Perception of House Price Risk and Homeownership*

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Abstract

This paper analyzes the importance of households' perceptions of house price risk in explaining homeownership choice. While a majority of US households (71%) believes that housing is a "safe" investment, renters are much more likely to perceive housing as a risky investment (conditional on income, savings, location and all other observables). Risk perceptions vary across demographic groups, but significant differences persist after controlling for observables. Current housing decisions and future intentions to buy versus rent are strongly correlated with perceptions of house price risk. Households' exposure to housing risk due to financial constraints, expected mobility or labor income risk affect the decision to buy versus rent but do not mitigate the impact of risk perceptions on housing choices. Finally, we show that households update their beliefs about the riskiness of housing in response to recent local house price changes. But renters are much slower to update than owners, which might explain the staggered entry into home ownership of different groups in response to house price increases.

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There is growing consensus that beliefs play an important role in explaining house price dynamics and the recent housing boom and bust cycles. Several influential studies have highlighted the importance of beliefs in explaining key stylized facts of the housing market: House prices display significant momentum (going back to Case and Shiller (1989); or Guren (2016)), have mean reversion at longer horizons (Cutler, Poterba and Summers (1991) or Glaeser (2013)), and excess variance relative to fundamentals (Glaeser, Gyourko and Saiz (2008), Head, Lloyd-Ellis and Sun (2014)).[1]

The existing empirical literature on belief formation about house prices has focused predominantly on how households form expectations about average returns but has paid much less attention to the second moment of returns, households' perceptions of house price risk. Yet many models of portfolio choice highlight that housing risk is a key input in the household's optimization problem and the decision about whether to buy or rent (Heaton and Lucas (2000), Campbell and Cocco (2003), or Cocco (2005)). They emphasize the special status of housing risk due to the non-divisibility and illiquidity of this asset. The paucity of prior analysis about risk perceptions of housing is largely driven by lack of available data.

In this paper we use a new, nationally representative housing survey of more than 50,000 households from 2010 to 2016 from Fannie Mae to study household perceptions of house price risk and their role in explaining housing choices and intentions to buy versus rent. We first show in the cross-section that there are significant differences in how households perceive the riskiness of an investment in housing. Older and richer people are significantly less likely to perceive housing as risky relative to younger and lower income respondents, and more educated people also see housing as less risky. But even conditioning on household characteristics there are significant differences in the perception of house price risk.

We can allay concerns that households' answers about housing risk are driven by differences in (risk) preference parameters, since perceptions of housing risk are not correlated with households'

[1] For the role of expectations in the recent crisis see for example Gerardi, Lehnert, Sherlund and Willen (2009), Glaeser, Gottlieb and Gyourko (2013), Shiller (2013), Gennaioli, Shleifer and Vishny (2015), Adelino, Schoar and Severino (2016, 2017)).

views of the riskiness of other securities such as stocks, mutual funds or bonds. In fact, a large majority of households (about 71%) view an investment in housing as safe. Even shortly after the financial crisis in 2011, 66% of households perceived housing as safe. In contrast, only 18% of respondents consider stocks a safe investment, and 55% of respondents consider (government and corporate) bonds safe. If household weighted these risk assessments by their underlying risk preferences, we should see more alignment in the rank ordering of the different securities within households. In addition, we show that answers about the perception of housing risk are not merely a proxy for one-year or 5-year ahead mean house price expectations. Using a separate (online) survey, we show that the risk perception of an investment in housing is primarily related with the left tail of the distribution of expected prices.

This heterogeneity in risk perceptions translates into differences in revealed housing choices: People who perceive housing as risky are much more likely (about 12 percent) to be renters than owners, even *conditional* on their geographic location (including zip code fixed effects), income, level of savings and future job prospects. The difference in risk perception between renters and homeowners is about 13-14 percentage points, or about 20 percent of the mean share who consider housing safe. Here again, we do not find differences in the risk assessment of renters and owners towards stocks or bonds. We also show that demographic characteristics like income, age, job stability are all strongly correlated with the choice to rent versus buy, as would be predicted by theory, but controlling for these demographic characteristics does not change the coefficient on housing risk.

Earlier papers have also highlighted that a household's time horizon in a location should affect the trade-off between house price versus rental price risk, see Sinai and Souleles (2005). To address this question, we look at factors that influence horizon such as labor income risk and expected mobility. We again find that these factors have a direct effect on the decision to rent versus own, e.g. households who plan to move soon are more likely to rent. But they are orthogonal to the role of risk perceptions on past housing choice. In addition, we find that the perception of house price risk is correlated with local house price volatility but not with rental price volatility. Taken together, our results suggest that *disagreement* between households about the risk of housing plays

an important role in decisions about housing choices even after controlling for differences in the *exposure* to risk.

In a third step, we show that beliefs about the risk of housing are strongly related not just with past choice (revealed preferences about homeownership), but also with stated intentions about buying versus renting in the future. People who believe that housing is risky are much more likely to state that they would rent, not buy, in their next move, again controlling for all demographics and measures of financial constraints. We also run a horse race between the perceptions about housing risk and expected next year's house price growth as a driver of the rent versus buy decision. Throughout our tests, perception about risk is significantly better than measures of house price expectations at distinguishing households' past choices and future intentions to buy versus rent. While renters are very different from owners in their perception of the risk of housing, they generally offer similar one-year ahead house price growth estimates. This result is consistent with Kuchler and Zafar (2017) who also report very similar house price expectations for home owners versus non-owners based on a NY Fed survey. Similarly, risk perception is also a stronger predictor of households' stated intentions to buy or rent than expected house price growth. Connecting beliefs and future intentions is important both for establishing the validity of the survey data and for documenting the importance of expectations about the riskiness of housing as a potential transmission channel for returns.

Finally, when we look into how perceptions about risk are formed, we find that the share of households who perceive housing as risky co-moves strongly with past local house price changes and local house price volatility measures, i.e. beliefs about house price risk extrapolate from recent experience, parallel to what has been shown for house price expectations (Nagel (2012), Kuchler and Zafar (2017)). Interestingly, households update much more slowly about the riskiness of housing than about one-year ahead house price changes. Lagged house prices even three years prior to the survey still correlate strongly with perceived riskiness of housing. In contrast, house price expectations only correlate with house prices lagged one year. In fact, respondents from areas that were most affected by the financial crisis of 2007/08 are also more likely to classify housing as risky than those living in areas that experienced small price drops. However, we do not find the same long-term effects on house price expectations: households in areas more affected by

the financial crisis do not have consistently lower house price expectations years later, if anything we find that they have higher house price expectations; possibly in line with the idea that these areas are due for a rebound in prices. In contrast, renters update more slowly about the riskiness of housing (based on past house price movements) than owners, but they extrapolate about 12-month house price changes from past prices similarly to owners (a result that is also consistent with Kuchler and Zafar (2017)).

Our results suggest that perceptions about housing risk in the cross-section are centrally important in explaining observed housing choices and intentions to buy versus rent. In addition, different groups seem to update differentially about the risk of housing when the housing market improves. Since renters are slower to change their perception that housing is risky in response to past house price increases, they might also come into the market to buy houses at later points in time. Given the stylized facts of price momentum and medium-term price reversal in the housing market, the strongly adaptive nature by which these households update, might make the more vulnerable to housing downturn. This dynamic in belief formation could explain why some sets of buyers enter the market at more adverse times and potentially prolong a market upturns, as suggested by Piazzezi and Schneider (2009).

Our results contribute to a series of recent papers that provide theories of home price expectations that rely on extrapolation of expectations from past house price growth (Case, Shiller and Thompson (2012), Barberis (2013), Gennaioli, Shleifer and Vishny (2015), Glaeser and Nathanson (2017), and DeFusco, Nathanson and Zwick (2017)). Heterogeneity in beliefs can have important implication for the propagation of shocks in the housing market, if the most optimistic agents in the market can disproportionately express the intensity of their beliefs, see for example Geanakopulous (1997) or Piazzesi and Schneider (2009), or Burnside, Eichenbaum and Rebelo (2016)).

Recent empirical work has shown that expectations about mean house price appreciation extrapolate from past local house price changes (Nagel (2012), Kuchler and Zafar (2017)), as well as from experiences of their social network (Bailey, Cao, Kuchler and Stroebel (2017)). Makridis (2017) shows that attitudes towards the economy similarly track local economic shocks. Armona,

Fuster and Zafar (2017) show that mean house price expectations impact hypothetical investment allocations as well as future purchase and sale decisions, and Bailey, Cao, Kuchler and Stroebel (2017) find that transitions from renting to owning are related to the experiences of individuals' social networks. Homeowners also typically underestimate the year-to-year house price increases, do not expect mean reversion (Armona, Fuster and Zafar (2017)), and forecast errors are auto-correlated (Case, Shiller and Thompson (2012), and Coibion and Gorodnichenko (2012), who confirm a similar pattern for inflation expectations).

Our findings are also consistent with recent behavioral models that create overshooting of expectations. Bordalo, Gennaioli and Shleifer (2012) suggest that a household that operates with a representativeness heuristic may, in fact, neglect downside risk as the upside becomes ever more salient. Glaeser and Nathanson (2015) produce similar dynamics of expected house price risk in a model where households update based on a "naïve" rule which attributes all increases in house prices to fundamental demand rather than speculation.

The rest of the paper proceeds as follows; we first describe the data and analyze the cross-sectional differences in risk perceptions. The next two sections lay out the role of risk perceptions on the choice to buy versus rent, and the interaction with household mobility. And finally, we document how household update their perception of housing risk based on past experiences. Section 6 concludes.

1. Data

The data for this paper come primarily from the Fannie Mae National Housing Survey. The survey is a nationally representative live telephone survey of approximately 1,000 individuals per month (on average, just under 900 interviews per month have usable data). We use data from interviews conducted between January of 2010 and March of 2016. The survey covers both owners and renters (unlike, for example, Case and Shiller (1988) and Case, Shiller and Thompson (2012)) and includes over 100 questions. The survey is the basis of the Home Purchase Sentiment Index published monthly by Fannie Mae researchers. We use several demographic characteristics available in the survey (including geography, homeownership status, income, age, education,

among others), as well as questions relating to: (i) expectations about future house price appreciation; (ii) attitudes towards housing and other assets; (iii) intentions about buying and renting; (iv) recent and expected future mobility; and (iv) personal financial situation. We list all questions used in our analysis in Appendix 1 and discuss each in detail when we describe the results.

We also conduct an online survey using Amazon's Mechanical Turk platform. The questionnaire is designed to elicit an expected distribution of one-year-ahead house price changes, as well as the risk perception question available in the Fannie Mae survey. The survey helps us relate the stated distributions with the risk perception question. The survey includes ten questions about individuals' age, income, geographical location, and gender, to be able to obtain the main controls available on the Fannie Mae survey. The participants were offered a monetary compensation of two dollars per survey and the study was conducted during July of 2018. The filters for recruiting survey participants restricted users based on their location (USA users only), as well as based on historical performance at Mechanical Turk tasks, specifically HIT (Human Intelligence Task) Approval Rate greater than or equal to 99% and at least 500 completed HITs. The exact questionnaire is available in the Online Appendix (Section A1).

House price data comes from the Federal Housing Finance Agency (for state-level house prices) and from Zillow (for ZIP code-level prices).

1.1 Summary Statistics

We show summary statistics in Table 1. We list the text of all questions used in the paper as well as the possible answers for each question in Appendix 1. The number of observations shown in the last column of Table 1 corresponds to the number of non-missing observations for each variable and all statistics and regressions are weighted by the appropriate sample weights. The median age in the sample is approximately 44 years, with about 25% of the sample below 30 years and 17% over 60 years of age. The income cutoffs are $35,000 for the bottom tercile and $75,000 at the top of the second tercile. Approximately 33% of respondents are renters, with a share that reaches 36% by 2015. Just over 50% of respondents have a college degree, about two thirds of the sample is

white, and 30% is black or Latino (both grouped under "minority" in the table). Approximately 20% of owners moved in the three years prior to the survey, and about 20% of the sample is located in sand states. The statistics are broadly consistent with demographic data for the United States as a whole (see, for example, the American Community Survey for a comparison).[2]

Panel B of Table 1 includes the main outcomes of interest for our paper. The first eight rows of the table refer to expectations about house prices obtained in the survey. The survey starts by asking respondents whether they think house prices are likely to go up, down, or stay the same. It then asks by how much respondents believe house prices will go up or down (only for those respondents who do not answer "stay the same"). We impute a value of 0 for this last category when we create the continuous measure of house price expectations. These correspond to questions 15-17 listed in Appendix 1.

In 2011, about 50% of respondents thought house prices would stay the same over the subsequent 12 months. This share goes down over time to about 39% in 2015. Also in 2011, 21% of respondents say they think house prices will go down. This share also drops to 8% by 2015. This reflects improving housing market conditions, and closely tracks recent experience in different states, as we will discuss in more detail in Section 3. Overall, respondents believe house prices will go up by about 1.7% over the subsequent 12 months. This reflects a combination of those who think house prices will stay about the same (who receive a value of 0), and the expectations conditional on house prices going up or down. An important part of the variation in average expected home price appreciation over time comes from changes in the share of responses in each of the three categories "prices will stay the same", "down" and "up", so we use both the continuous measure and the three dummies in the tables below. We also show the absolute value of the expectation error, where the expectation error is computed as the difference between forward-looking actual 12-month house price changes at the state level and the continuous measure of house price expectations. This number hovers around 6 to 8% over our sample period.

We next show summary statistics for the "risk" and future "potential" questions for housing and stocks as investments. These correspond to questions 75-76 listed in Appendix 1. When asked

[2] Statistics available at https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

about whether they view an investment in housing as safe or risky, 71% of households answer that they believe housing is a safe investment. This share reaches a minimum of 66% in 2011 and rises to 75% by 2015. The response to the question about housing is in stark contrast to the views about the riskiness of stocks, where only 18% of respondents believe they are a safe investment. The perception of risk for stocks also moves over the business cycle, with a minimum of 15% saying stocks are safe in 2011 and a maximum of 19% by 2015. The share of respondents who believe housing is safe is close in magnitude to the results in Case and Shiller (1988), where over 50% of respondents considered that buying a home had "little" or "no risk" in boom markets (Anaheim and San Francisco), and in all markets analyzed in that paper less than 6% of respondents believed buying a home had a "great deal" of risk.

At the same time as respondents are asked about the riskiness of these asset classes, they are also asked about the potential (of future appreciation) for the same asset classes. 61% believe that housing has potential, with this share again moving year-to-year with recent house price appreciation. About 69% of respondents believe stocks have potential.

Panel B of Table 1 also shows a variety of mobility and personal finance-related variables used in the analysis. In our sample, about 40% of households plan on moving soon, where "soon" is defined as the subsequent three years. This share is stable in the survey years, but the survey only starts collecting answers to this question in 2012. When asked whether they were likely to buy or rent a home if they were to move, 70% of respondents say they would buy. Conditional on saying they would rent now, 35% of respondents say they would always rent in the future, and conditional on saying they would buy now, 92% of respondents say they would always buy in the future.

In addition to the income question described above, the survey includes additional direct measures of personal financial situation specifically geared towards capturing distress. These include asking about the difficulty that households believe they would have in obtaining a mortgage (question 22 listed in Appendix 1), as well as questions about sufficient savings (question 111), sufficient income (question 112), and current ability to make payments on debt (question 109). 56% of respondents say they would have difficulty obtaining a mortgage in 2011, a number that drops to 47 percent by 2015, reflecting the overall trend in credit access during this period. Similarly, almost

1/3 of households were stressed to pay their debts in 2010 and 2011, dropping to about 26% of them were in 2015. Only about 5% of respondents say they would consider defaulting on their mortgage even at the peak of distress in the housing market in 2010 and 2011.

Finally, we report answers to the question of whether households believe it is acceptable to default on one's mortgage under different conditions of distress. Consistent with work by Guiso, Sapienza and Zingales (2013), only 10% of households believe it is acceptable to default on one's mortgage because of negative equity, and this number rises to 17% when households are asked about default when one experiences distress.

We show summary statistics of the Mechanical Turk survey in Table A1 of the Online Appendix. As we would expect given the context of this survey, respondents are generally younger and are more likely to be renters relative to those on the Fannie Mae survey. Panel B of Table A1 shows average shares assigned by respondents to each bin of house price changes.

2. Cross-sectional differences in attitudes towards risk

We now analyze how perceptions of housing risk vary across the population and provide additional evidence that the questions about the risk of housing elicits the households' perception about the distribution of prices not differences in risk aversion. Table 2, Panel A shows how attitudes towards risk and potential for housing varies with household characteristics and juxtapose the results with the perception of risk of stocks. In panel B we analyze how house price expectations differ across the population. We correlate the answers on riskiness of housing and on price expectations with household demographics, controlling for year and state fixed effects to isolate the cross sectional variation. We also cluster standard errors by state and year to capture potential cross-sectional and time series correlations in the data.

Panel A of Table 2 shows the results when the survey asks about the risk of housing as an investment, where we see large differences in the cross-section of survey respondents. Higher income individuals perceive housing as significantly safer than low-income individuals (10 percentage points for the middle income tercile and 14 percentage points at the top). Similarly,

older respondents are much more likely to consider housing safe than younger ones (by 13 percentage points relative to the youngest category of under-30). We also find that college-educated respondents consider housing less risky. These results might reflect the personal experiences households had in the housing market, since older individuals might have experienced less turbulence in the housing market over the long run, while younger people might be particularly affected by the memory of recent house price shocks in the US housing market. Similarly, richer and more educated people might find it easier to navigate the risks of housing market. This interpretation is reminiscent of recent work that highlights the importance of personal experiences for updating beliefs, see Malmendier and Nagel (2016).

When asked about the future potential of housing as an investment, we find that there are small differences along the income dimension (although they are not monotonic), older individuals see lower potential in housing as an investment relative to the youngest category, and renters are also close to two percentage points less optimistic along this dimension. Male respondents are 5 percentage points more likely to say housing has potential relative to women.

In the last two columns of Table 2 panel A, we repeat the same analysis for households' perception about the riskiness and potential of stocks. Stocks provide an important comparison to housing as an investment and it also allows us to observe if those demographic groups who are concerned about the risk of housing are also concerned about risks in other asset classes. We see that the responses about the riskiness of stocks are very different from housing. There are essentially no differences in the perception of risk by income level of the respondents. Similarly, there are few differences along the age dimension, although individuals over 60 years are about five percentage points more likely to think stocks are safe investment relative to the other age groups. There are large differences in the perception of future appreciation potential for stocks. This perception increases with income and decreases very strongly with age. Finally, college-educated respondents are seven percentage points more likely to answer that stocks have potential. We view this as evidence that the differences between the groups are not about risk aversion, but rather about differences in perception that are specific to housing as an asset class.

In Table A3B in the appendix, we look at house price expectations across different demographic groups. Here we see few statistically and economically significant cross-sectional results. We find that differences by age and income are generally not monotonic and not always consistent across specifications, consistent with the results in Kuchler and Zafar (2017). College educated and minority respondents are somewhat optimistic relative to the baseline. These results suggest that the same demographic groups that shows very different perceptions of housing risk have much less disagreement about expected house price appreciation.

The share of individuals who consider housing is risky relates to local volatility measures (Figure 1, as well as Panel B of Table 2). Across both the figures using state-level data, as well as in the Table using county-level measures of volatility, we find that perception of risk is related to local volatility measures of house price growth. We also find that the perception of owners is more strongly related to local volatility than that of renters, and that neither group seems sensitive to local rental price volatility.

2.1 Risk perception and expectations

It is worth characterizing in more detail how perceptions of risk correlate with 12-month expectations about mean returns. This analysis helps to confirm that household answers about riskiness are not just a proxy for house price expectations. In Table 3 we see that responses about house price expectations have very low correlation with perceived risk. In this table the main variable of interest is an indicator variable that is equal to 1 for households who believe housing is a risk investment, and 0 otherwise. The risk dummy is associated with slightly lower average expected house price changes, and with 5% more households believing prices will drop. Conditional on believing house prices will drop, respondents who think housing is risky believe they will drop by about one percentage point more. There is also an effect of 0.4 percentage points on the upside, and 4% fewer households believe house prices will increase. We find very similar results when we do not include state and year fixed effects (unreported). Panel B shows that differences are in the same direction, but smaller in magnitude, when we consider 5-year ahead expectations. These results confirm that the measure of housing risk elicited from the survey is not

just a proxy for long term expectations about average prices. Finally, Panel C shows differences across interactions of the responses about risk and potential. As we progress from respondents who believe housing is "risky, without potential" all the way to those who believe housing is "safe, with potential" (the omitted category) expected changes in house prices for the next 12 months increase monotonically. Expected changes in prices conditional on believing prices will drop are larger in magnitude for respondents who believe housing is risky.

2.1.1. Perception of risk and elicited probability distribution

As we describe in more detail in the data section, we conduct a separate online survey to directly relate the question about perception of risk with a full distribution of expected one-year returns. We show in Panel C of Table 3 that respondents who believe housing is risky put more probability on prices dropping in the next 12 months, as well as on the possibility that prices will rise more than 4% (although this result is not significant). We plot more a more detailed distribution in Figure 2. In addition, we show in Table A1 in the online appendix that, combined, there are no differences in mean expectations, but there are weak (and insignificant with a t-stat of 1.2) differences in standard deviation of expected house price changes across respondents who believe housing is risky and those who believe housing is safe.

3. Risk perceptions of renters versus owners

To understand how risk perceptions, affect actual choices in the housing market we now analyze the difference in the answers about the riskiness and price expectations of housing between owners and renters. As mentioned above our survey gives us detailed information about the ownership status of households. Figures 1-3 show differences between owners and renters in their risk perception sorted also across a variety of demographic characteristics. Figure 3 shows the share of renters and owners who consider housing a risky investment. It is clear from Panels A and B that across all income groups renters perceive housing as much riskier than owners. There are also strong age and income effects, with a lower share of high income and older respondents perceiving housing as risky, which is in line with the above regressions. Panel C shows the difference between

Panels A and B. Across all age and income bins, we find 10-20 percentage point differences between renters and owners in the share that believe housing is a risky investment.

Figure 4 shows differences between renters and owners in their perception of the risk of an investment in housing, stocks and bonds. While we saw above that renters are much more likely to consider housing risky than owners, this is not the case for stocks. In fact, across all income and age bins, renters and owners look similar in their assessment of the risk of stocks. Similarly, they also do not differ much (economically) when they are asked about bonds. This result again supports the idea that there is something special about the evaluation of the risk of housing, and that the differences we find are not just due to renters being more risk averse, lower income, or younger than owners.

There are also marked differences between the assessment of the *risk* of housing and expectations about one-year ahead house price growth. Consistent with the findings in Kuchler and Zafar (2017), and unlike the results for risk, we find that renters and owners make similar predictions about future house price increases, and that this holds even within fine income and age bins (Figure 5). As an additional validation of our empirical strategy (and of the differences between renters and owners) we show in Table A2 of the Online Appendix that renters and owners differ, however, in their expected one-year ahead standard deviation of house price changes even when we use the New York Fed survey also used in Kuchler and Zafar (2018).

3.1. Past housing choice and the perception of risk of housing

One concern in interpreting the above results could be that renters and homeowners are different along many dimensions, in particular renters are much more likely to be constrained, and thus more likely to not be able to purchase a home (as opposed to choosing not to buy). In this section we analyze if the *conditional* differences in the risk perception of renters as helping to explain the choice of not owning a home.

We start by establishing that renters are different from homeowners in ways that match the findings in the previous literature. Table A3 shows that renters on average have significantly lower income than homeowners, a well-known cross-sectional fact and consistent with theories of limited

enforcement and collateral constraints (Eisfeldt and Rampini (2009) and Rampini and Viswanathan (2013)). In addition, renters are younger and minorities are 8 percentage points more likely to be renters. In Column 2 we add the measure of also show that renters are 32% more likely to say they expect to move soon, again in line with our prior. Columns 3, 4 and 5 use measures of household financial distress and relate them to homeownership. In line with the results on income, all three measures are very strongly related to homeownership status, as respondents who are stressed to pay their debts, have insufficient savings, or are concerned about their jobs are all more likely to be renters.

Table 4 regresses a dummy for the choice of being a renter or a homeowner on the demographic characteristics and a dummy for whether the household perceives housing as risky. The results show that perceptions about housing risk are strongly related to the choice to be a homeowner or a renter, conditional on all the observables used in Table 2 and Table A3. In Column 1 we see that individuals who consider housing risky are 11 percentage points more likely to be renters than owners (relative to a mean of 33% of respondents who are renters). Columns 2 and 3 control for the perception about the riskiness of stocks and we see that the answer to this question does not help explain housing choice. The estimated coefficient on the dummy for whether stocks are risky is zero and statistically not significant. This result again confirms that concerns about the riskiness of housing is not just an expression of the general risk aversion of the household.

We add further controls in Columns 4 and 5 about the personal finances of the household in addition to the demographic baseline controls that we included in columns 1 and 2. The idea is to control for any variables that proxy for the household's financial and economic situation and thus could explain home ownership choices but also be related to the perception of housing risk. We find that households which are more financially constrained or concerned about the stability of their job are more likely to be renters than owners. This is very much in line with earlier research on housing and portfolio choice. But importantly for our analysis the inclusion of these variables does not significantly alter the role of perception of housing risk in explaining home ownership choices. As we show in Table A3, renters are different along a number of dimensions, and are much more likely to have lower income and less wealth, as well as to be constrained according to these additional measures. However, even conditional on these characteristics, their perception of

the riskiness of an investment in housing is significantly higher than that of homeowners. In sum, the results suggest that even conditional on the household's personal and financial situation, perceptions of housing risk matter importantly for ownership choices.

In the last column of Table 4 we add interactions of the type of job of respondents (split into 7 categories given in Appendix 1 under q133) with the share of employment in a county in non-tradable industries (classified as NAICS codes 44-45 and 72). This means that we estimate the role of risk perception within types of jobs, as well as controlling flexibly for the county-level share of employment in non-tradable industries separately for each type of jobs. The correlation of labor income with housing returns is an important element in homeownership choice (Cocco (2005) and Davidoff (2006)), so we want to rule out that our results on renters and owners reflects differences in how labor income of the two groups relate to housing. The results in Table 4 show that, even controlling flexibly for types of jobs, the perception of the risk of an investment in housing still strongly separates renters and owners in the cross-section.

In Panel B of Table 4 we repeat this analysis but look at the relationship between housing choices (rent versus own) and house price expectations, instead of perception of risk. We again control for household demographics in these regressions. The results show that across all specifications the correlation between housing choices and expected house price appreciation is zero and not significant. We again include controls for the financial constraints of the household in columns 4 and 5, but the estimated coefficient on the expected house price change stays zero and is not significant. When we include both year-ahead house price expectations and risk perceptions in the same regression (column 3) the results are unchanged: The coefficient on the indicator variable of housing risk is large and significant, while the coefficient on house price expectations is very close to zero and insignificant. These results highlight a stark difference in the role that risk perceptions and 12-month expected returns play for revealed housing choices. This finding is particularly important since we have seen that the fraction of households who perceive housing as risky is low

(71% of households on average say that housing is safe). In contrast only 18% of households perceive stocks as safe.

3.2. Intention to buy or rent

In the previous section we document that perceptions about the risk of house prices are significantly more important in explaining revealed housing choices than year-ahead expectations about the appreciation of housing. In this section we now analyze the relation between future intentions to buy and rent, and expectations of appreciation and risk of the survey respondents. While actual choice data is generally preferable to stated intentions (Manski (2017)), we do not track the same respondents over time (i.e., our data is not a panel but a representative repeated cross-section), so we cannot relate past survey answers to future choices. However, the survey does elicit answers to questions about a household's future stated intentions to buy or rent.

The main outcome of interest for this subsection is a question that asks whether respondents would be more likely to buy or rent if they were to move now (question 31 in Appendix 1). This question is posed to all respondents, irrespective of whether they are currently owners or renters. Figure 6 shows that both owners and renters are significantly more likely to say they want to rent than buy if they consider housing a risky investment, within income tercile and age quartile bins. The gap is somewhat larger in magnitude for renters, but it is also on the order of 10-20 percentage points for owners.

Panel A of Table 5 shows that individuals who say that housing is risky investment are 14 percentage points less likely to say that they want to buy in the next move. This magnitude is very significant since it explains almost half of the difference in the likelihood of wanted to rent versus buy. Similarly, we find that households who think housing has potential are seven percentage points more likely to buy. In column (3) we also include the forward-looking 12-month expected house price changes as an explanatory variable. When included by itself, we find that a one percentage point higher12-month expectation about housing prices is related to a 0.1% higher likelihood of intending to buy. Similarly, a belief that house prices will go down over the next 12

months is related with a two percentage points lower likelihood of intending to buy. As in all other tables, these results are conditional on the respondent characteristics shown in Table 2.

But when we include both perceived risk of housing and expectations about the short-term appreciation in column 5, we find that house price expectations have significantly less explanatory power for future intentions than responses about perception of risk. In the same regression, we also include a "housing has potential". The coefficient on expected future appreciation becomes much smaller in magnitude (to roughly half of column 3) and loses statistical significance. The same happens when we put risk, potential, and expectations that house prices will go down in the same regression. This is consistent with households' perception of the risk and potential of an investment in housing as a more relevant feature of their decision-making than short-term expectations about house price growth. When we add other controls for financial constraints in Table 5 column 6, we again find that risk and potential matter by themselves, and that there is little role for short-term expectations to explain the buy versus rent decisions in the future. Furthermore, the coefficient on risk does not change after we control for long-term potential, which we interpret as evidence that "perception of risk" is capturing the second moment of house price returns.

Panel B shows that perception of risk and potential matters for owners and renters similarly in their intention to buy, although point estimates are slightly larger for renters. Forward looking expectations have a stronger correlation with future intentions for owners than renters. Taken together, these results imply that while renters and owners have starkly different views about the riskiness of housing on average, conditional on their beliefs, risk perceptions feed similarly into intentions to purchase homes in the future.

3.3. Mobility

One possible interpretation of the results on the risk perception of housing is that we are not fully taking into account how the risk perception of respondents depends on their future expected mobility and on the relevant risks that different households be subject to. This point is developed in detail in Sinai and Souleles (2005). In that paper, housing provides a hedge against fluctuations in housing cost, but has asset price risk. On the other hand, renting is exposed to changes in housing

costs, but not price risk. Sinai and Souleles (2005) show that the risk of owning declines with household expected horizon in a home. We address this issue directly in Table 6 using data on expected mobility for both homeowners and renters, as well as the past mobility of owners (we dot not have data on past mobility of renters).

When we look at expectations about future mobility, we find that, consistent with the argument in Sinai and Souleles (2005), renters are much more likely to expect to move in the next five years. We still find, however, that perception of risk is strongly associated with rental, and the interaction of expected mobility and perception of risk is insignificant and close to zero, suggesting that it is not just the higher expected mobility of renters that leads to their higher perception of risk.

We also consider the recency with which owners moved into their current home. This analysis speaks to the results in Case and Shiller (1988, 2003), who focus on recent homebuyers. The rationale in those papers is that recent buyers are likely to have higher expectations about house prices, as well as a lower perception of risk. In contrast with the idea that recent owners differ markedly from those that purchased their homes a longer time ago, we do not find that the timing of an owner's move is associated with a higher likelihood of intending to rent, and the recency of a move also does not interact with perception of risk in predicting future intentions.

4. Recent experience and updating about risk

In this section we consider the role of recent house price experiences on both future house price expectations, as well as attitudes towards the risk and potential of housing and stocks. We start by relating the answers about housing risk and potential to past 12-month state-level house price changes. This analysis follows the prior literature which has shown that house price expectations seem to be adaptive and are influenced by past house price changes. The results in Table 7, Panel A show that attitudes towards housing risk are strongly related with the prior local housing market experience. A one percentage point change in local house prices over the previous 12 months is associated with a drop of 0.28% in the share of individuals who believe housing is risky. But even house price changes two and three years prior still have a strong effect on risk perceptions; there is still an 18% drop in the percentage of households that believe housing is risky based on state

level house price three years ago. In column 2, we regress the potential of housing on lagged house prices, and again we find that prices several years ago still affect the view about the upside of housing. Three year lagged house prices have a positive and significant effect for the fraction of households that perceive housing as having potential, and positive but insignificant effects of the more recent lags.

These results suggest that updating about the riskiness of housing follows a relatively slow moving, adaptive process where even house price expectations three years ago influence todays perception of risk. In fact, in Table A3 of the appendix, we also show that households who went through the worst house price drops during the financial crisis still perceive housing as riskier during our sample period than those households who were less affected by the crisis. In columns 3 and 4 of Table 7 we also show that renters seem to update more slowly about the risk of housing in response to house prices than owners. We find that the risk attitude of renters moves less with the house price experience over the previous 12 months than that of owners (although the difference is not statistically significant when we include all households in one regression with interactions), but it reacts similarly to experiences farther in the past (the third lag in particular). These findings are suggestive that different groups in the economy update differentially about the riskiness of housing, and potentially with it about the likelihood that they might engage in a move or house purchase. This is consistent with the patterns in Figure 7, Panel B where we show that the aggregate renter perception of risk reacts more slowly to house price changes than that of homeowners. This may be due to inattention on the part of renters, which leads them to react with a longer lag to recent movements. We return to this point below when we discuss expectation errors. We do not find large effects between by age or income in the extent to which perception of risk reacts to past house prices.

In Panel B of Table 7 we now repeat the same set of regressions using house price expectations as the dependent variable. There is recent evidence by Kuchler and Zafar (2017) that house price expectations co-move with local lagged house price appreciation, and we obtain similar results in Panel B of Table 7. A one percentage point increase in state-level house prices is associated with a 0.18% increase in the expectations over the subsequent 12 months. However, we see that house price expectation are mainly correlated with one year lagged house prices, and that the coefficients

on two and three year lagged prices are zero and not significant. These results suggest that expectations about mean returns adapt more quickly in response to house price changes than risk perceptions. When we unpack the expectations about mean returns, we see that lagged appreciation very strongly changes the share of respondents that believe house prices will either stay the same, go up, or go down. A 1% increase in local house prices leads to a 1.4% increase in the share of respondents that believe house prices will increase, and a simultaneous reduction in both the share who believe prices will go down (of about 0.78%) and the share of those who think prices will remain flat. This evidence is consistent with the extrapolative expectations hypothesis that has been linked to household behavior before the housing crisis, namely in Barberis (2013), Gennaioli, Shleifer and Vishny (2015), and Glaeser and Nathanson (2015). Columns 4 and 5 of Panel B generally shows very small (and insignificant) differences across renters and owners, in the adaptive nature of house price expectations of households

5. Expectation errors

One question that emerges from the previous tests is whether the different risk attitudes are related to differences in the ability or desire of households to understand house price behavior, and, more generally, their attention to local housing markets. In our final set of results we consider both time series and cross-sectional evidence on the relation between expectations about future house prices and realizations. In Table A4 we focus on a regression of realized forward-looking 12 month state-level house price changes on the continuous measure of expectations from the survey. We find that there is a positive relationship on average between the two, but we lose statistical significance when we include both year and state fixed effects. A similar picture emerges when we use ZIP Code level house prices instead (Panel A, columns 5-8). Panel B of Table A4 shows year-by-year estimates, and again there is only a weak relation between expectations and future realizations when we include both year and state fixed effects, although we do find a significant relationship in most years when we remove state fixed effects.

We then consider how expectation errors vary in the cross-section with both beliefs about risk and potential and respondent characteristics (Table 8). We use as the dependent variable the absolute

value of the expectation error measured as the difference between realized house price appreciation over the subsequent 12 months and the continuous measure of house price changes.

Respondents that believe housing is risky tend to make systematically larger prediction errors than those who believe housing is safe. To the extent that these households are aware that they make larger errors, it is possible that this contributes to the perception that housing as an investment is a risky proposition. We do not find differences in errors for households who believe housing has "potential", but we do find that more constrained households (those who believe they would have difficulty obtaining a mortgage) make larger prediction errors. There are no differences by homeowner tenure, and we find that households who expect to move soon make slightly larger errors. In almost all these cases, the errors are associated with under-predicting future appreciation (i.e., the groups that were more conservative in their estimates tended to make the larger mistakes in this period).

In the last column we include the usual cross-sectional characteristics of respondents, as well as the risk and potential measures. We find that renters make higher errors when they predict house prices, but that the indicator variable associated with "risk" is three times larger in magnitude. Higher income is associated with smaller errors, as is college education.

6. Conclusion

This paper analyzes the role that the risk perception of housing in the population, and how this relates to housing choices and future intentions to rent versus buy. Consistent with previous research, in particular Case and Shiller (1988, 2003), we show that households in the United States tend to view housing as a safe investment (over two thirds of respondents). We show that this is much higher than the proportion who believe stocks or bonds are safe.

We show that the risk perception of housing is important to explain past housing choices. Across a variety of specifications, and controlling carefully for both income and financial constraints, we find that households which perceive housing as risky are more likely to be renters than owners. Similarly, respondents are much more likely to want to rent in the future if their view is that

housing is risky. This is consistent with models of household portfolio choice with housing (such as Campbell and Cocco (2003) and Cocco (2005), whereby higher perceptions of the second moment of housing returns should lead to a smaller allocation of wealth towards housing.

We show that risk perceptions of housing co-move negatively with past house price increases, but there is an asymmetry between renters and owners in how fast they adjust beliefs about house price risk. Renters respond to past house price increases only with a lag of several years, while owners are more quickly to consider housing as safe when house prices go up. This difference in the speed of updating may explain why some groups enter home ownership later in the housing cycle. The results have potentially important implications for understanding past housing cycles. If households update their perception of housing risk adaptively, we would expect households to allocate more of their wealth towards housing in response to an ongoing cycle, potentially even as investors in second homes, which has been shown to correlate with more pronounced local housing cycles (Bhutta (2015) and DeFusco, Nathanson and Zwick (2016)).

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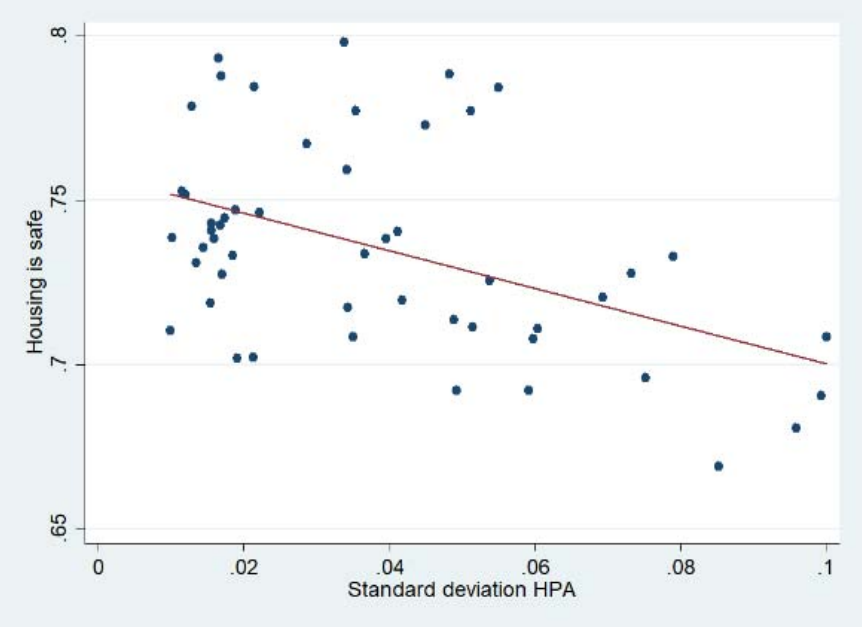
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Figure 1: Perception of risk and local house price risk measures

Note: Panel A shows the share of respondents by state who consider housing a safe asset (y-axis) by the state-level standard deviation of annual house price changes (Panel A) and the population-weighted ZIP code-level beta of local house price growth on national house price growth (Panel B). Elasticity data comes from Saiz (2010). Response data is from the Fannie Mae National Housing Survey.

Panel A: Standard deviation of annual house price changes



Panel B: ZIP code level beta

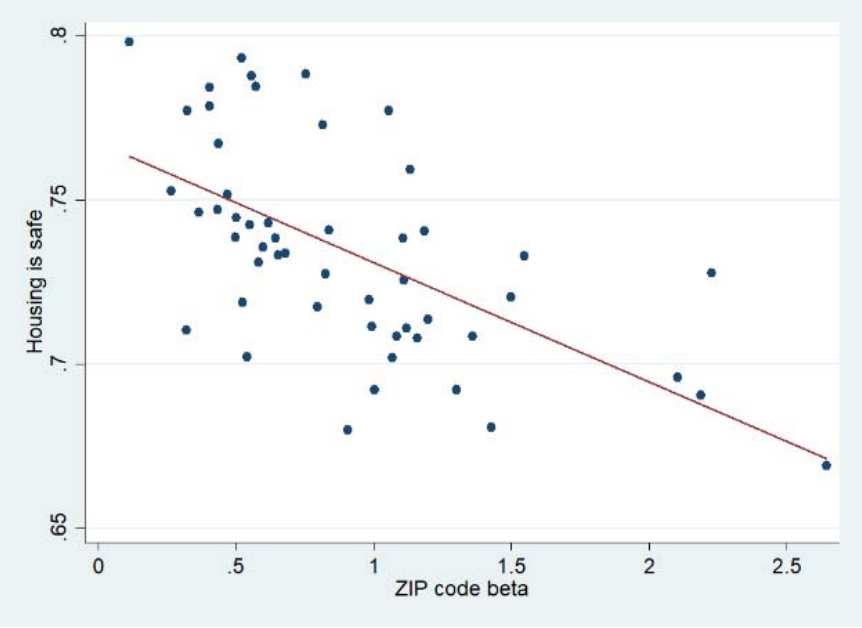


Figure 2: Perception of risk and elicited distribution of 1-year expectations

Note: Panel A shows the average weight given by respondents to the Mechanical Turk survey to each of 10 bins of 1-year ahead house price changes. Respondents are split into those who consider housing a safe vs a risky asset.

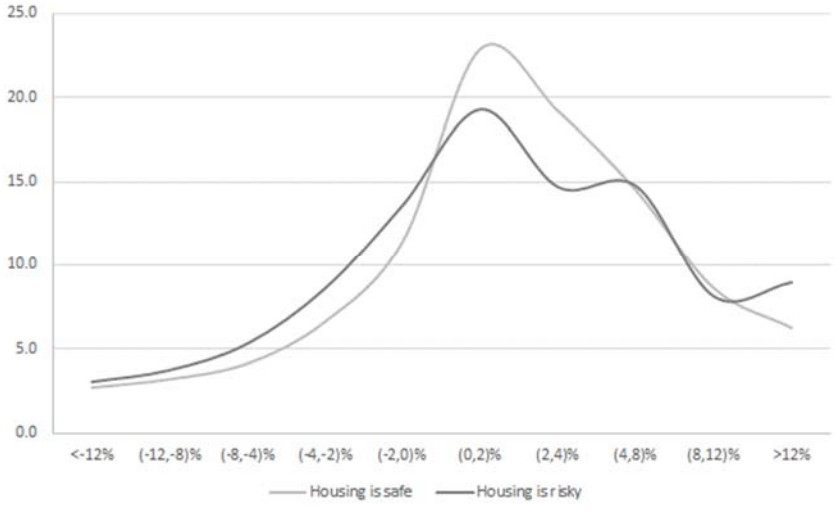
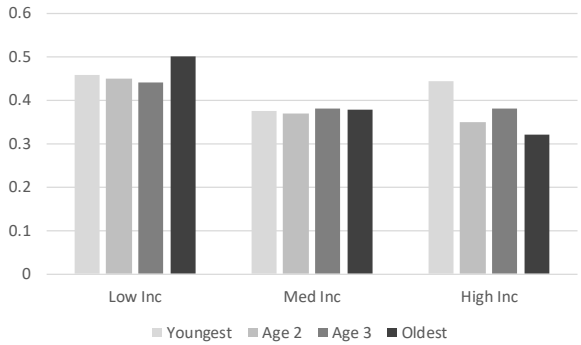


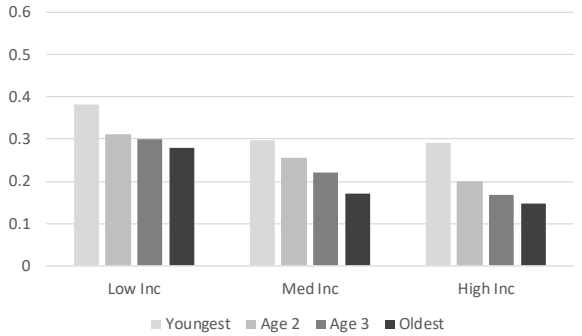
Figure 3: Risk perception by age and income: Difference between Renters and Owners

Figure shows share of renters (Panel A) and owners (Panel B) that perceive housing to be a risky investment for respondents in each income and age category. Panel C shows the difference between renters and owners (calculated as the share of renters minus share of owners) in risk perception. Sample means (weighted by sample weights) of each variable are shows in the title of each panel. Respondents are split into (weighted) income terciles and age quartiles.

Panel A: Renters



Panel B: Owners



Panel C: Difference (Renters-Owners)

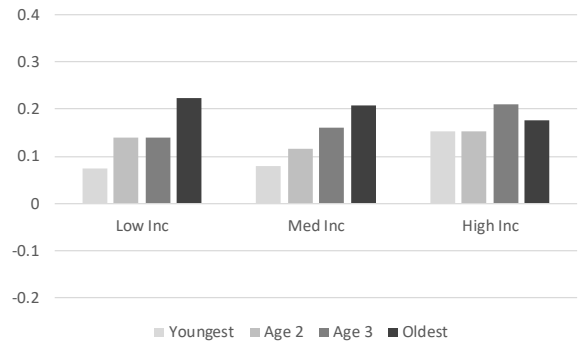
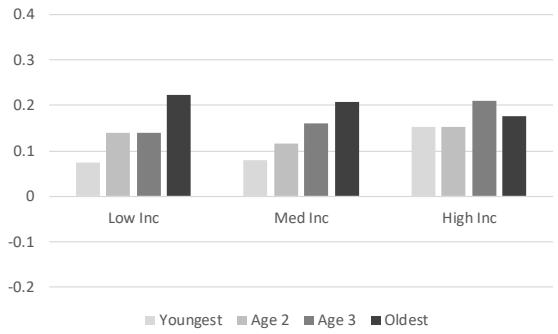


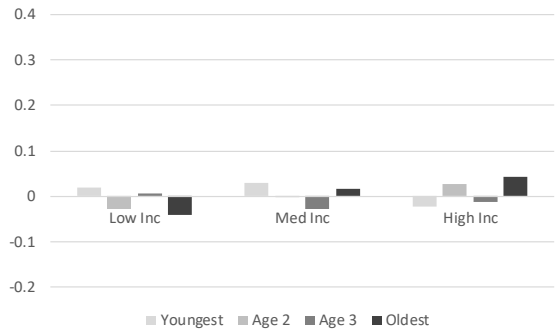
Figure 4: Perception of risk by asset class: Difference between Renters and Owners

Figure shows difference between renters and owners (always calculated as share of renters minus share of owners) in risk perception (Panel A), perception of the potential of housing (Panel B) and whether they believe it is a good or a bad time to buy (Panel C) for respondents in each income and age category. Sample means (weighted by sample weights) of each variable are shows in the title of each panel. Respondents are split into (weighted) income terciles and age quartiles.

Panel A: "Housing is risky" ($\bar{x} = 29\%$)



Panel B: "Stocks are risky" ($\bar{x} = 82\%$)



Panel C: "Bonds are risky" ($\bar{x} = 45\%$)

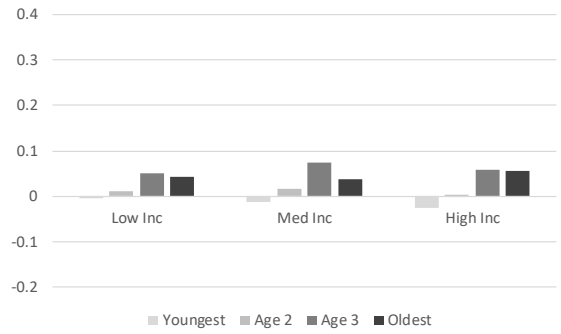
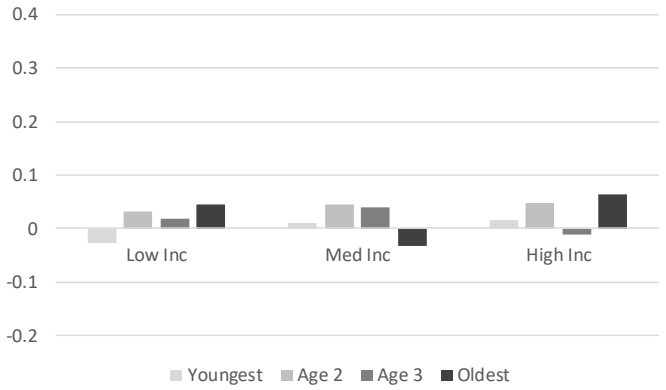


Figure 5: House price expectations by income and age: Renters vs Owners

Figure shows difference between renters and owners in the share that expect prices will go up over the next 12 months (Panel A), and in the share that expect prices will go down over the next 12 months (Panel B) for respondents in each income and age category (always calculated as share of renters minus share of owners). Sample means (weighted by sample weights) of each variable are shows in the title of each panel. Respondents are split into (weighted) income terciles and age quartiles.

Panel A: Diff. share expecting prices to go up ($\bar{x} = 39\%$)



Panel B: Diff. share expecting prices to go down ($\bar{x} = 13\%$)

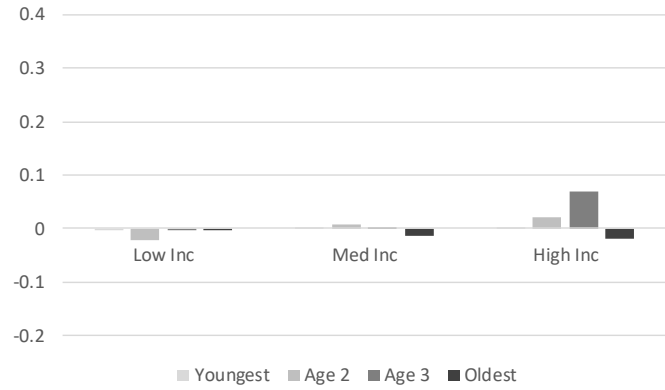
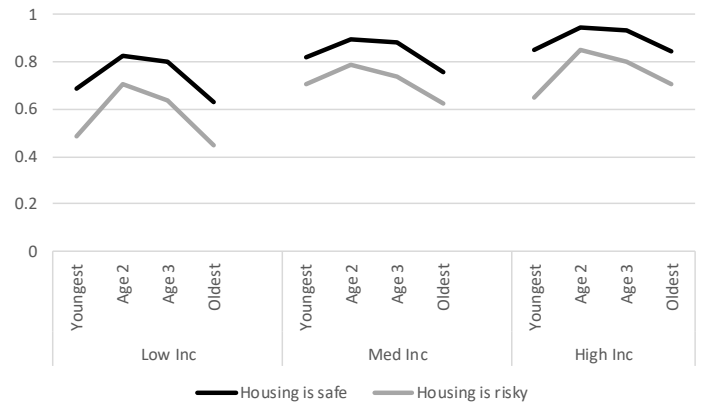


Figure 6: Intention to buy by perception of risk

Figure shows intention to buy if the respondent were to move now (from question 31 listed in Appendix 1) for respondents in each income and age category depending on their risk perception for owners (Panel A) and renters (Panel B). All shares are weighted by sample weights. Respondents are split into (weighted) income terciles and age quartiles.

Panel A: Owners



Panel B: Renters

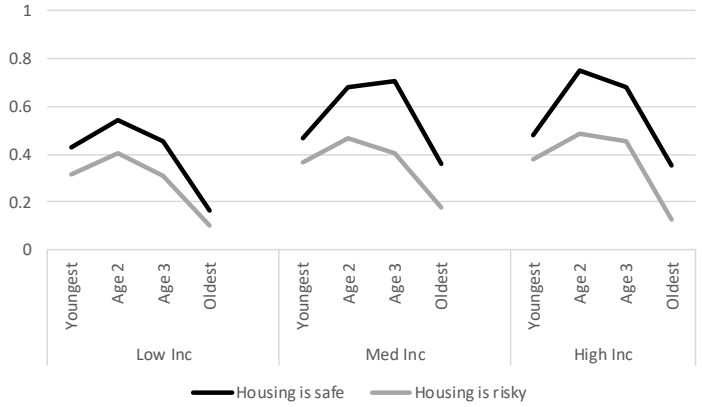
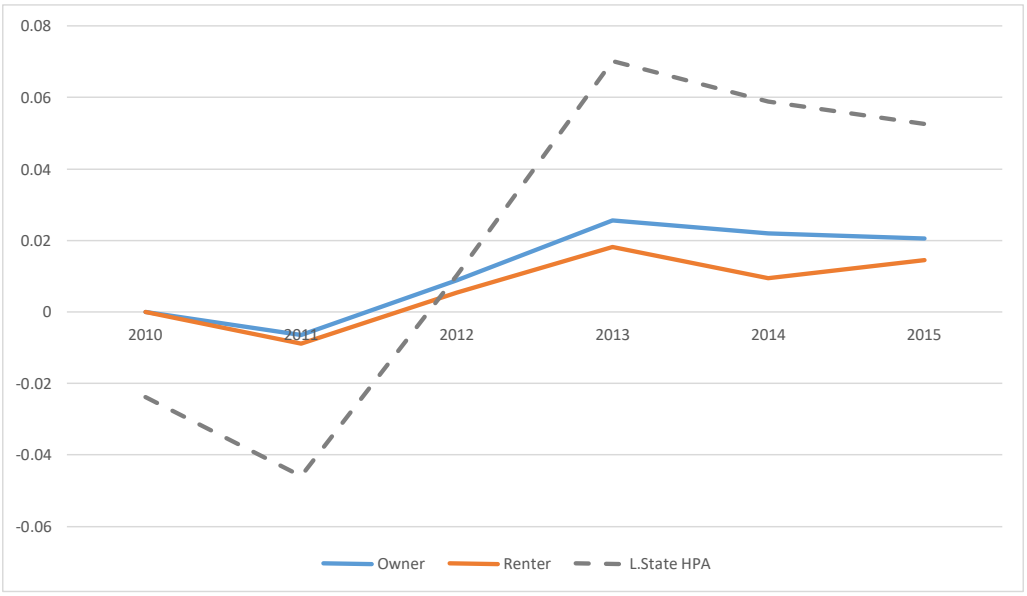


Figure 7: Expectations, risk and recent house price experience, Owners vs Renters

Note: Panel A shows changes in mean forward-looking house price expectations separately for owners and renters (relative to the 2010 mean expectations) as well as lagged 12-month house price changes at the state level. Panel B shows changes in the share of respondents who consider housing a safe asset, as well as lagged 12-month state house price changes. Data is from the Fannie Mae National Housing Survey.

Panel A: House price expectations



Panel B: Share responding housing is safe

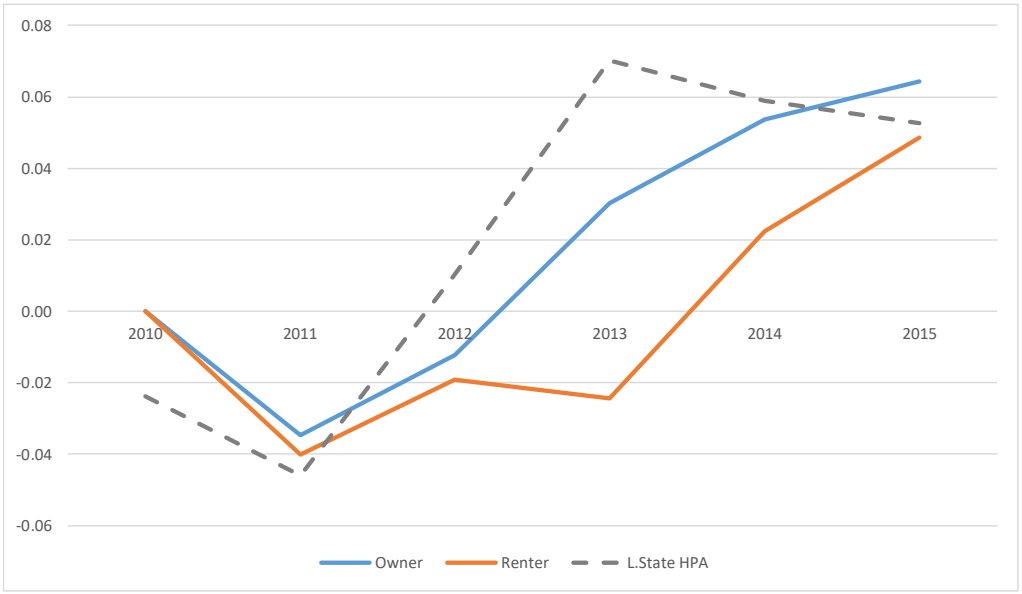


Table 1: Summary statistics

Note: Table shows summary statistics for the variables used in the analysis. We show means weighted by the sample weights for each year in the sample and for all years ("Total" column). Data is from the Fannie Mae National Housing Survey.

Panel A: Respondent characteristics

		2010	2011	2012	2013	2014	2015	Total	N
Age	*18-29*	0.24	0.24	0.24	0.24	0.24	0.24	0.24	60,241
	30-44	0.29	0.30	0.30	0.30	0.30	0.29	0.29	60,241
	44-60	0.31	0.29	0.29	0.29	0.29	0.29	0.29	60,241
	60+	0.17	0.17	0.17	0.17	0.17	0.18	0.17	60,241
Income	*< $35k*	0.33	0.35	0.35	0.35	0.35	0.34	0.35	65,608
	$35k < x < $75k	0.33	0.32	0.32	0.32	0.32	0.32	0.32	65,608
	> $75k	0.33	0.33	0.33	0.33	0.33	0.34	0.33	65,608
Renter		0.31	0.32	0.33	0.33	0.34	0.36	0.33	65,610
Recent owner	*(<= 3 years)*	0.19	0.18	0.17	0.19	0.19	0.20	0.19	36,123
Male		0.50	0.50	0.50	0.50	0.50	0.50	0.50	65,608
College		0.53	0.52	0.53	0.52	0.52	0.53	0.53	65,610
Race	*White*	0.66	0.65	0.63	0.63	0.63	0.63	0.64	65,610
	Minority	0.27	0.28	0.29	0.30	0.29	0.29	0.29	65,610
	Other	0.07	0.07	0.08	0.08	0.08	0.08	0.08	65,610
HPA 2006-2010		-0.16	-0.16	-0.16	-0.16	-0.15	-0.15	-0.16	65,584
Sand State (AZ, CA, FL, NV)		0.22	0.24	0.21	0.20	0.19	0.19	0.21	65,584

Panel B: Attitudes and expectations

		2010	2011	2012	2013	2014	2015	Total	N
Expected 1-yr HPA	*∠ Price*	0.007	0.000	0.015	0.030	0.025	0.026	0.017	54,995
	∠ Price = 0	0.47	0.51	0.48	0.38	0.42	0.39	0.44	65,610
	Share down	0.20	0.21	0.13	0.08	0.07	0.08	0.13	65,610
	Share up	0.31	0.25	0.35	0.50	0.46	0.47	0.39	65,610
	Don't know	0.03	0.03	0.04	0.04	0.04	0.06	0.04	65,610
	∠ Price | down	-0.11	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	5,979
	∠ Price | up	0.10	0.08	0.08	0.08	0.07	0.07	0.08	19,928
	Abs(Expectation error)	0.06	0.07	0.08	0.06	0.05	0.06	0.06	54,972
Good time to buy		0.72	0.71	0.75	0.74	0.72	0.71	0.72	62,479
Attitude housing	*Safe*	0.70	0.66	0.68	0.71	0.74	0.75	0.71	60,713
	With potential	0.60	0.57	0.60	0.62	0.62	0.64	0.61	60,713
Attitude stocks	*Safe*	0.17	0.15	0.16	0.19	0.19	0.19	0.18	58,341
	With potential	0.53	0.56	0.58	0.60	0.63	0.64	0.59	58,341
Attitude bonds	*Safe*	0.56	0.54	0.57	0.52	0.54	0.56	0.55	55,280
	With potential	0.29	0.29	0.28	0.28	0.27	0.28	0.28	55,280
Intentions	*Move soon*	.	.	0.39	0.39	0.39	0.43	0.40	40,724
	Buy if move	0.69	0.67	0.69	0.69	0.69	0.68	0.69	62,812
	Always rent | rent	0.32	0.31	0.35	0.37	0.39	0.38	0.35	17,019
	Always buy | buy	0.93	0.93	0.91	0.92	0.92	0.93	0.92	39,348
Personal Finance	*Difficult obtain mtg.*	0.57	0.56	0.54	0.53	0.49	0.47	0.52	63,954
	Stressed to pay debt	0.34	0.32	0.28	0.28	0.26	0.26	0.29	61,921
	Consider default	0.05	0.05	0.04	0.04	0.03	0.03	0.04	27,177
Attitude default	*OK to default: LTV*	0.10	0.10	0.12	0.10	0.10	0.10	0.10	60,456
	OK to default: distress	0.18	0.20	0.19	0.16	0.16	0.16	0.17	59,757

Table 2: Attitude towards housing – Cross-sectional patterns

Note: Panel A uses answers to the question "Do you think buying a home / buying stocks is a [1:Safe investment with a lot of potential; 2:Safe investment with very little potential; 3:Risky investment with very little potential; 4:Risky investment with a lot of potential]?" and shows results from OLS regressions on respondent demographics. Panel B shows OLS regressions of "Housing is risky" on county-level house price appreciation and rental appreciation volatility (calculated over the 2011-2016 period), as well as the share of returns coming from rental income (also at the county level). Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Individual demographics

	Housing is risky	Housing has potential	Stocks are risky	Stocks have potential
$35k < income < $75k	-0.100***	0.029***	0.004	0.034***
	0.007	0.008	0.006	0.007
Income > $75k	-0.143***	0.002	-0.001	0.090***
	0.010	0.013	0.003	0.005
Age: 30-44	-0.069***	-0.041***	0.004	-0.034***
	0.015	0.015	0.006	0.005
Age: 44-60	-0.105***	-0.020	-0.009	-0.078***
	0.019	0.012	0.007	0.007
Age: 60+	-0.135***	-0.031***	-0.048***	-0.160***
	0.016	0.012	0.007	0.016
Male	0.000	0.050***	0.000	-0.043***
	0.003	0.005	0.005	0.008
College	-0.050***	-0.013	0.009***	0.073***
	0.006	0.008	0.003	0.005
Minority	0.016*	0.037***	-0.038***	-0.024***
	0.010	0.008	0.006	0.009
Other_Ethnicity	0.002	-0.019*	0.004	0.005
	0.016	0.010	0.006	0.009
State & Year FE	Y	Y	Y	Y
N	55,805	55,805	53,661	53,661
r2	0.05	0.01	0.01	0.04

Panel B: Local volatility measures

	Housing is risky							
					Renters		Owners	
House price volatility	0.319***	0.236*			0.322***	0.040	0.319***	0.342*
	0.084	0.121			0.116	0.225	0.122	0.207
Rental price volatility			-0.064	0.105				
			0.214	0.235				
Controls & Year FE	Y	Y	Y	Y	Y	Y	Y	Y
State FE	N	Y	N	Y	N	Y	N	Y
N	47,199	47,199	45,648	45,648	13,096	13,096	34,103	34,103
r2	0.06	0.07	0.06	0.07	0.01	0.02	0.03	0.03

Table 3: Perception of risk and expected house price changes

Note: Table shows regressions with and without fixed effects of several measures of 12-month expectations (Panel A), and 5-year expectations (Panel B) of house prices on households' assessment of the riskiness of housing as an investment. "% Down", "%Up" and "Share == 0" are all indicator variables for whether each respondent thought house prices were going to go down, up, or stay the same over the subsequent 12 months. Panel C relates answers to the question about housing to an elicited distribution of one-year ahead house price expectations. Data in Panels A and B is from the Fannie Mae National Housing Survey. Panel C uses data from the Mechanical Turk survey described in the data section. Standard errors are clustered at the state and year level, and regressions in Panels A and B are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: 1-year ahead expectations

	Expected Δ HP	**Share == 0**	**% Down**	**% Up**	**Δ Price | Down**	**Δ Price | Up**
Housing is risky	-0.007***	-0.016	0.049***	-0.040***	-0.009***	0.004**
	0.0008	0.0190	0.0052	0.0148	0.0017	0.0013
Controls	Yes	Yes	Yes	Yes	Yes	Yes
State & Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	47,153	55,805	55,805	55,805	5,260	16,797
r2	0.04	0.02	0.04	0.05	0.06	0.09

Panel B: 5-year ahead expectations

	Share == 0	**% Down**	**% Up**
Housing is risky	0.007	0.021***	-0.031*
	0.0008	0.0190	0.0052
Controls	Yes	Yes	Yes
State & Year FE	Yes	Yes	Yes
N	18,819	18,819	18,819
r2	0.01	0.02	0.02

Panel C: Elicited probability distribution

	Drop < -4%		**Drop 0-4%**		**Increase 0-4%**		**Increase > 4%**	
Housing is risky	1.893	1.290	4.038**	3.127*	-8.248***	-6.705***	2.316	2.288
	1.222	1.231	1.750	1.797	2.010	2.226	2.174	2.154
Controls	N	Y	N	Y	N	Y	N	Y
State FE	N	Y	N	Y	N	Y	N	Y
N	978	975	978	975	978	975	978	975
r2	0.00	0.08	0.01	0.08	0.02	0.08	0.00	0.09

Table 4: Housing choice, risk perception and expectations

Note: Table shows OLS regressions of a respondent-level indicator variable for whether respondents are renters or owners on whether they consider housing and stocks risky (Panel A) and 12-month ahead house price expectations (Panel B), all controls from Table 2, as well as a variety of financial and economic distress measures. These include q22 and q109-q112 listed in Appendix 1), and refer to the perceived ability to pay all types of debt, levels of income and savings, and job prospects. The last column adds an interaction of fixed effects for the type of job (q133) with the share of employment in a county working in non-tradable industries (NAICS codes 44-45 and 72). All regressions include the demographic controls shown in Tables 2 and 3. Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Perceived housing / stocks risk

	Renter vs Owner					
Housing is risky	0.114***		0.112***	0.109***	0.104***	0.098***
	0.009		0.009	0.008	0.015	0.014
Stocks are risky		0.001	-0.011	-0.013*	-0.024**	
		0.007	0.008	0.008	0.010	
Stressed to pay debts				0.037***	-0.007	
				0.011	0.015	
Sufficient savings					-0.053***	
					0.002	
Sufficient income					-0.074***	
					0.011	
Concerned about job					-0.004	
					0.012	
Controls	Y	Y	Y	Y	Y	Y
State & Year FE	Y	Y	Y	Y	Y	Y
Profession FE x NT share						Y
N	55,805	53,661	52,354	51,592	23,726	18,568
r2	0.28	0.27	0.28	0.28	0.29	0.29

Panel B: House price expectations (12-month ahead)

	Renter vs Owner					
Exp. Price Change	-0.012	0.060	0.060	0.058	-0.005	0.124
	0.027	0.047	0.042	0.047	0.042	0.102
Δ Price = 0		0.001	-0.002	-0.001	-0.020**	-0.004
		0.016	0.017	0.017	0.009	0.016
Expect Down		0.027	0.013	0.025	-0.001	
		0.025	0.025	0.025	0.024	
Housing is risky			0.113***			
			0.008			
Stressed to pay debts				0.046***	-0.001	
				0.012	0.021	
Sufficient savings					-0.053***	
					0.005	
Sufficient income					-0.073***	
					0.012	
Concerned about job					-0.001	
					0.017	
Controls	Y	Y	Y	Y	Y	
State & Year FE	Y	Y	Y	Y	Y	
Profession FE x NT share						Y
N	50,473	50,473	47,153	47,745	22,512	17,006
r2	0.27	0.27	0.28	0.27	0.28	0.28

Table 5: Risk attitudes and future intentions

Note: Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Buy vs Rent in the next move

	Intend to rent = 1					
Risk home	0.142***				0.132***	0.127***
	0.006				0.008	0.011
Potential home		-0.070***			-0.050***	-0.041***
		0.009			0.008	0.006
Expected Δ HP			-0.114**		-0.065	-0.045
			0.054		0.065	0.124
Down				0.022***		
				0.008		
Stressed to pay debt						0.057***
						0.009
Sufficient savings						-0.045***
						0.010
Concerned about job						0.010
						0.007
Controls	Y	Y	Y	Y	Y	Y
State & Year FE	Y	Y	Y	Y	Y	Y
N	53,704	53,704	48,729	57,729	45,652	26,958
r2	0.23	0.22	0.21	0.21	0.23	0.24

Panel B: Differences between renters and owners

	Intend to rent | current owner				Intend to rent | current renter			
Risk home	0.135***			0.127***	0.144***			0.131***
	0.005			0.007	0.013			0.015
Potential home		-0.061***		-0.042***		-0.083***		-0.069***
		0.008		0.007		0.013		0.015
Expected Δ HP			-0.154***	-0.096***			-0.063	-0.033
			0.019	0.026			0.126	0.127
Controls	Y	Y	Y	Y	Y	Y	Y	Y
State & Year FE	Y	Y	Y	Y	Y	Y	Y	Y
N	38,777	38,777	35,992	33,750	14,927	14,927	12,737	11,902
r2	0.10	0.08	0.08	0.10	0.09	0.08	0.07	0.09

Table 6: Role of past and expected mobility

Note: Table shows OLS regressions of a respondent-level indicator variable for whether respondents are renters or owners, and whether they would want to rent if they were to move now, on a dummy variable for whether they consider housing a risky investment, as well as measures of both future expected mobility (whether they intend to move in the next 5 years, from q13bb) and past mobility (when owners purchased their home, q26). All regressions include the demographic controls shown in Table 2. Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Renter = 1		**Intend to rent if move = 1**		
Housing is risky	0.109***	0.109***	0.168***	0.162***	0.127***
	0.010	0.019	0.006	0.006	0.010
Move soon (next 5 years)	0.314***	0.314***	0.129***	0.125***	
	0.009	0.016	0.009	0.009	
Housing is risky x Move soon		-0.001		0.013	
		0.026		0.009	
Recent owner (≤ 3 years)					-0.009
					0.011
Housing is risky x Recent owner					-0.003
					0.003
Controls	Y	Y	Y	Y	Y
State & Year FE	Y	Y	Y	Y	Y
N	33,838	33,838	32,616	32,616	28,801
r2	0.36	0.36	0.18	0.18	0.08

Table 7: Risk attitudes and effect of recent house price experience

Note: Panel A shows regressions of the share of respondents who consider housing risky and "with potential" on three lags of 12-month state-level house price changes. Panel B shows the same regressions by respondent characteristics. Panels C and D use 12-month expectations as the independent variables. Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Risk and potential

			Housing is risky	
	Housing is risky	**Housing has potential**	**Renter**	**Owner**
L.State HPA	-0.278***	0.124	-0.163	-0.353***
	0.066	0.083	0.144	0.061
L2.State HPA	-0.041	0.060	-0.013	-0.057
	0.049	0.038	0.067	0.045
L3.State HPA	-0.187***	0.129***	-0.213***	-0.175***
	0.046	0.041	0.074	0.045
Controls & State FE	Y	Y	Y	Y
N	55,805	55,805	15,296	40,509
r2	0.06	0.01	0.02	0.03

Panel B: House price expectations (12-month ahead)

				Exp. Δ Price	
	Exp. Δ Price	**Δ Price = 0**	**% Down**	**Renter**	**Owner**
L.State HPA	0.179***	-0.614***	-0.781***	0.134***	0.203***
	0.020	0.117	0.128	0.020	0.018
L2.State HPA	0.008	0.013	-0.133***	0.008	0.007
	0.010	0.100	0.029	0.013	0.007
L3.State HPA	0.009	-0.247**	-0.048	0.013	0.008
	0.011	0.120	0.039	0.016	0.009
Controls	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y
N	50,473	60,214	60,214	13,040	37,433
r2	0.04	0.02	0.03	0.02	0.05

Table 8: Expectation errors in the cross-section

Note: Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Abs(F.Actual HPA-Expected HPA)					
Risk home	0.009***					0.007***
	0.001					0.001
Potential home		-0.001				0.000
		0.001				0.001
Difficult to obtain mortgage			0.006***			
			0.001			
Recent Owner (<= 3 years)				0.001		
				0.001		
Move soon (<= 5 years)					0.002**	
					0.001	
Renter						0.002*
						0.001
$35k < income < $75k						-0.002***
						0.001
Income > $75k						-0.004***
						0.001
Age: 30-44						-0.002**
						0.001
Age: 44-60						-0.001
						0.001
Age: 60+						-0.003***
						0.001
Male						0.003***
						0.001
College						-0.004***
						0.001
Minority						0.003*
						0.002
Other Ethnicity						0.000
						0.002
Year FE	Y	Y	Y	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y
N	51,290	51,290	53,975	30,994	35,121	47,153
r2	0.13	0.12	0.12	0.11	0.15	0.13

Appendix 1: Survey questions used in the analysis

	Question	Answer (options)
12	In general, do you think this is a very good time to buy a house, a somewhat good time, a somewhat bad time, or a very bad time to buy a house?	1:Very good time; 2:Somewhat good time; 3:Somewhat bad time; 4:Very bad time
13bb	When do you expect to move next?	1:Never; 2:Less than 1year; 3:1-3 years; 4:3-5 years; 5:5+years
15	During the next 12 months, do you think home prices in general will go up, go down, or stay the same as where they are now?	1:Prices will go up; 2:Prices will go down; 3:Prices will remain about the same
16	(If 15=down) By about what percent do you think home prices in general will go down on the average over the next 12 months?	[open ended question]
17	(If 15=up) By about what percent do you think home prices in general will go up on the average over the next 12 months?	[open ended question]
22	Do you think it would be very difficult, somewhat difficult, somewhat easy, or very easy for you to get a home mortgage today?	1:Very difficult; 2:Somewhat difficult; 3:Somewhat easy; 4:Very easy
26	How long have you owned your current home?	1:Less than a year; 2:1-3 years; 3:3-5 years; 4: >5 years
31	If you were going to move, would you be more likely to:	1:Rent; 0:Buy
50	(If 31=Rent) In the future, are you more likely to:	1:Always rent; 0:Buy at some point in the future
50b	(If 31=Buy) In the future, are you more likely to:	1:Always own; 0:Rent at some point in the future
75	Buying a home: Do you think this investment is...	1:Safe investment with a lot of potential; 2:Safe investment with very little potential; 3:Risky investment with very little potential; 4:Risky investment with a lot of potential
76	Buying stocks: Do you think this investment is...	1:Safe investment with a lot of potential; 2:Safe investment with very little potential; 3:Risky investment with very little potential; 4:Risky investment with a lot of potential
87	If a person's home is now worth less than what they owe on it, do you think it is okay for them to stop paying their mortgage?	1:Yes; 0:No
88	If a person is facing financial distress, do you think it is okay for them to stop paying their mortgage?	1:Yes; 0:No
99	Now I'd like to ask about the next 5 years. In 5 years, do you think your home's value will have:	1:Gone Up; 2:Gone Down; 3:Stayed exactly the same
109	Are you very stressed, somewhat stressed, not very stressed or not at all stressed about your ability to make payments on your debts?	1:Very stressed; 2:Somewhat stressed; 3:Not very stressed; 4:Not at all stressed
111	Do you feel you have sufficient savings?	1:Yes; 0:No
112	Do you feel that your current household income is sufficient for the amount of expenses you have, including any payments on debt and mortgages?	1:Yes; 0:No
112b	How concerned are you that you will lose your job in the next twelve months? Are you very concerned, somewhat concerned, not very concerned, or not at all concerned that you will lose your job in the next twelve months?	1:Very concerned; 2:Somewhat concerned; 3:Not very concerned; 4:Not at all concerned
122	Which of the following categories best describes your age?	1:18-20; 2:21-24; 3:25-29; 4:30-34; 5:35-39; 6:40-44; 7:45-49; 8:50-54; 9:55-59; 10:60-64; 11:65-69; 12:70-74; 13:75+
133	How would you describe the work you do?	1:White collar professional, like a doctor, lawyer, marketing, 2:White collar office or support person 3:White collar government, law enforcement, or education; 4:Fine arts, 5:Blue collar/trade worker, like carpenter, electrician, farming, manufacturing worker, retail, security; 6:Military; 7:Other.
142	For statistical purposes only, we need to know your total family income for 2011. Will you please tell me which of the following categories best represents your total family income?	1:Less than $10,000; 2:$10,000-$14,999; 3:$15,000-$24,999; 4:$25,000-$34,999; 5:$35,000-$49,999; 6:$50,000-$74,999; 7:$75,000-$99,999; 8:$100,000-$149,999; 9:$150,000-$199,999; 10:$200,000+

Perception of House Price Risk and Homeownership – ONLINE APPENDIX

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Section A1: Mechanical Turk questionnaire

The questions below were used in the Mechanical Turk survey we ran in July of 2018. The questions include a combination of questions from the Fannie Mae Housing Survey and from the Survey of Consumer Expectations by the Federal Reserve Bank of New York.[3]

We want to learn about your current housing situation, and your outlook for the future of the housing market. This survey takes about 10 minutes.

The questions in this survey have no right or wrong answers - we are interested in your views and opinions. Your responses are confidential, and it helps us a great deal if you respond as carefully as possible. If you should come to any question that you can't or don't want to answer, just click on 'NEXT' and wait for the next question to appear.

Thank you for your participation!

Q1: During the next 12 months, do you think home prices in general will go up, go down, or stay the same as where they are now?

1: Prices will go up; 2:Prices will go down; 3:Prices will remain about the same; 99:Don't know.

Q2: ## IF DOWN (Q1=Down). By about what percent do you think home prices in general will go down on the average over the next 12 months? ## IF UP (Q1=Up). By about what percent do you think home prices in general will go up on the average over the next 12 months?

[3] Introduction and survey question number 4 were adapted from the Survey of Consumer Expectations, © 2013-2017 Federal Reserve Bank of New York (FRBNY). The SCE questions are available without charge at http://www.newyorkfed.org/microeconomics/sce and may be used subject to license terms posted there. FRBNY did not participate in or endorse our survey, and FRBNY disclaims any responsibility or legal liability for the administration of the survey and the analysis and interpretation of data collected.

Q3: Buying a home: Do you think this investment is...

1: Safe investment with a lot of potential; 2:Safe investment with very little potential; 3:Risky investment with very little potential; 4:Risky investment with a lot of potential; 99:Don't know VOL

Q4: And in your view, what would you say is the percent chance that, over the next 12 months, the average home price nationwide will...

increase by 12% or more [] percent chance; increase by 8% to 12% [] percent chance percent chance; increase by 4% to 8% [] percent chance increase by 2% to 4% [] percent chance; increase by 0% to 2% []percent chance; decrease by 0% to 2% []percent chance; decrease by 2% to 4% [] percent chance; decrease by 4% to 8% [] percent chance; decrease by 8% to 12% []percent chance decrease by 12% or more []percent chance. Total 100

Q5: Buying stocks: Do you think this investment is...

1:Safe investment with a lot of potential; 2:Safe investment with very little potential; 3:Risky investment with very little potential; 4:Risky investment with a lot of potential; 99:Don't know VOL;

Q6: What is your current homeownership situation?

1:Own your home outright and do not have any debt on it; 2:Have a mortgage on your home, such as a first mortgage, second mortgage or Home Equity Line of Credit or HELOC; 3:Rent; 4:Live with someone else and don't pay for housing; 99:Don't know VOL;

Q7: Which of the following categories best describes your age?

1:18-20; 2:21-24; 3:25-29; 4:30-34; 5:35-39; 6:40-44; 7:45-49; 8:50-54; 9:55-59; 10:60-64; 11:65-69; 12:70-74; 13:75+; 99:Don't know VOL;

Q8: What is the ZIP code and State of your current primary residence?

Q9: Gender

1:Male; 0:Female;

Q10: For statistical purposes only, we need to know your total family income for this year. Which of the following categories best represents your total family income?

1:Less than $10,000; 2:$10,000-$14,999; 3:$15,000-$24,999; 4:$25,000-$34,999; 5:$35,000-$49,999; 6:$50,000-$74,999; 7:$75,000-$99,999; 8:$100,000-$149,999; 9:$150,000-$199,999; 10:$200,000+; 99:Don't know VOL;

Appendix Figures and Tables

Figure A1: Perception of risk and housing supply elasticity

Note: Figure shows the share of respondents by state who consider housing a safe asset (y-axis) and the population-weighted housing supply elasticity. Elasticity data comes from Saiz (2010). Response data is from the Fannie Mae National Housing Survey.

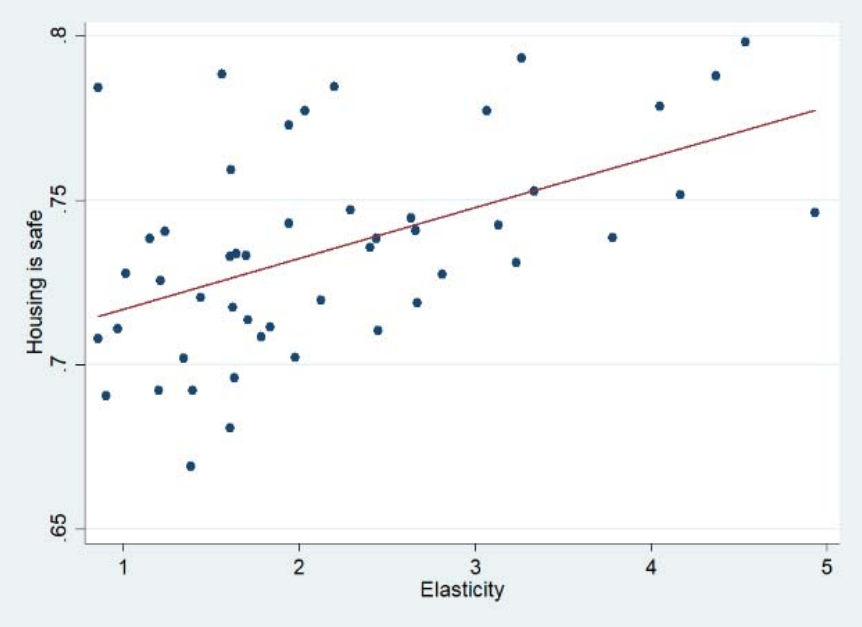


Table A1: Summary statistics (online survey respondents)

Note: data comes from the Mechanical Turk survey described in more detail in the data section.

Panel A: Respondent characteristics

		Share	N
Age	*18-29*	0.30	1,008
	30-44	0.47	1,008
	44-60	0.17	1,008
	60+	0.06	1,008
Income	*< $35k*	0.16	1,008
	$35k < x < $75k	0.43	1,008
	> $75k	0.27	1,008
Renter		0.51	1,005
Gender	*Male*	0.52	1,008

Panel B: Attitudes and expectations

		Mean	N
Elicited distribution	Drop 4% or more	0.104	1,008
	Drop 0-4%	0.191	1,008
	Rise 0-4%	0.401	1,008
	Increase 4% or more	0.302	1,008
Moments (constructed)	Mean	0.024	1,008
	Standard deviation	0.051	1,008
	Skewness	0.103	1,006
	Kurtosis	6.021	1,006

Panel C: Moments of elicited distribution

	Expected HPA		Std. Dev HPA		Skewness HPA		Kurtosis HPA	
Housing is risky	0.001	0.001	0.003	0.001	-0.090	-0.039	-0.388	-0.370
	0.004	0.003	0.002	0.002	0.096	0.105	0.423	0.488
Controls	N	Y	N	Y	N	Y	N	Y
State FE	Y	Y	Y	Y	Y	Y	Y	Y
N	980	975	980	975	978	975	978	975
r2	0.00	0.08	0.00	0.10	0.00	0.08	0.00	0.07

Table A2: First through fourth moments of one-year house expected price changes (NY Fed Housing Survey)

Note: This Table uses data from survey questions from the Survey of Consumer Expectations, © 2013-2018 Federal Reserve Bank of New York (FRBNY).

	Renter vs Owner									
Expected HPA	-0.186	-0.019							-0.099	0.007
	0.152	0.132							0.154	0.134
Std. Dev HPA			1.947***	0.825***					1.892***	0.815***
			0.237	0.220					0.233	0.217
Skewness HPA					-0.019***	-0.009*			-0.015***	-0.007
					0.006	0.005			0.006	0.005
Kurtosis HPA							-0.004***	-0.003***	-0.003***	-0.002**
							0.001	0.001	0.001	0.001
Controls	N	Y	N	Y	N	Y	N	Y	Y	Y
State FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	8,586	8,472	8,586	8,472	8,586	8,472	8,586	8,472	8,586	8,472
r2	0.02	0.20	0.04	0.20	0.02	0.20	0.02	0.20	0.05	0.20

Table A3: Housing choice – cross-sectional patterns

Note: Panel A shows OLS regressions of the renter / owner status of a household and whether a household intends to buy or rent in their next move on several demographic characteristics. Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Renter					Buy vs Rent if move				
$35k < income < $75k	-0.232***	-0.198***	-0.229***	-0.236***	-0.225***	0.204***	0.199***	0.194***	0.190***	0.196***
	0.011	0.012	0.012	0.009	0.013	0.011	0.010	0.012	0.014	0.010
Income > $75k	-0.390***	-0.347***	-0.382***	-0.373***	-0.389***	0.307***	0.289***	0.287***	0.285***	0.298***
	0.011	0.010	0.012	0.013	0.011	0.010	0.013	0.011	0.013	0.010
Age: 30-44	-0.224***	-0.139***	-0.224***	-0.226***	-0.223***	0.189***	0.170***	0.191***	0.184***	0.207***
	0.011	0.015	0.012	0.012	0.014	0.016	0.017	0.016	0.014	0.014
Age: 44-60	-0.318***	-0.208***	-0.316***	-0.313***	-0.323***	0.188***	0.151***	0.185***	0.178***	0.204***
	0.011	0.013	0.010	0.005	0.013	0.019	0.027	0.018	0.016	0.020
Age: 60+	-0.429***	-0.259***	-0.418***	-0.406***	-0.427***	0.064***	-0.010	0.040**	0.039**	0.061***
	0.012	0.016	0.011	0.009	0.016	0.019	0.021	0.018	0.019	0.021
Male	0.001	0.002	-0.001	0.003	-0.001	-0.008	-0.003	-0.004	-0.009	-0.007
	0.004	0.003	0.005	0.003	0.005	0.007	0.006	0.007	0.008	0.007
College	0.009*	-0.003	0.007	0.007*	0.013**	-0.011*	-0.007	-0.009	-0.013**	-0.011
	0.005	0.005	0.004	0.004	0.005	0.006	0.008	0.006	0.006	0.007
Minority	0.082***	0.065***	0.083***	0.081***	0.078***	0.002	0.016	-0.001	0.008	0.008
	0.017	0.011	0.016	0.017	0.016	0.014	0.015	0.014	0.016	0.014
Other_Ethnicity	0.017	-0.007	0.017	0.023	0.007	-0.039***	-0.012	-0.037**	-0.051***	-0.028*
	0.015	0.008	0.015	0.015	0.013	0.015	0.011	0.015	0.017	0.016
Move Soon		0.320***					-0.134***			
		0.009					0.007			
Stressed to pay debts			0.045***					-0.097***		
			0.012					0.007		
Sufficient savings				-0.073***					0.095***	
				0.005					0.010	
Concerned about job					0.027***					-0.055***
					0.008					0.008
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
State & Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	60,214	37,130	56,872	44,861	47,197	57,729	35,657	54,558	43,101	45,300
r2	0.27	0.36	0.27	0.27	0.26	0.14	0.16	0.14	0.14	0.14

Table A3B: House price expectations and demographics (12-month ahead)

Note: Table shows OLS regressions of the continuous measure of house price expectations for the subsequent 12 months, the share of respondents who believe house prices will stay the same, go down, go up, or who don't know, on several respondent characteristics. Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Price Change	Δ Price = 0	Down	Up	Don't know
$35k < income < $75k	-0.003***	0.032***	-0.002	-0.010	-0.020***
	0.001	0.009	0.005	0.013	0.005
Income > $75k	-0.003	0.014	0.002	0.013	-0.029***
	0.003	0.018	0.008	0.023	0.003
Age: 30-44	-0.006***	0.034***	0.004	-0.040***	0.002
	0.002	0.009	0.013	0.013	0.005
Age: 44-60	-0.002	0.013	0.000	-0.019	0.006
	0.002	0.012	0.014	0.018	0.004
Age: 60+	0.002	-0.028*	-0.026***	0.025	0.029***
	0.002	0.015	0.009	0.018	0.004
Male	0.003***	0.019***	-0.015***	-0.023***	0.019***
	0.001	0.003	0.004	0.007	0.002
College	-0.001	0.012	-0.014***	0.011	-0.009***
	0.001	0.008	0.003	0.009	0.003
Minority	0.008***	-0.050***	-0.011	0.065***	-0.003
	0.001	0.012	0.008	0.013	0.002
Other_Ethnicity	0.005***	-0.071***	0.002	0.056***	0.013***
	0.001	0.008	0.009	0.010	0.004
State & Year FE	Y	Y	Y	Y	Y
N	50,473	60,214	60,214	60,214	60,214
r2	0.04	0.02	0.03	0.05	0.02

Table A3: Expectations and attitudes after the crisis

Panel A: Expected price changes

	Exp. Δ Price	Δ Price = 0	Down	Up	Don't Know
Crisis HP T2 (Middle)	-0.002*	0.010	-0.002	-0.008	0.000
	0.001	0.014	0.008	0.013	0.004
Crisis HP T3 (Worst)	0.005*	-0.031	-0.008	0.046*	-0.006*
	0.003	0.019	0.011	0.024	0.003
Controls	Y	Y	Y	Y	Y
State FE	N	N	N	N	N
N	50,473	60,214	60,214	60,214	60,214
r2	0.03	0.02	0.03	0.04	0.01

Panel B: Risk and potential attitudes

	Housing is risky	Housing has potential	Stocks are risky	Stocks have potential	Bonds are risky	Bonds have potential
Crisis HP T2 (Middle)	0.019**	-0.014**	-0.002	0.005	-0.004	-0.014***
	0.008	0.006	0.007	0.008	0.013	0.005
Crisis HP T3 (Worst)	0.025***	-0.006	0.007	0.009**	0.016	-0.024***
	0.009	0.008	0.008	0.003	0.013	0.006
Controls	Y	Y	Y	Y	Y	Y
State FE	N	N	N	N	N	N
N	55,805	55,805	53,661	53,661	50,777	50,777
r2	0.06	0.01	0.01	0.04	0.08	0.06

Table A4: Expectation errors

Note: Data is from the Fannie Mae National Housing Survey. Standard errors are clustered at the state and year level, and all regressions are weighted by the sample weights. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Pooled analysis

	Actual State HP change				Actual ZIP HP change			
Expected HP change	0.048***	0.020**	0.027	-0.003	0.121***	0.042	0.097***	0.015
	0.005	0.008	0.024	0.006	0.018	0.026	0.020	0.013
Year FE	N	Y	N	Y	N	Y	N	Y
State FE	N	N	Y	Y	N	N	Y	Y
N	54,972	54,972	54,972	54,972	39,184	39,170	39,170	39,170
r2	0	0.41	0.27	0.68	0.01	0.31	0.12	0.43

Panel B: Year-by-year

	Actual State Δ HP		Actual ZIP Δ HP	
Expected HP change	-0.005	-0.008	-0.019**	-0.022***
	0.003	0.008	0.009	0.007
Expected HP change x 2011	0.007**	0.002	-0.020**	-0.027***
	0.003	0.007	0.008	0.008
Expected HP change x 2012	0.038***	0.024***	0.116***	0.098***
	0.009	0.009	0.007	0.009
Expected HP change x 2013	0.035***	0.002	0.116***	0.078***
	0.011	0.007	0.011	0.017
Expected HP change x 2014	0.058***	0.000	0.085***	0.017
	0.008	0.009	0.008	0.022
Expected HP change x 2015	0.026***	-0.001	0.075***	0.043**
	0.007	0.005	0.017	0.017
Expected HP change x 2016	0.030***	0.013**	0.095***	0.082***
	0.002	0.006	0.013	0.009
Year FE	Y	Y	Y	Y
State FE	N	Y	N	Y
N	54,972	54,972	39,170	39,170
r2	0.42	0.68	0.32	0.43

Table A5: Effect of recent house price experience on intention to move soon

	All	Renter	Owner	Age > 44	Age ≤ 44	High Inc.	Median & Low Inc.
L.State HPA	0.172***	0.090	0.228***	0.173***	0.149**	-0.038*	0.270***
	0.010	0.062	0.050	0.044	0.063	0.021	0.041
L2.State HPA	-0.081	0.052	-0.144	0.050*	-0.179	-0.116	-0.062
	0.105	0.038	0.118	0.029	0.166	0.118	0.091
L3.State HPA	0.286***	0.233***	0.278*	0.185***	0.359**	0.243	0.311***
	0.103	0.077	0.146	0.033	0.157	0.154	0.078
Controls & State FE	Y	Y	Y	Y	Y	Y	Y
N	37,130	9,644	27,486	19,869	17,261	13,122	24,008
r2	0.29	0.18	0.09	0.12	0.25	0.21	0.33

Table A6: Effect of recent house price experience on intention to buy if the household were to move

	All	Renter	Owner	Age > 44	Age ≤ 44	High Inc.	Median & Low Inc.
L.State HPA	0.114***	0.183*	0.084***	-0.024***	0.229***	0.140***	0.090*
	0.035	0.107	0.027	0.009	0.075	0.019	0.049
L2.State HPA	0.013	0.015	0.025	0.045	0.010	0.032*	0.012
	0.053	0.076	0.035	0.042	0.067	0.019	0.068
L3.State HPA	0.024	-0.029	0.052**	0.081*	-0.025	-0.055**	0.068
	0.040	0.045	0.024	0.046	0.057	0.024	0.060
Controls & State FE	Y	Y	Y	Y	Y	Y	Y
N	57,729	16,121	41,608	29,838	27,891	19,330	38,399
r2	0.21	0.07	0.08	0.23	0.21	0.16	0.17

Table A7: Risk perception and alternative measures of local house price risk

	Housing is risky			
County-level beta	0.014***	0.004		
	0.004	0.005		
Proportion of return from rental			-0.055**	-0.012
			0.026	0.023
Controls & Year FE	Y	Y	Y	Y
State FE	N	N	N	N
N	47,199	47,199	43,423	43,423
r2	0.06	0.07	0.06	0.07