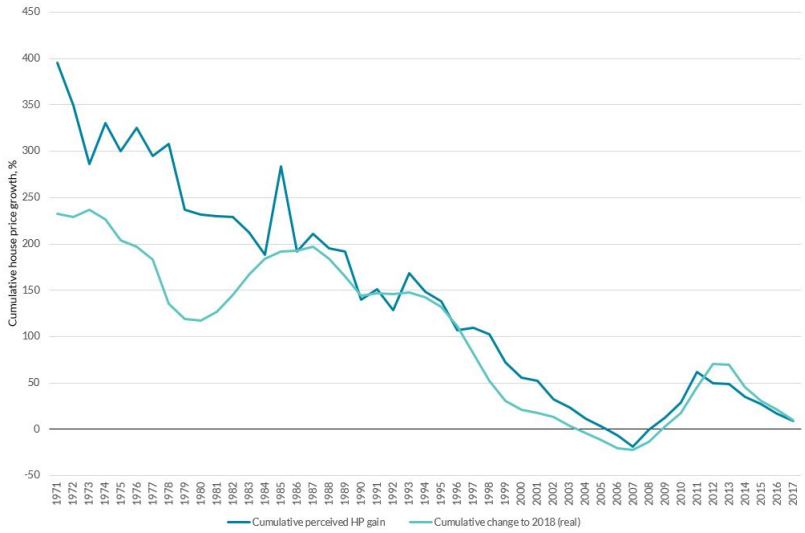
Source: FRED and authors' calculations.

While, for cumulative experience, we calculate the cumulative growth in real house prices between year of acquisition and survey year, 2018 (Figure 12).

We then replace our *housing acquisition experience* variables in our baseline two-stage regression speciation with these measures to tease out which mechanism is most likely contributing to the significance of our *housing acquisition experience* measures. We also note that in our robustness test (Table A.9) all three of the housing price experience measure dummies - including Celtic Tiger - are significant and positive.

[28] It may be possible to approximate a first-time buyer in the HFCS using some combination of the survey's questions around loan to value (LTV), time of property acquisition and year of mortgage origination. For example, first time buyers typically have higher LTVs. The HFCS data indicates that nearly a fifth of the sample used in our regression analysis have an LTV>=75 per cent. Households with a LTV>=75 per cent had lower house price expectations and lower (indeed, negative) house price perceptions on average compared to households with LTVs <75 per cent. The data also shows however, that almost a quarter of mortgaged homeowners in the sample hold a mortgage on their home which has been refinanced or renegotiated since acquisition and around 4 in ten have a mortgage with an origination year that is different to the year they acquired their HMR. Careful interpretation of the data is therefore required.

Figure 12. Cumulative house price growth, perceived and actual (real) – by year of acquisition (IE, 2018)



Source: FRED, HFCS and authors' calculations.

Results in Table 6 provide some evidence for the *point-in-time experience* mechanism described above. For example, the coefficient on our measure of volatility at the time of house acquisition is significant and positive in columns 3 and 4, compared to the negative and insignificant coefficient for our *cumulative experience* measure used in columns 1 and 2. Coefficients on the other variables of interest, remain significant with their sizes qualitatively similar to our baseline results.

Further exploration of this mechanism is recommended as a future area of research. Nevertheless, the findings seem to suggest that *housing acquisition experience* provides an important contextual reference which could have long-lasting memory effects on future house price beliefs.

There are several limitations in our methodology that should also be noted. Firstly, our analysis focuses on homeowners only and therefore the results are not generalizable to renters. Similarly, the expectations question in the HFCS only covers the next 12 months ahead; a short-term measure. Consequently, our results cannot provide insights into to how households form medium to longer-term house price expectations. These remain key areas for future research.

We find little role for socio-demographics once we control for experiences. However, this could be driven by the high level of non-response in the HFCS house price expectation question, which makes the relevant role of demographics more difficult to disentangle. Those responding to the question are more likely to be younger, tertiary educated, mortgaged and in work. The absence of older, non-degree educated, outright owning, retired respondents (who have lower house price expectations but higher perceived returns) may make it difficult to identify the importance of demographics and could also be producing a bias in our results, particularly in relation to PAYR.

Table 6. Cumulative HP growth or housing price volatility at time of acquisition

	(1)	(2)	(3)	(4)
PAYR* (predicted errors)	0.0481**	0.0409**	0.0319	0.0329*
	(0.0204)	(0.0190)	(0.0196)	(0.0187)
Cumulative HP growth since acquisition (real)	-0.0849	-0.00483		
	(0.127)	(0.157)		
Acquired house during volatile HP growth			0.689**	0.590**
			(0.322)	(0.293)
Live in Southern region		0.652*		0.617*
		(0.341)		(0.342)
Live in Eastern & Midlands region		1.345***		1.308***
		(0.330)		(0.329)
Has other property		-0.700**		-0.710**
		(0.292)		(0.290)
Risk averse		-0.508**		-0.499**
		(0.237)		(0.232)
Lower than normal income		-0.669**		-0.616**
		(0.260)		(0.259)
Constant	2.951***	1.882***	2.777***	1.764***
	(0.139)	(0.405)	(0.113)	(0.389)
N	2,004	2,004	2,004	2,004
R-squared	0.005	0.049	0.007	0.052
Additional controls included*	Y	Y	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Robust standard errors.
*** p<0.01, ** p<0.05, * p<0.1
Results based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base for location is living in the Northern or Western region.
* Additional controls throughout the second stage include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over, categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage.

Furthermore, our measure of *personal experience* does not consider the accuracy of a homeowner's perceptions of how the price of their home has changed over time. It is possible that our PAYR measure is capturing both perceived and realised house price growth. Further research trying to disentangle this would be useful, but the HFCS data used in this paper is not sufficient for such a study, which would require a market-based valuation of the HMR today. This is typically only available periodically when a home is either being sold or valued for taxation purposes.

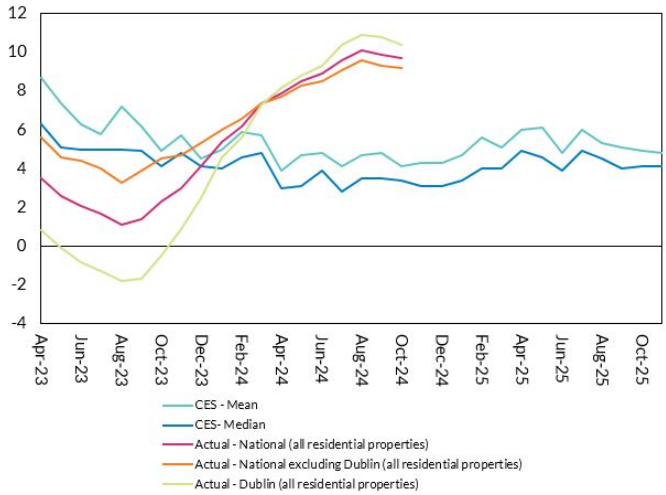
The HFCS data also does not yet permit any time series analysis. Newly available data from the European Central Bank's (ECB's) Consumer Expectations Survey (CES) has the potential to address this gap. The CES provides monthly information on 12-month ahead house price expectations. Responses to date suggest that households' expectations are less volatile than the actual outturn of property prices in Ireland but also less accurate, at least based on the mean and median household (Figure 13). However, given the short time series, it is unclear at this stage how closely the expectations will match actual outturn over a longer and more stable time horizon.

Our paper does not consider the implications of Irish households' house price expectations. For example, how households' beliefs about future house price changes

influence their consumption, investment, saving or borrowing decisions.[29] There is also scope for further research to explore how expectations can influence housing market behaviour, including how home acquisition is financed in Ireland.

Finally, our study focuses on the determinants of average house price expectations. Yet the literature includes evidence that recent and personal experiences can affect higher moments. For example, more volatile local house prices are associated with a more dispersed distribution (Kuchler & Zafar, 2019). The variance of house price beliefs can similarly be influenced by that of households' social networks (Bailey, Dávila, Kuchler & Stroebel, (2019)) as well as other factors such as more precarious finance or work situations (Ben-David et al., 2018). This latter finding suggests that the uncertainty of a household's experience can be translated into the uncertainty of their expectations and potentially then onto more precautionary consumption and investment behaviours. From a consumer protection perspective, this suggests that errors in understanding house price dynamics could lead to some households making suboptimal decisions. The consideration of higher moments and changes in the distribution of household expectations is also relevant for forecasting (Brandao-Marques et al., 2023).

Figure 13. Annual house price growth: Actual outturn vs T-12 expectations (Apr 2023-Nov 2025)



Source: ECB's Consumer Expectations Survey (weighted); CSO – Residential Property Price Index.
Note: Expectations data reflects weighted survey responses to a CES question asking consumers in T-12 whether "in 12 months from now, by about what percentage do you expect the price of your current home to be higher/lower?" Actual outturn data reflects the percentage change over 12 months in Ireland's Residential Property Price Index (RPPI) as published by the CSO on a monthly basis.

6 Conclusion

Households' beliefs about house prices and their dynamics are of great interest to policymakers given their potential to impact consumption, saving and investment at the aggregate level, as well as their role as inputs into forecasting and the calibration of structural economic models. Despite this, the literature on the formation and determinants of house price expectations remains relatively limited, particularly for

[29] Le Roux & Roma (2019) explore the relationship between house price perceptions and consumption. They find mixed evidence across the euro area but nevertheless conclude that slightly higher perceptions are positively associated with a mild increase in spending.

European countries. This paper seeks to address this gap by providing the first specific case study on Ireland.

Using data from the 2018 wave of the HFCS, we explore the extent to which Irish homeowners extrapolate from experiences, in particular their perceived *personal experience* of own house price growth to date when forming their short-term (12 month ahead) house price expectations. Applying a two-stage approach, we also examine the role of *local experience* of house price developments and *housing acquisition experience* (which refers to the household's experience of above or below average growth in the housing market at the time acquiring their current property).

We find that when asked in 2018, on average, Irish homeowners are more optimistic about how house prices will change over the next 12 months if they have had a more positive *personal experience* of house prices, which we measure as having perceived a higher rate of return on the value of their home since its initial acquisition. More optimistic expectations are also associated with living in the region containing Dublin and acquiring the home during above average house price variation compared to those living elsewhere or who acquired during periods of lower house price growth. Controlling for experiences, we find little role for socio-demographic determinants.

Our analysis suggests that time of acquisition reflects more than just a simple time or age effect. The housing market dynamics in Ireland (encompassing several periods of high - positive and negative - house price growth over the past three decades) may have had a lasting influence on households' beliefs. Another key conclusion from the findings is that *local experience* and *housing acquisition experience* can be considered largely distinct from the broader definition of *personal experience*. Finally, we find some tentative evidence of a potential state-dependency, where the time of acquisition may alter the relationship between house price expectations and perceptions.

While the findings cannot be interpreted as causal, reported relationships are in line with the literature. Nevertheless, our results still point to a large unexplained component which suggests other factors outside of those analysed in this paper are relevant. Other areas for future research include: exploring the determinants of medium to long term expectations; the role of higher moments in the distribution of house price perceptions; whether renters form expectations differently to homeowners, and the implications of Irish households' house price expectations for their consumption, saving, investment and borrowing decisions.

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Appendix

Table A.1 | Descriptive Statistics – by whether Irish home-owning households responded to HFCS expectations question or not

	(1) Households who did respond to house price expectations question	(2) Households who did not respond to house price expectations question	(3) Is the difference statistically significant?
Female	56%	54%	
Aged 60 years or over	39%	45%	***
Tertiary educated	46%	38%	***
Working	59%	51%	***
Live in Northern & Western region	14%	27%	***
Live in Eastern & Midlands region	51%	34%	***
Live in the Southern region	34%	39%	**
Gross HH income (€, median)	61,000	48,830	***
Gross HH wealth (€, median)	368,149	316,061	*
Has other property	25%	28%	*
Has a mortgage	48%	37%	***
Risk averse	73%	77%	*
Acquired pre-1996	36%	42%	***
Acquired in Celtic Tiger	39%	35%	*
Acquired in GFC Bust	10%	11%	
Acquired in GFC Recovery	12%	8%	***
Lower than normal income	13%	13%	
N	2,247	1,369	

Source: HFCS (weighted) and authors' own calculations.
Note: *** p<0.01, ** p<0.05, * p<0.1
Statistics based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners who responded to the question.
Results relating to if the difference between the two samples is statistically significant is based on regressions of each household characteristic on a dummy variable for whether the house price expectation question was missing or not. However, similar conclusions are also reached using ANOVA analysis.

A.2 | A note on the response pattern to the house price expectations (HP_Exp) question in the HFCS questionnaire

Amongst those households that did respond, there is some commonality in how Irish homeowners allocated their 10 points when answering the HFCS house price expectations question (HBZ010x). In sum, almost 40 per cent of Irish homeowners selected at least one end bin (i.e. expect growth of more than 5 per cent or less than -5 per cent). While close to a tenth allocated all 10 points to only these end bins.

The majority of respondents (55 per cent) used only one bin, indicating a relatively high level of certainty in answering this question. The next most common approach was to use two bins (30 per cent) then three bins (11 per cent). Only 2 per cent of households allocated their 10 points across all 5 bins.

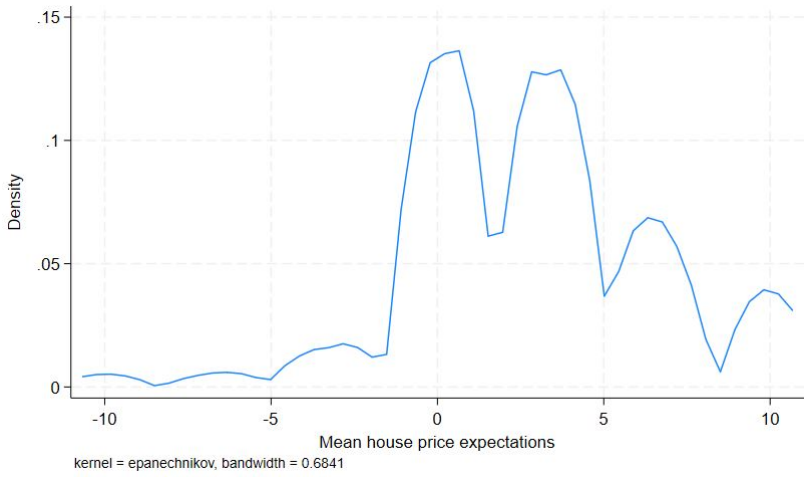
In terms of the general level of optimism in the responses, almost 7 in 10 Irish households selected a positive allocation compared to 13 per cent for negative bins. Close to a quarter of households allocated their 10 points solely to the middle bin associated with house prices being largely unchanged (i.e. expecting prices to change by no more than a 2 per cent increase or decrease).

Table A.3 | OLS regression of house price expectations and perceptions on key socio-demographic characteristics (IE, 2018)

	(1) Mean house price expectations	(2) Perceived annual yearly return
Female	-0.201	-0.247
	(0.208)	(0.306)
Aged >= 60 years old	-0.0225	0.980**
	(0.285)	(0.342)
Tertiary	0.182	-0.327
	(0.214)	(0.308)
Working	-0.327	-0.879**
	(0.259)	(0.305)
Own with mortgage	0.539	-1.320***
	(0.280)	(0.370)
Wealth – Q2	0.900**	1.189**
	(0.320)	(0.404)
Wealth – Q3	1.300***	1.810***
	(0.356)	(0.470)
Wealth – Q4	1.095**	1.794***
	(0.343)	(0.461)
Wealth – Q5	0.737*	1.809***
	(0.366)	(0.416)
Income – Q2	0.0814	0.408
	(0.334)	(0.444)
Income – Q3	-0.0414	-0.715
	(0.319)	(0.396)
Income – Q4	-0.114	0.702
	(0.366)	(0.496)
Income – Q5	0.00306	-0.128
	(0.380)	(0.493)
Constant	1.950***	4.233***
	(0.404)	(0.462)
N	2,247	3,112
R-squared	0.0210	0.0702

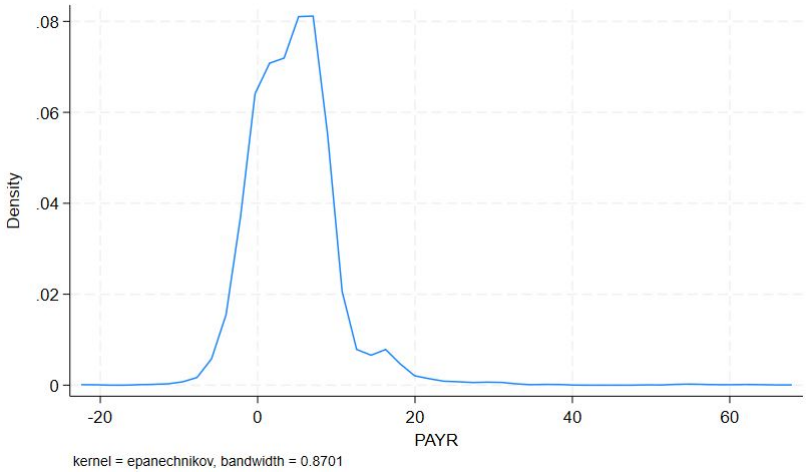
Source: HFCS (weighted) and authors' own calculations.
Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Results based on a simple OLS regression of homeowners responding to the relevant HFCS question. Sample for for Column 2 regression excludes observations with negative values for HMR purchase or current price; those who have owned their current home for less than one year and outlier observations with a PAYR > 100 per cent. Base for income and wealth quintiles is the respective first quintile.

Figure A.4 | Kernel density distribution of mean 12 month ahead house price expectations (IE, 2018)



Source: HFCS (weighted) and author's own calculations.
Note: Distributions based on the first implicate of wave 3 homeowners who responded to the house price expectations question.

Figure A.5 | Kernel density distribution of perceived average yearly return on the home probability distribution (IE, 2018)



Source: HFCS (weighted) and author's own calculations.
Note: Distributions based on the first implicate of weighted HFCS data from wave 3. The sample excludes observations with negative values for HMR purchase or current price; those who have owned their current home for less than one year and outlier observations with a PAYR > 100 per cent.

Table A.6 | Descriptive statistics of house price expectations – by time of acquisition (IE, 2018)

	Mean	Variance	CV	Skewness	Kurtosis	N
Low, steady growth (pre-1996)	2.6	14.6	1.5	-0.3	3.7	828
Celtic Tiger (1996-2007)	2.9	12.8	1.2	0.0	3.7	771
GFC bust (2008-2012)	3.3	12.9	1.1	0.2	2.7	183
GFC recovery (2013-2017)	3.5	11.1	1.0	0.0	3.8	222

Source: HFCS (weighted) and author's own calculations.
Note: Statistics based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners. Sample for house price perceptions excludes outlier observations with perceptions greater than or equal to 100 per cent.

Table A.7 | Descriptive statistics of house price perceptions – by time of acquisition (IE, 2018)

	Mean	Variance	CV	Skewness	Kurtosis	N
Low, steady growth (pre-1996)	6.9	9.7	0.5	0.7	6.4	828
Celtic Tiger (1996-2007)	1.6	13.2	2.3	0.8	5.7	771
GFC bust (2008-2012)	3.3	53.9	2.2	2.8	17.1	183
GFC recovery (2013-2017)	8.9	101.8	1.1	2.6	13.9	222

Source: HFCS (weighted) and author's own calculations.
Note: Statistics based on the first implicate of weighted HFCS data from wave 3. The sample includes only homeowners. Sample for house price perceptions excludes outlier observations with perceptions greater than or equal to 100 per cent.

Table A.8 | Comparison of descriptive statistics (IE, 2018)

	Full sample (homeowners only)	Regression sample
Male	45%	45%
Age		
<=44	25%	27%
45-54	22%	25%
55-64	21%	22%
65-74	19%	17%
75+	13%	10%
Education		
Lower sec-	29%	22%
Upper/post-sec	28%	30%
Tertiary	43%	48%
Willing to take average or substantial risk *	75%	72%
Working	55%	61%
Gross HH income (median, €)	56,300	63,321
Net HH wealth (median, €)	270,129	295,374
Has other property	26%	25%
Has rental income	12%	14%
Time of property acquisition		
Low, steady growth (pre-1996)	39%	35%
Celtic Tiger (1996-2007)	38%	42%
GFC bust (2008-2012)	11%	11%
GFC recovery (2013-2017)	11%	12%
Region		
Northern & Western	19%	13%
Eastern & Midlands	44%	54%
Southern	36%	33%
Tenure status		
Own home outright	56%	50%
Owns home with a mortgage	44%	50%
Debt status		
Holds any debt	77%	84%
Debt to income (median) *	0.92	0.94
Debt to asset (median) *	0.16	0.17
Debt service to income (median) *	0.12	0.12
HMR mortgage service to income (median) *	0.12	0.12
Loan to value (median) *	0.48	0.47
Type of interest (mortgage holders only)		
Any Fixed	9%	11%
Any SVR/Tracker	34%	39%
Income lower than normal	13%	13%
Expect real income fall *	24%	24%
N	3,596	2,004

Source: HFCS (weighted) and authors' calculations.
Note: Statistics based on the first implicate of weighted HFCS data from wave 3. The full sample includes all home-owning households. The regression sample includes only home-owning households that reported information on both house price expectations and perceptions and excludes observations with: a PAYR above 100 per cent; years of acquisitions inconsistent with the age of the household or missing information on risk preferences. Both samples exclude observations with negative values of HMR purchase or current price.
* Sample size is slightly reduced for this variable due to missing observations.

Table A.9 | Robustness check – Standard OLS estimation of mean house price expectations

	(1)	(2)	(3)	(4)	(5)	(6)
PAYR	0.0521***	0.0593***	0.0480**	0.0433**	0.0438**	0.0420**
	(0.0197)	(0.0221)	(0.0207)	(0.0198)	(0.0197)	(0.0196)
Acquired in Celtic Tiger		0.662**	0.703**	0.656**	0.645**	0.654**
		(0.294)	(0.291)	(0.307)	(0.308)	(0.305)
Acquired in GFC Bust		0.973**	1.018***	0.992**	0.990**	1.024***
		(0.397)	(0.393)	(0.396)	(0.397)	(0.392)
Acquired in GFC Recovery		0.810**	0.830**	0.802**	0.734*	0.752**
		(0.387)	(0.379)	(0.385)	(0.384)	(0.382)
Live in Southern region			0.686**	0.620*	0.639*	0.631*
			(0.341)	(0.339)	(0.340)	(0.341)
Live in Eastern & Midlands region			1.490***	1.199***	1.239***	1.270***
			(0.325)	(0.325)	(0.326)	(0.329)
Has other property				-0.736**	-0.746**	-0.711**
				(0.297)	(0.295)	(0.294)
Risk averse					-0.494**	-0.500**
					(0.237)	(0.234)
Lower than normal income						-0.673***
						(0.258)
Constant	2.723***	2.090***	1.095**	0.731	1.150**	1.221**
	(0.332)	(0.431)	(0.515)	(0.555)	(0.569)	(0.567)
N	2,004	2,004	2,004	2,004	2,004	2,004
R-squared	0.009	0.016	0.037	0.048	0.051	0.055
Additional controls included *	Y	Y	Y	Y	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Results based on an OLS estimation of mean 12 month ahead house price expectations. The base time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996) while the base for location is living in the Northern or Western region.
* Additional controls include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over. From Column 4 onwards, a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

Table A.10 | Robustness check – Two stage estimation of mean house price expectations, using a categorical PAYR variable

	(1)	(2)	(3)	(4)	(5)	(6)
Moderate perceived returns	0.736**	0.847**	0.804**	0.710*	0.679*	0.665*
	-0.357	-0.366	-0.373	-0.379	-0.372	-0.374
High perceived returns	1.375**	1.315**	1.283**	1.167**	1.143**	1.082*
	-0.586	-0.661	-0.617	-0.579	-0.579	-0.575
Acquired in Celtic Tiger		0.538*	0.627**	0.583*	0.567*	0.580*
		-0.295	-0.291	-0.305	-0.306	-0.302
Acquired in GFC Bust		0.931**	1.003**	0.972**	0.963**	1.002**
		-0.407	-0.4	-0.401	-0.403	-0.398
Acquired in GFC Recovery		0.852**	0.836**	0.800*	0.736*	0.760*
		-0.428	-0.414	-0.413	-0.41	-0.409
Live in Southern region			0.675**	0.611*	0.631*	0.622*
			-0.34	-0.339	-0.339	-0.341
Live in Eastern & Midlands region			1.533***	1.245***	1.283***	1.312***
			-0.325	-0.324	-0.326	-0.328
Has other property				-0.730**	-0.741**	-0.707**
				-0.296	-0.294	-0.293
Risk averse					-0.466**	-0.473**
					-0.235	-0.232
Lower than normal income						-0.669***
						-0.259
Constant	2.211***	1.600***	0.553	0.26	0.686	0.766
	-0.445	-0.564	-0.618	-0.65	-0.651	-0.65
N	2,004	2,004	2,004	2,004	2,004	2,004
R-squared	0.009	0.015	0.038	0.049	0.052	0.056
Additional controls included *	Y	Y	Y	Y	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Results based on an OLS estimation of mean 12 month ahead house price expectations. The base time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996) while the base for location is living in the Northern or Western region.
Low perceptions groups is defined as households whose perceived return is less than the mean PAYR minus 1 standard deviation. High perceptions group is defined as households whose perceived return is greater than the mean PAYR plus 1 standard deviation. While households are categorised as having moderate perceptions if they are between these two limits.
* Additional controls include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over. From Column 4 onwards, a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

Table A.11 | Robustness check – Alternative specification of acquisition timing

	(1)	(2)
PAYR*	0.0420**	0.036**
	(0.020)	(0.018)
Years since home acquired		-0.009
		(0.009)
Acquired in Celtic Tiger	0.433	
	(0.299)	
Acquired in GFC Bust	0.874**	
	(0.384)	
Acquired in GFC Recovery	0.831**	
	(0.375)	
Live in Southern region	0.653*	0.652*
	(0.347)	(0.347)
Live in Eastern & Midlands region	1.328***	1.331***
	(0.335)	(0.334)
Has other property	-0.711**	-0.690**
	(0.298)	(0.300)
Risk averse	-0.500**	-0.506**
	(0.236)	(0.239)
Lower than normal income	-0.673***	-0.654***
	(0.257)	(0.257)
Constant	1.473***	2.112***
	(0.572)	(0.504)
N	2,004	2,004
R-squared	0.055	0.050
Additional controls included *	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Bootstrap standard errors (based on 2000 replications) in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Results based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base for location is living in the Northern or Western region. In the case of Column 1, the base for the time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996).
* Additional controls include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over. There is also a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

Table A.12 | Robustness check – Alternative specification of age

	(1)	(2)
PAYR* (predicted errors)	0.0420**	0.0420**
	(0.020)	(0.019)
Acquired in Celtic Tiger	0.433	0.396
	(0.299)	(0.322)
Acquired in GFC Bust	0.874**	0.789*
	(0.384)	(0.404)
Acquired in GFC Recovery	0.831**	0.715*
	(0.375)	(0.393)
Live in Southern region	0.653*	0.646*
	(0.347)	(0.348)
Live in Eastern & Midlands region	1.328***	1.323***
	(0.335)	(0.337)
Has other property	-0.711**	-0.708**
	(0.298)	(0.298)
Risk averse	-0.500**	-0.503**
	(0.236)	(0.237)
Lower than normal income	-0.673***	-0.659***
	(0.257)	(0.260)
Constant	1.473***	1.692***
	(0.572)	(0.669)
N	2,004	2,004
R-squared	0.055	0.055
Additional controls included *	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Bootstrap standard errors (based on 2000 replications) in parentheses
*** p<0.01, ** p<0.05, * p<0.1
In Column 1, age is captured using a dummy for the household respondent being aged 60 years or over while Column 2 uses a categorical age variable: < 44 years (base); 45-54 years old, 55-64 years old; 65-74 years old and aged 75 years or over.
Results based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base for location is living in the Northern or Western region. In the case of Column 1, the base for the time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996).
* Additional controls include dummy variables for the household respondent being female; being in work; being tertiary educated; a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

Table A.13 | Robustness check – Alternative approaches to outlier PAYR observations

	(1)	(2)	(3)
PAYR* (predicted errors)	0.0420**	0.047***	0.071**
	(0.020)	(0.018)	(0.028)
Acquired in Celtic Tiger	0.433	0.427	0.420
	(0.299)	(0.290)	(0.301)
Acquired in GFC Bust	0.874**	0.866**	0.857**
	(0.384)	(0.385)	(0.402)
Acquired in GFC Recovery	0.831**	0.857**	0.773**
	(0.375)	(0.362)	(0.390)
Live in Southern region	0.653*	0.653*	0.617*
	(0.347)	(0.349)	(0.352)
Live in Eastern & Midlands region	1.328***	1.337***	1.338***
	(0.335)	(0.334)	(0.331)
Has other property	-0.711**	-0.707**	-0.687**
	(0.298)	(0.291)	(0.300)
Risk averse	-0.500**	-0.498**	-0.440*
	(0.236)	(0.237)	(0.232)
Lower than normal income	-0.673***	-0.673***	-0.665***
	(0.257)	(0.252)	(0.258)
Constant	1.473***	1.472***	1.454***
	(0.572)	(0.563)	(0.549)
N	2,004	2,005	2,008
R-squared	0.055	0.057	0.057
Additional controls included *	Y	Y	Y

Source: HFCS (weighted) and author's own calculations.
Note: Bootstrap standard errors (based on 2000 replications) in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Column 1 reflects the main model specification presented in Table 3 which follows the approach of excluding observations with a PAYR greater than 100 per cent. Column 2 excludes observations with a PAYR above 120 per cent while Column 3 winsorises the sample at the 2nd and 98th percentiles of the weighted distibution of PAYR.
Results based on a two stage process of first regressing PAYR on variables reflecting time of acquisition and location, followed by using the residuals of this process (PAYR*) in a standard OLS estimation of mean 12 month ahead house price expectations. The base for location is living in the Northern or Western region. The base for the time of acquisition is pre-Celtic Tiger (i.e. home acquired before 1996).
* Additional controls include dummy variables for the household respondent being female; being in work; being tertiary educated and being aged 60 years or over. There is also a categorical variable for household gross wealth quintiles (with a base of quintile 1) and an indicator variable for whether the household has a mortgage are also included.

Figure A.14 | a. Predictive average marginal effects of PAYR on house price expectations (with 95% confidence intervals) – by location

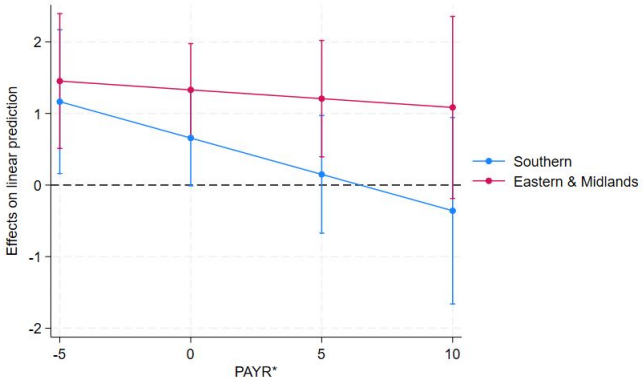


Figure A.14 | b. Predictive average marginal effects of PAYR on house price expectations (with 95% confidence intervals) – by other property status

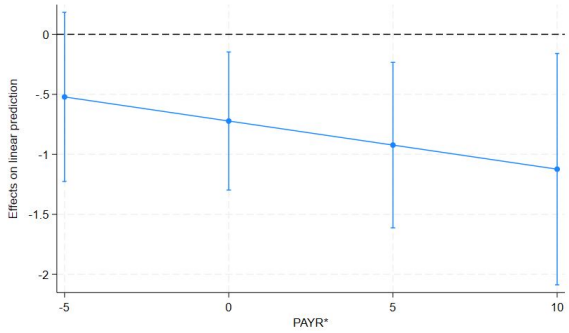
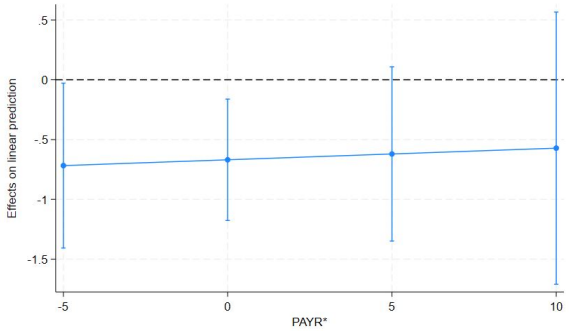


Figure A.14 | c. Predictive average marginal effects of PAYR on house price expectations (with 95% confidence intervals) – by income perceptions



Source: HFCS (weighted) and authors' calculations.
Note: Plots produced following regressions with robust standard errors as per Table 5. The base period is observations who acquired their home pre-1996.

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