Housing market sentiment and homeownership

Zhaoyingzi Dong[1] · Eddie C. M. Hui[2] · Daichun Yi[3]

Abstract

The homeownership in China has witnessed a sharp growth during the last two decades even though the increasing housing price has brought challenges to housing affordability. This study provides a new explanation for this phenomenon. Based on the China Households Finance Surveys (CHFS), we try to explore how housing market sentiment influences households' actual housing-purchasing decision and potential house-purchasing intention. Our results show that housing price and housing market sentiment play quite different roles in households' housing-related decisions. Higher housing price lowers the probability to make actual house purchase and discourage households' home-purchase intention. Higher sentiment is positively related to the decision of purchasing a house, especially the second house. Households' house-purchasing intention can be stimulated by higher sentiment. The higher the sentiment, the more investment will be made in housing market. From an academic perspective, this study contributes to the existing literature by considering the importance of market collective attitudes, i.e. "market sentiment". From a practical perspective, our findings are expected to facilitate a better-informed decision-making process for homebuyers, property developers and policy makers.

1 Introduction

During the last two decades, the Chinese urban housing market has experienced a rapid development. The rocketing housing price has brought about challenges to housing affordability. However, homeownership's rate has risen from 72% in 2000 according to the 2000 Population Census[1] to over 90% in 2017 according to the China Household Finance Survey (CHFS). Houses no longer serve as shelters for home solely, and more importantly, houses are regarded as one kind of safe assets with higher returns for many Chinese households.

Scholars have tried to account for the rising homeownership in China from various aspects, including the traditional ideas, urbanization, housing reforms, the Hukou system, credit access and so on (Huang and Clark 2002; Xu 2017; Cui et al. 2016). However, these are not enough to explain the boom of second homeownership. Previous literature on the second home in the West proposes that the second home is driven form leisure demand (Tress 2002), and the rising mobility, emotional attachment (Hui and Yu 2009) and so on.

---

[1] https ://www.stats .gov.cn/tjsj/ndsj/renko upuch a./2000p ucha/html/l0804 a.htm.

These are helpful in understanding owning multiple houses in different cities, but not enough to explain the growth and the high ratio of second homeownership in the same city as the first houses' in China, especially in the first tier cities. Some scholars also argue that the purchase of second home is for investment (Smith 2005). Nonetheless, these studies may ignore that the households decision-making process may be influenced by the behavior of people around them and the whole market sentiment. Compared with the decision of purchasing the first house, the choice of buying multiple houses is more likely to be driven by investing demand rather than owner-occupier living demand. Thus, the second ownership may be affected by market sentiment as well. Especially in a market like China, where the information asymmetry is more obvious and the speculation-motivation in housing market sentiment is overheating.

Literature has identified that housing price in China is determined by some collective psychology factors, such as sentiment or confidence (Soo 2018; Hui et al. 2017; Zheng et al. 2014). Investor sentiment, a general belief of investors towards a market and reflects investors' propensity to speculate, can affect market returns (Baker and Wurgler 2006, 2007; Baker et al. 2012, Lemmon and Portniaguina 2006) and alter market participants' behaviors (Kurov 2008; Chau et al. 2011; Blasco et al. 2012; Ling et al. 2014). At micro level, market participants including households are irrational in making their housing choice and decisions. However, little literature has touched upon this issue.

The distinctiveness happened in Chinese housing market provides a unique opportunity and context for studying the role of sentiment in households' homeownership and housing purchase decision. This paper will first follow the methodology in stock market and use principal component analysis (PCA) to establish regional sentiment index. Then, based on the China Household Finance Survey (CHFS) 2011, 2013, 2015 and 2017, one of the most high-quality micro-data on Chinese household survey, we attempt to investigate whether households actual house-purchasing action and their potential house-purchasing intention are related to the housing market sentiment.

Our results find that: Higher housing price lowers the probability to make actual house purchase and home-purchase intention. However, higher sentiment has a positive effect on the actual decision of purchasing a house, and this effect is stronger in purchasing the second house. Households' house-purchasing intention can be stimulated by higher sentiment as well. In addition, households tend to invest more in housing market when housing market sentiment is higher.

This study proceeds as follows. Section "Literature review" reviews previous studies on the related topics and propose our hypotheses. Section "Data" describes the data and variables definitions. Section "Empirical analyses" displays and analyzes the results. Finally, we draw conclusions in Section "Conclusion".

2 Literature review

2.1 Literature on homeownership

Tenure transition from renters to homeowners is determined by both household and contextual factors (Cui et al. 2016). It can be triggered by the events during a household's life, such as marriage and childbirth, and also depends on the available resources, like current and expected future income. Wei and Zhang (2011) suggest sex ratios can affect house decisions because Chinese parents with a son prefer to save more money to purchase

a house to improve their son's competitiveness in marriage markets. They argues that besides the personal factors, contextual factors, such as housing price and credit policy, play an important role in the decision-making of purchasing a house. Leisure/recreation and investment are the two motivations that drive the second home demand (Huang and Yi 2011). Second home, a kind of leisure consumption, can facilitate people's recreational activities. For example, scholars have found that the dissatisfaction of the environment contributes to the growth of second home ownership and it is the reason why many second homes are located in more spacious and beautiful living environment and tourism communities (Tress 2002; Hui and Yu 2009). In this context, second home compensates some needs that lack in the primary home. Another important driving force for second home is investment demand. Since home can serve as both consumption goods and investment vehicles, households may allocate their wealth in housing market to obtain the returns. Compared with the decision of purchasing the first house, the choice of buying multiple houses may be driven by investing demand rather than owner-occupier living demand. Literature also finds that the purchase of second home is planned in households' investment strategies during their life time (Smith 2005). Other personal and contextual factors also matter, including improvement in transportation and communication, distance to the work place and so on. Huang and Yi (2011) explore the patterns and dynamics of the Chinese second homeownerships; they find both maturing housing market and institutional factors can exert impacts.

No matter what determines the ownership of the first and second home, households are not totally rational in making their decisions sometimes due to the information asymmetry (Hui and Wang 2014) and are likely to be affected by the collective attitude (sentiment). However, even numerous studies have analyzed the determinants of homeownership, little research has touched upon the issue of effect of sentiment on homeownership, especially on second homeownership.

2.2 Literature on sentiment

In finance literature, sentiment is defined as a collective belief and expectation towards a market and leads to speculative investment demand. Previous studies focusing on sentiment in equity markets find that not only can sentiment affect market returns (Baker and Wurgler 2006, 2007; Baker et al. 2012, Lemmon and Portniaguina 2006); but also it can alter market participants' behaviors (Kurov 2008; Chau et al. 2011; Blasco. 2012, Ling et al. 2014). For example, Kurov (2008) finds that sentiment has effects on trading behavior. In his paper, he finds that index futures traders are using positive feedback strategies, which means they buy when price rises and sell when price decreases, and this positive feedback is more active during the high sentiment period. Similar finding is also shown in a study by Chau et al. (2011) on the Exchange-traded Fund Contracts in the U.S market. Blasco et al. (2012) investigates the components of investors' herding behavior and their results show that herding intensity is determined by both market sentiment and returns. They also find when the past returns differ, investors act differently during bearish and bullish market sentiment periods.

Compared with the large amount of institutional investors participating in stock market, most participants in housing market are individual households who are less informed and more sentiment driven. Besides, due to the special characteristics of housing marketilliquidity and limitations to short selling, it prevents rational and sophisticated participants entering the market and counteracts mispricing (Clayton et al. 2009; Ling et al.

2014; Hui and Wang 2014). Thus, sentiment is more likely to have a lasting and stronger effect on housing market. As a result, the higher expectation in future housing returns leads to more investments and trades in housing assets (Fischer and Stamos 2013; Corradin et al. 2013). What is more, as herding behavior exists in Chinese housing market, less-informed households tend to imitate the actions taken by others who are perceived to be better informed. During high sentiment period where more traders are participating in the housing market and transaction volumes are increasing (Yu and Yuan 2011; Hui and Wang 2014), households may choose to follow the trend and make a purchase.

However, even numerous studies have focused on stock market sentiment (Baker and Wurgler 2006, 2007; Baker et al. 2012; Lemmon and Portniaguina 2006), little is known about housing market sentiment. The very few existing studies have noticed that the transaction volumes and housing returns in housing market are related to sentiment (Ling et al. 2014; Hui et al. 2017; Clayton et al. 2009). For example, Wu and Brynjolfsson (2015) find a positive relationship between housing-related online queries and the future house price and home sales. Hui et al. (2017) investigate the effect of sentiment on housing returns in Shanghai and suggest that the overall impact of buyer–seller sentiment on property returns is negative, while that of developer sentiment is positive. However, most of them are based on macro or aggregate analysis, while few studies examine the effect of sentiment in a microstructure setting. Ling et al. (2014) assert non-fundamental factors such as sentiment and that systematic biases in investors' and homeowners' beliefs can induce them to trade. Jian and Anderson (2013) demonstrate that herding behavior exist in REIT market investors or residential buyers learn and imitate others in the course of investing in REIT market.

2.3 Hypothesis

Theoretically, housing market sentiment may affect household tenure choice through several ways. First, due to the nature of housing market-inability to short sell, overvaluations in housing price/returns persist the longer following periods of high sentiment (Ling et al. 2014) and a higher expectation in future housing returns (Fischer and Stamos 2013; Corradin et al. 2013). The positive expectation for future stimulates individuals' enthusiasm of purchasing houses. Second, less-informed households tend to imitate the actions taken by others who are perceived to be better informed. During high sentiment period where more traders are participating in the housing market and transaction volumes are increasing (Yu and Yuan 2011; Hui and Wang 2014), households may choose to follow the trend and make a purchase.

Therefore, we expect higher sentiment will affect household tenure choice and purchasing intention. The first and second hypotheses are proposed as follows:

H1: When housing market sentiment increases, the intention of purchasing new houses will be strengthened.
H2: Higher housing market sentiment will increase the probability of attaining homeownership.

In addition, being different from stock markets, higher market sentiment usually accompanies with increasing housing price and housing wealth. Housing wealth effect literature iterates that when people expect housing price will increase, they will feel their life-long expected total wealth will increase and then revise their investment and

1 3

consumption behaviors. For homeowners, with more wealth in hand, they have more money to invest. In addition, compared with the decision of purchasing the first house, the choice of buying multiple houses may be driven by investment demand rather than owner-occupier living demand. Literature also finds that the purchase of second home is planned in households' investment strategies during their life time (Smith 2005). Therefore, higher sentiment will stimulate housing investment demand and encourage owners to buy more houses through housing wealth effect.

We propose our third hypothesis as follows:

H3: Compared with the purchase of a first house, a higher sentiment will lead to second homeownership in the market.

By exerting effects on homeownership, housing market sentiment further affects housing demand. The positive expectation for future during higher sentiment market not only stimulates individuals' enthusiasm of purchasing houses, which further leads to more investment in housing assets. In addition, higher sentiment with higher investment demand and expected housing wealth effect may alters individual's investment behavior and risk attitude and encourage households to invest more. Our last hypothesis is:

H4: Households tend to invest more on housing (for example, buy more houses and more expensive houses) when housing market sentiment is high.

3 Data

This study employs a comprehensive household-level dataset from the China Household Finance Survey (CHFS) in 2011, 2013, 2015 and 2017 collected by the Survey and Research Center for China Household Finance of Southwestern University of Finance and Economics. CHFS is a survey of Chinese communities, families, and individuals across China, which is conducted every 2 years, aiming to collect micro-level information about household financial and non-financial assets (including housing and other properties), debts and credit constraints, households' demographic characteristics and so on. It has collected data from a sample of 8438 households in 2011, 28,141 in 2013, 37,289 in 2015, and 40,011 in 2017, respectively. The detailed information contained in this dataset enables us to identify households' housing information and control other households' demographic features and family information. Compare with other micro datasets, CHFS contains very detailed and accurate information about housing properties, including the numbers, the area, the value, the location as well as households' house-purchasing plans. This high-quality micro information makes it possible for us to conduct our empirical analysis.

In the following analysis, we select the data of urban households in CHFS since their housing wealth can be estimated relatively accurate. Observations with missing values are deleted from the sample as well.

3.1 Dependent Variable

For our research purposes, we will have the following several dependent variables to estimate how sentiment and households housing-related decision are correlated.

(1) Actual housing-purchase action

CHFS includes variables indicating whether a household owns a housing unit or not and the time of the purchase of each house. In order to test H2 and H3 and identify how housing market sentiment affects housing purchase decisions, we define a dummy variable **Buyhouse,** which equals 1 if the house purchasing time is during the surveyed year (2011, 2013, 2015 and 2017) and equals 0 otherwise. Based on the sequence of the purchasing time, we further identify whether this purchase is the first house (**Buyfirst** = 1) or whether this purchase is the second house (**Buysecond** = 1). (2) House-purchasing intention

We also use a sub-sample in Questionnaire A that contains the information whether a household wants to purchase a house, which is used for test H1. The definition of dummy variable house- purchasing intention (**Intention**) is derived from the following question in the CHFS " Does your family have a plan to buy a new house?" in the questionnaire A, which equals to 1 if a household intends to buy a new house and 0 otherwise.

(3) Housing demand/investment

We use two variables as proxies for the housing demand/investment, which is used for test H3. First, we select the number of houses that purchased during the surveyed year and examine the effect of sentiment on households' investment in housing market (**Housenumber**). Second, CHFS contains information of the money spent on each housing unit owned by a household. We calculate the total cost of the house purchased in the surveyed year (**Housecost**) as another proxy for housing demand.

3.2 Market sentiment

In literature, the measurement of sentiment index can be categorized into two types, survey-based measure and market-based measures. The survey-based measure is the "bottom

1 3

Table 1 Selected Proxies

Categories	Proxies
Buyers' market	The transaction volumes in the housing market
	The transaction amount in the housing market
Sellers' market	The developing housing area of commercial residential building
	The new built housing area of commercial residential building
	The underdeveloped housing area of commercial residential building
	The amount of land area purchased by developers
	The average land cost
Capital market	The fulfilled amount of investment of developers
	The total loans of financial institutions

up" and a relative microeconomic method, which usually is based on survey data and ask respondents about their expectation or opinion about future market. The survey data has its advantages for reflecting a detailed sentiment for each single participant. However, this subjective measure is prone to measurement errors. The market-based approach constructs the sentiment index by an array of proxies, aiming to reflect the aggregated attitude to the whole market from a relative macro-level. This approach is widely used in literature analyzing stock market sentiment due to its potential to capture bubbles and price movement patterns in a simple, direct and comprehensive way (Baker and Wurgler 2007). During the recent years, some scholars also apply this method to housing market (Clayton et al. 2009; Hui et al. 2017; Marcato and Nanda 2016).

Thanks to the popularity of use of computers and online search engines, a hybrid between direct and indirect has emerged. Some literature measures the sentiment from the media or search engine by capturing articles' general tone through the aggregation of sentences and words (Soo 2018; Chauvet et al. 2016; Zheng et al. 2014), which is a forward-looking indicator and expresses the timely public attitudes to the recent information. However, most studies related to this area analyzing sentiment are in English, while reliable references for focusing on the mining of opinions in other language including Chinese are far from less. It is hard to generate a tonal list which includes all relevant positive and negative words and counts the actual numbers of articles or words.

The aim of this paper is to estimate how market sentiment at macro-level affects micro-level participants' decision. Therefore, we follow Baker et al. (2012), Clayton et al. (2009) and Hui et al. (2017) and employ principal component analysis (PCA) to compose the yearly housing market sentiment to reflect an aggregated sentiment. Based on the data from housing market (buyer market), land market(seller market) and capital market during the period of 2003–2017 for each province across China, we select 9 proxies to construct the sentiment index of tree categories (Hui et al. 2018), which is shown in Table 1. The data constructing sentiment index is from the statistical year book of each province. The detailed procedure of composing sentiment can be found in Hui et al. (2017).

The estimated sentiment of each province from 2003 to 2017 is shown in Fig. 1.
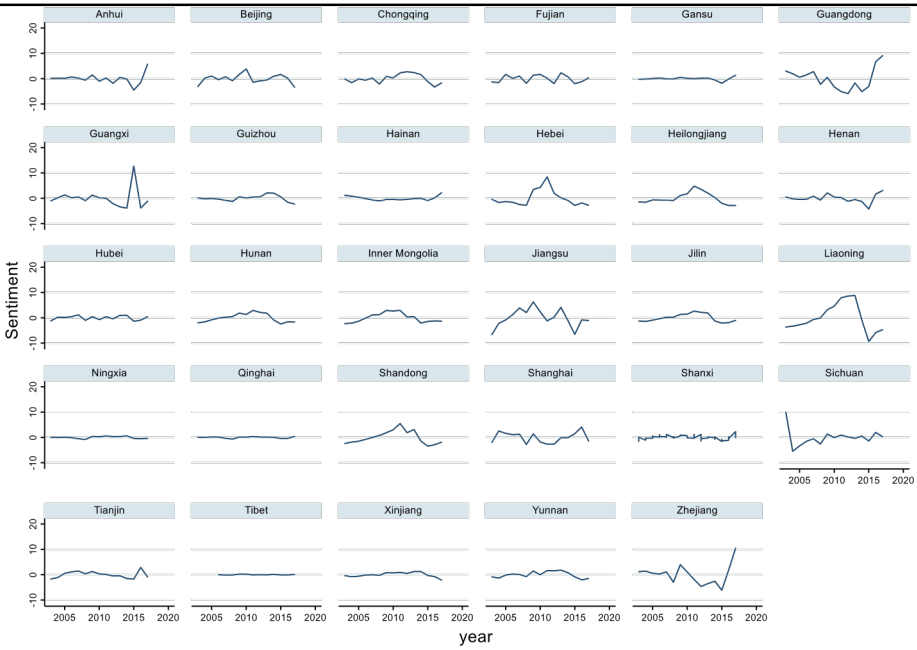
Fig. 1 Sentiment of each province from 2003 to 2017

3.3 Control variables

Housing price is also an important factor that influences tenure choice and housing demand. We measure housing price **(HP)** for each family by using the average housing price in the province where the household lives. By adding the housing price to dependent variables, we can also compare the different effects of housing price and housing market sentiment on housing-related decisions.

Following previous literature (Huang and Clark 2002; Hui et al. 2018), the other control variables include the following demographic information: family size (***Familysize***), family annual income (***Income)***, total asset values (***Asset***), the number of family number who are under 18(***No. Under 18***) and who are over 60 (***No. Over 60***). The characteristics of household head, gender (***Gender***), age (***Age***), the educated level (***Education***), marriage (***Marriage***) and health conditions (***Health***), are added. Since housing-related decision may be driven regional economic situation, we add regional (***GDP***) in each province to capture the influence of business cycle. The definition and descriptive statistics for all variables are shown in Table 2.

4 Empirical analyses

In this section, we start with Probit Regression as a baseline regression to examine how sentiment affects a household's actual tenure choice (entry to the homeownership and the second homeownership) and potential house-purchasing intention. Second, we apply

Table 2 Variable Definition Descriptive Statistics

	Variables		N	Mean	SD
House-related dependent variables	Intention	House-purchasing intention (Only in Questionnaire A)	39,180	0.187	0.390
	Buyhouse	Make a house-purchase during the surveyed year (Make a purchase=1 or 0 otherwise)	77,317	0.019	0.142
	Buyfirst	The house-purchase is the first house (buyfirst=1 or 0 otherwise)	77,317	0.00921	0.096
	Buysecond	The house-purchase is the second house (buysecond=1 or 0 otherwise)	77,317	0.00854	0.092
	Housecost	the total cost of the house purchased in the surveyed year (RMB)	72,700	12,090	179,717
	Housenumber	the number of the house purchased in the surveyed year (RMB)	77,317	0.186	0.142
House-related controls	Housevalue	The total market value of houses owned (RMB)	77,317	749,032	14198948
	Ownership	Homeowner status (ownership=1 if a household is an owner or 0 otherwise)	77,317	0.851	0.356
	Nhouse	The number of houses a household owned	77,222	1.056	5.231
Household-level controls	Asset	Total family assets (RMB)	72,123	1,249,060	2,251,768
	Income	Annual household income (RMB)	72,123	93,349	202,336
	Education	Education level of the household head(illiteracy=1, primary school=2,junior high school=3, senior high school=4, technical secondary school=5, junior college=6, bachelor=7,master=8, doctor=9)	77,177	3.881	1.765
	Health	Health condition of the head of household (excellent=1, good=2, fair=3, bad=4, very bad=5)	70,663	2.703	1.058
	Gender	Gender of the head of household (men=1; women=2)	77,309	1.285	0.452
	Familysize	Family size	77,311	3.180	1.459
	Marriage	Marriage status of the head of household (married==1, single==0)	77,317	0.843	0.364
	Age	Age of the head of household	77,295	52.22	15.08
	No. Over 60	Number of people who is over 60	77,311	0.661	0.851
	No. Under18	Number of people who is under 18	77,311	0.512	0.723
Province-level controls	Sentiment	Province-level sentiment in current year	109	−0.217	3.457
	HP	Province-level housing price (RMB/Square meter)	109	7139.911	4651.848
	GDP	Province-level GDP (10,000,0000 RMB)	109	24,038.49	17,992
	Housing Returns	Province-level housing returns	109	0.076	0.055

13

Multivariate Probit Model which considers the correlation between house-purchase actual decision, house-purchase potential intention and current homeownership. In the third step, we further analyze how sentiment affects households' housing demand, namely, the number of units they purchased, and the money spend on these houses, as a robustness check.

In the following analysis, we take the logarithmic form of the price-related variables (*Housecost, GDP, HP, Income,* and *Asset*). Some key variables such as *Nhouse, Income*, *Asset* and *Housecost* are winsorized at 1% level in each tail to get rid of the potential effect from outliers.

4.1 Baseline regression

We first consider the effect of sentiment on actual housing purchase decision. The results of Probit Model with robust error are shown in Table 3. As shown in Column (1)–Column (3), current housing market sentiment has a significantly positive effect on house-purchase decision and the second-house purchase decision, and this positive effect is stronger on second-house purchase, supporting our H3. However, it does not affect the probability of purchasing the first house. This result makes sense since the transition from renter to owner usually is triggered by living demand. As the second (third or fourth and above) house is more likely to be related to investment demand (Smith 2005) and sentiment leads to speculative investment demand (Baker and Wulrger 2006, 2007) and Baker et al. (2012), second homeownership is hence prone to be driven by housing market sentiment. The lagged sentiment has no significant effects in all models. These results indicate that current sentiment indeed encourages households to make purchase, especially for investment demand. The coefficient of housing price is significantly negative in all models. The magnitude is much larger in Column (2) than that in Column (3), indicating the purchase of second house is more likely to be discouraged by higher housing price compared with buying the first one.

In terms of the heterogeneity in households, wealthier households are more likely to make a purchase. Previous literature tends to suggest that homeownership can be triggered by marriage (Cui et al. 2016). To the contrary, our findings shows the coefficient of marriage is significantly negative in Column (1) and Column (2), indicating that single households are more likely to make a first home purchase. These results are probably because and married households have already owned houses before the surveyed year. In addition, according to Wei and Zhang (2011) suggesting Chinese tend to purchase a house to improve their competitiveness in marriage markets, we suppose this is another reason why single person is more likely to make a first home purchase. Hence, we will observe a negative relationship between the first newly purchase decision and marriage variables. A head's age and education have a "U" shape effect on both models in Column (1) and Column (2). Males are more likely to buy a second house compared with females.

Table 3 Column (4) shows the result based on Probit model. In the baseline Probit Model, a higher sentiment today will stimulate households to make a home purchase plan for tomorrow, supporting our first Hypothesis H1. However, the sentiment in the last year have a negative effect on the purchase intention. This echoes the literature about sentiment, which assets sentiment will drive up price level in the short run but lead to a price reversal in the long run (Da et al. 2011).

Both *Log(Asset)* and *Log(Income)* are significantly positive, indicating wealthier households are more likely to make a new-house purchasing plan. Larger family's

purchasing intention is stronger as well. Single person is more likely to plan to buy a house. Healthier households have a stronger intention to purchase houses. Males' intention is

Table 3 The effect of sentiment on house-purchasing action and intention

	(1)	(2)	(3)	(4)
Model	Probit	Probit	Probit	Probit
DV	Buyhouse	Buyfirst	Buysecond	Intention
Sentiment	0.012***	−0.001	0.023***	0.011***
	(0.004)	(0.005)	(0.005)	(0.003)
L.Sentiment	0.005	0.007	0.002	−0.020***
	(0.006)	(0.007)	(0.008)	(0.005)
Housing returns	1.386***	0.792**	1.904***	−0.571***
	(0.248)	(0.310)	(0.339)	(0.177)
L.Log (HP)	−0.341***	−0.245***	−0.444***	−0.051**
	(0.032)	(0.039)	(0.045)	(0.024)
L.Log (GDP)	−0.020	−0.007	−0.045*	−0.008
	(0.017)	(0.021)	(0.024)	(0.013)
Log (Income)	0.037***	0.019**	0.062***	0.061***
	(0.009)	(0.009)	(0.015)	(0.008)
Family size	0.006	−0.007	0.019	0.106***
	(0.012)	(0.016)	(0.016)	(0.010)
Marriage	−0.082**	−0.083*	−0.005	−0.080**
	(0.041)	(0.049)	(0.064)	(0.032)
Health	0.015	0.045***	−0.024	−0.033***
	(0.013)	(0.016)	(0.018)	(0.011)
Gender	−0.036	−0.013	−0.068*	−0.060***
	(0.028)	(0.034)	(0.040)	(0.023)
Education	−0.151***	−0.164***	−0.075	−0.043
	(0.037)	(0.045)	(0.051)	(0.029)
Education^2	0.013***	0.014***	0.006	0.006**
	(0.004)	(0.005)	(0.005)	(0.003)
No. Under 18	−0.016	−0.041	0.017	−0.038**
	(0.023)	(0.028)	(0.030)	(0.018)
No. Over 60	−0.042**	−0.045*	−0.028	−0.129***
	(0.020)	(0.026)	(0.027)	(0.015)
Age	−0.026***	−0.041***	0.004	−0.022***
	(0.006)	(0.006)	(0.009)	(0.005)
Age^2	0.000**	0.000***	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Log (Asset)	0.257***	0.144***	0.385***	0.222***
	(0.012)	(0.012)	(0.019)	(0.017)
Log (Housevalue)				−0.198***
				(0.015)
Ownership				2.096***
				(0.187)
Nhouse				0.001
				(0.001)
Constant	−1.469***	−0.520	−3.763***	−2.448***
	(0.305)	(0.372)	(0.434)	(0.329)
Observations	69,944	69,944	69,944	27,730
Pseudo R_Squared	0.093	0.059	0.149	0.093

Notes: ***, **, and * denote statistical significance at the 1%, 5% and 10% level respectively; parentheses show robust stand errors

stronger than females'. More family member under 18 and over 60 will weaken such an intention. The intention is weaker with an increase in ages. Owning a house has a positive effect. More expensive houses owned in hand discourages the purchasing intention as well.

4.2 Multivariate probit model

Since whether a household wants to purchase a new house or not in the future is associated with their current homeownership status and recent decision of house-purchasing, whether a household want to buy a house is therefore subject to selection bias. Thus, we employ Multivariate Probit Model for the joint probability of the multiple binary outcomes. Table 4 reports the results of Multivariate Probit Model. In model 1, ρ_{12} and ρ_{23} is significantly, suggesting house-purchasing intention is correlated with recent house-purchasing actions and current homeownership. Therefore, using Multivariate Probit model is necessary in this regard. Similarly, the significant ρ_{12} and ρ_{23} in Model 2, and significant ρ_{23} in Model 3 suggest Multivariate Probit model is a more appropriate choice.

Column (1) shows the determinants of the probability of actual housing−purchase. The current housing market sentiment is still positive but loses its significance, while the past sentiment has no significant effect. The coefficient of housing price is still significantly negative. Column (2) shows current higher sentiment strengthens households' purchase intention. However, the sentiment in the last year has a negative effect on the purchase intention. Higher housing price discourages households' intentions to purchase a new house due to the increasing cost. Column (4) and Column (7) show the determinants of the probability of actual purchase of the first house and the second house respectively. Consisting with the result in Table 3, we can see that higher housing market sentiment stimulates households to buy a second house, while does not affect the first-house purchase significantly. The result shown in Column (5)–(6) and Column (8)–(9) is consistent with the previous part.

Overall, after considering interaction of homeownership and house-purchasing intention, our results remain stable and support the hypotheses H1 to H3.

4.3 Robustness check: the effect of sentiment on housing demand

This stage estimates the effect of sentiment on housing demand. We use two variables, the number of the houses purchased in the surveyed year and the money spend on the newly bought houses, as proxies for the housing demand.

Considering the large number of zero value of number of houses purchased existing in our data, the traditional Optimal Least Square (OLS) might cause biased estimation. Therefore, we use OLS as the baseline regression (Column (1) in Table 5) and negative binomial model (NB) to reproduce the result (Column (2) in Table 5).

As shown in Table 5 Column (1) and Column (2), both models show that the coefficient of current year sentiment is significantly positive and the coefficient is larger in negative binomial model. This result confirms that people indeed purchase more houses when sentiment is higher. In Column (3), the coefficient of current year sentiment is significantly positive, which suggests households would like to spend more money on houses during the booming market. However, the past sentiment has no significant effect on the investment in

housing market. The results further confirm that higher sentiment will stimulate households to invest in housing market, providing evidence that supports H4.

Table 4 Multivariate Probit Model: The effect of sentiment on house-purchasing action and intention

	(1) Model 1	(2)	(3)	(4) Model 2	(5)	(6)	(7) Model 3	(8)	(9)
DV	Buyhouse	Intention	Ownership	Buyfirst	Intention	Ownership	BuySeocond	Intention	Ownership
Sentiment	0.005 (0.006)	0.011*** (0.003)		−0.011 (0.008)	0.011*** (0.003)		0.014* (0.007)	0.011*** (0.003)	
L.Sentiment	0.007 (0.010)	−0.020*** (0.005)		0.019 (0.012)	−0.020*** (0.005)		−0.006 (0.012)	−0.020*** (0.005)	
L.Housing return	1.442*** (0.364)	−0.571*** (0.177)		0.935** (0.460)	−0.572*** (0.177)		1.834*** (0.466)	−0.571*** (0.177)	
L.Log (HP)	−0.392*** (0.051)	−0.056** (0.024)		−0.229*** (0.063)	−0.056** (0.024)		−0.542*** (0.067)	−0.056** (0.024)	
L.Log (GDP)	0.013 (0.028)	−0.009 (0.013)	−0.147*** (0.032)	0.055 (0.035)	−0.010 (0.013)	−0.147*** (0.032)	−0.059 (0.036)	−0.010 (0.013)	−0.147*** (0.032)
Log (Income)	0.077*** (0.018)	0.060*** (0.007)	−0.038*** (0.014)	0.035* (0.018)	0.060*** (0.007)	−0.038*** (0.014)	0.123*** (0.029)	0.060*** (0.007)	−0.038*** (0.014)
Family size	−0.016 (0.021)	0.105*** (0.010)	−0.073*** (0.022)	−0.058** (0.027)	0.105*** (0.010)	−0.073*** (0.022)	0.022 (0.027)	0.105*** (0.010)	−0.073*** (0.022)
Marriage	−0.138** (0.062)	−0.079** (0.032)	−0.001 (0.072)	−0.113 (0.071)	−0.079** (0.032)	−0.001 (0.072)	−0.009 (0.092)	−0.079** (0.032)	−0.001 (0.072)
Health	−0.006 (0.022)	−0.032*** (0.011)	0.130*** (0.025)	0.046* (0.027)	−0.032*** (0.011)	0.130*** (0.025)	−0.060** (0.029)	−0.032*** (0.011)	0.130*** (0.025)
Gender	−0.011 (0.044)	−0.061*** (0.022)	−0.132** (0.055)	0.019 (0.054)	−0.061*** (0.022)	−0.132** (0.055)	−0.036 (0.058)	−0.061*** (0.022)	−0.132** (0.055)
Education	−0.119** (0.058)	−0.043 (0.029)	−0.025 (0.065)	−0.172** (0.069)	−0.043 (0.029)	−0.026 (0.065)	0.034 (0.080)	−0.043 (0.029)	−0.025 (0.065)
Education^2	0.009 (0.006)	0.006** (0.003)	−0.011 (0.007)	0.015** (0.007)	0.006** (0.003)	−0.011 (0.007)	−0.007 (0.008)	0.006** (0.003)	−0.011 (0.007)
No. Under 18	0.006 (0.037)	−0.038** (0.018)	−0.005 (0.043)	−0.035 (0.048)	−0.038** (0.018)	−0.005 (0.043)	0.050 (0.046)	−0.038** (0.018)	−0.005 (0.043)

Table4 continued

DV	(1) Model1 Buyhouse	(2) Intention	(3) Ownership	(4) Model2 Buyfirst	(5) Intention	(6) Ownership	(7) Model3 BuySeocond	(8) Intention	(9) Ownership
No.Over60	-0.072** (0.033)	-0.129*** (0.015)	0.009 (0.035)	-0.027 (0.042)	-0.129*** (0.015)	0.009 (0.035)	-0.092** (0.041)	-0.129*** (0.015)	0.009 (0.035)
Age	-0.023** (0.009)	-0.022*** (0.005)	0.007 (0.011)	-0.043*** (0.010)	-0.022*** (0.005)	0.007 (0.011)	0.007 (0.013)	-0.022*** (0.005)	0.007 (0.011)
Age^2	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Log(Asset)	0.066 (0.048)	0.232*** (0.016)	0.598*** (0.019)	0.060 (0.037)	0.232*** (0.016)	0.598*** (0.019)	-0.095 (0.075)	0.232*** (0.016)	0.598*** (0.019)
Log(Housevalue)	0.213*** (0.046)	-0.200*** (0.013)		0.025 (0.025)	-0.201*** (0.013)		0.535*** (0.074)	-0.201*** (0.013)	
Ownership		1.868*** (0.193)			1.866*** (0.193)			1.864*** (0.193)	
Nhouse		0.001 (0.001)			0.001 (0.001)			0.001 (0.001)	
Constant	-2.014*** (0.507)	-2.253*** (0.317)	-3.321*** (0.492)	-0.371 (0.628)	-2.256*** (0.317)	-3.320*** (0.492)	-4.260*** (0.671)	-2.255*** (0.317)	-3.321*** (0.492)
	$\lambda 2$ -0.046*** (0.017)	$\lambda 3$ 0.015 (0.051)	$\lambda 3$ 0.116** (0.057)	$\lambda 2$ 0.030 (0.051)	$\lambda 3$ -0.030* (0.018)	$\lambda 3$ 0.119** (0.057)	$\lambda 2$ -0.022 (0.018)	$\lambda 3$ 0.021 (0.051)	$\lambda 3$ 0.119** (0.057)
Observations	27,730	27,730	27,730	27,730	27,730	27,730	27,730	27,730	27,730

Notes:***,**,and*denotestatisticalsignificanceatthe1%,5%and10%levelrespectively;Parenthesesshowrobuststandarderrors

13

Table 5 The effect of sentiment on housing demand

	(1)	(2)	(3)
Moldel	OLS	NB	OLS
DV	Nhouse	Nhouse	Housecost
Sentiment	0.001***	0.030***	0.008***
	(0.000)	(0.009)	(0.002)
L.Sentiment	0.000	0.011	0.002
	(0.000)	(0.013)	(0.003)
L.Housing return	0.061***	3.590***	0.543***
	(0.011)	(0.598)	(0.114)
L.Log (HP)	−0.010***	−0.794***	−0.119***
	(0.001)	(0.076)	(0.013)
L.Log (GDP)	−0.000	−0.043	0.004
	(0.001)	(0.041)	(0.009)
Log (Income)	0.001***	0.090***	0.019***
	(0.000)	(0.023)	(0.002)
Family size	0.000	0.015	−0.001
	(0.001)	(0.030)	(0.006)
Marriage	−0.003*	−0.151	−0.039**
	(0.002)	(0.100)	(0.020)
Health	0.000	0.025	0.003
	(0.001)	(0.031)	(0.006)
Gender	−0.002	−0.088	−0.017
	(0.001)	(0.067)	(0.014)
Education	−0.008***	(0.085)	−0.100***
	(0.002)	−0.346***	(0.018)
Education^2	0.001***	0.029***	0.011***
	(0.000)	(0.009)	(0.002)
No. Under18	−0.001	−0.056	−0.012
	(0.001)	(0.052)	(0.012)
No. Over60	−0.001*	−0.101**	−0.015*
	(0.001)	(0.049)	(0.008)
Age	−0.002***	−0.051***	−0.021***
	(0.000)	(0.013)	(0.003)
Age^2	0.000***	0.000	0.000***
	(0.000)	(0.000)	(0.000)
Log (Asset)	0.007***	0.621***	0.079***
	(0.000)	(0.027)	(0.004)
Constant	0.074***	−3.155***	0.888***
	(0.014)	(0.734)	(0.157)
α		0.498**	
		(0.234)	
Observations	69,944	69,944	65,413
Adjusted R_Squared	0.013		0.015

Notes: ***, **, and * denote statistical significance at the 1%, 5% and 10% level respectively; Parentheses show robust stand errors

5 Conclusion

Since the housing market reform in 1998, the Chinese urban housing market has witnessed a rapid growth. The rocketing housing price has brought challenges to housing affordability.

Ever since, homeownership rates did not decrease as expected, but indeed increased sharply. This study provides a novel explanation for this phenomenon. Based on the China Households Finance Surveys (CHFS) 2011, 2013, 2015 and 2017, we have established a new framework within which uses various models to investigate the impact of housing market sentiment on the households' housepurchasing actual action, house-purchasing potential intention and housing demand.

The main results show higher housing price lowers the probability of making a purchase and home-purchase intention. Higher sentiment encourages households to make a purchase. Households' house-purchasing intention can be strengthened by higher sentiment in current year. When housing market sentiment increases, households will invest more in housing market, such as buying more houses and more expensive houses.

From an academic perspective, this study contributes to the existing literature by considering market sentiment. The study has provided evidence how the households' tenure choice and their housing demand are affected by the collective expectation and attitude toward the whole market. The important role of sentiment in the households' home ownership indicates that the ignorance of sentiment in previous literature is not appropriate (or at least the picture is incomplete). In this way, we have also provided a new explanation for the driving forces of the increasing homeownership, especially of the second homeownership in China, which is ignored by previous studies.

Our findings provide important insights for policy makers, property developers and households. Higher housing price lowers the probability of owning multiple houses and suppresses home buying intention. By contrast, higher housing market sentiment stimulates the households to invest more in housing market. Thus, for policy-makers, understanding the impact of sentiment is much more important than just controlling the housing price level when it comes to improving the housing affordability, particularly for living demand and curbing the investing or speculative demand. On the other hand, for property developers, this study helps predicting future housing demand, facilitating a better-informed decision-making process in land purchases and property development. For households, being aware of the role of sentiment is beneficial in their making decisions and optimizes their wealth allocation.

Appendix

See Table 6.

Table 6 Correlation table of sentiment, housing return and housing price

	Sentiment	L. Sentiment	L.Housing Return	L.HP	L.HP
Sentiment	1.0000				
L. Sentiment	0.4392	1.0000			
L.Housing Return	0.0840	0.0321	1.0000		
L.HP	−0.0896	−0.0739	−0.0410	1.0000	

| HP | −0.0640 | −0.0708 | 0.0835 | 0.9871 | 1.0000 |

References

Baker, M., & Wurgler, J. (2006). Investor sentiment and the cross-section of stock returns. *The Journal of Finance, 61*(4), 1645–1680.

Baker, M., & Wurgler, J. (2007). Investor sentiment in the stock market. *The Journal of Economic Perspectives, 21*(2), 129–151.

Baker, M., Wurgler, J., & Yuan, Y. (2012). Global, local, and contagious investor sentiment. *Journal of Financial Economics, 104*(2), 272–287.

Blasco, N., Corredor, P., & Ferreruela, S. (2012). Market sentiment: a key factor of investors' imitative behavior. *Accounting and Finance, 52*(3), 663–689.

Campbell, J. Y., & Cocco, J. F. (2007). How do house prices affect consumption? evidence from micro data. *Journal of Monetary Economics, 54*(3), 591–621.

Chau, F., Deesomsak, R., & Lau, M. C. (2011). Investor sentiment and feedback trading: evidence from the exchange-traded fund markets.*International Review of Financial Analysis*, 20(5), 292–305.

Chauvet, M., Gabriel, S. A., & Lutz, C. (2016). Mortgage default risk: New evidence from internet search queries. *Journal of Urban Economics*, 96, 91–111.

Clayton, J., Ling, D. C., & Naranjo, A. (2009). Commercial real estate valuation: fundamentals versus investor sentiment. *Journal of Real Estate Finance and Economics, 38*(1), 5–37.

Corradin, S., Fillat, J. L., & Vergara-Alert, C. (2013). Optimal portfolio choice with predictability in house prices and transaction costs. *The Review of Financial Studies, 27*(3), 823–880.

Cui, C., Geertman, S., & Hooimeijer, P. (2016). Access to homeownership in urban China: a comparison between skilled migrants and skilled locals in Nanjing. *Cities, 50*, 188–196.

Da, Z., Engelberg, J. O. S. E. P. H., & Gao, P. (2011). In search of attention. *The Journal of Finance, 66*(5), 1461–1499.

Fischer, M., & Stamos, M. Z. (2013). Optimal life cycle portfolio choice with housing market cycles. *The Review of Financial Studies, 26*(9), 2311–2352.

Huang, Y., & Clark, W. A. (2002). Housing tenure choice in transitional urban China: a multilevel analysis. *Urban Studies,39*(1), 7–32.

Huang, Y., & Yi, C. (2011). Second home ownership in transitional urban China. *Housing Studies, 26*(03), 423–447.

Hui, E. C. M., & Wang, Z. (2014). Market sentiment in private housing market. *Habitat International, 44*, 375–385.

Hui, E. C. M., & Yu, K. H. (2009). Second homes in the Chinese Mainland under "one country, two systems": a cross-border perspective. *Habitat International, 33*(1), 106–113.

Hui, E. C. M., Dong, Z., Jia, S. H., & Lam, C. H. L. (2017). How does sentiment affect returns of urban housing? *Habitat International, 64*, 71–84.

Hui, E. C. M. , Dong, Z. , & Jia, S. H. . (2018). How do housing price and sentiment affect consumption distribution in china?. *Habitat International*, S0197397517307269.

Jian, Z., & Anderson, R. I. (2012). Extreme risk measures for international reit markets. *Journal of Real Estate Finance & Economics, 45*(1), 152–170.

Kim, J. S., Ryu, D., & Seo, S. W. (2014). Investor sentiment and return predictability of disagreement. *Journal of Banking and Finance, 42*, 166–178.

Kurov, A. (2008). Investor sentiment, trading behavior and informational efficiency in index futures markets. *Financial Review, 43*(1), 107–127.

Lemmon, M., & Portniaguina, E. (2006). Consumer confidence and asset prices: Some empirical evidence. *Review of Financial Studies, 19*(4), 1499–1529.

Lin, C. Y., Rahman, H., & Yung, K. (2009). Investor sentiment and REIT returns. *The Journal of Real Estate Finance and Economics, 39*(4), 450–471.

Ling, D. C., Naranjo, A., & Scheick, B. (2014). Investor sentiment, limits to arbitrage and private market returns. *Real Estate Economics, 42*(3), 531–577.

Marcato, G., & Nanda, A. (2016). Information content and forecasting ability of sentiment indicators: case of real estate market. *Journal of Real Estate Research, 38*(1), 115–129.

Smith, S. J. (2005). Banking on housing? speculating on the role and relevance of housing wealth in Britain.

Soo, C. K. (2018). Quantifying sentiment with news media across local housing markets. *The Review of Financial Studies, 31*(10), 3689–3719.

1 3

Stambaugh, R. F., Yu, J., & Yuan, Y. (2012). The short of it: investor sentiment and anomalies. *Journal of Financial Economics, 104*(2), 288–302.

Tress, G. (2002). Development of second-home tourism in Denmark. *Scandinavian Journal of Hospitality and tourism, 2*(2), 109–122.

Wu, L., & Brynjolfsson, E.(2015). The future of prediction: how google searches foreshadow housing prices and sales. *NBER Chapters,* 147.

Xu, Y. (2017). Mandatory savings, credit access and home ownership: the case of the housing provident fund. *Urban Studies, 54*(15), 3446–3463.

Yu, J., & Yuan, Y. (2011). Investor sentiment and the mean–variance relation. *Social Science Electronic Publishing, 100*(2), 367–381.

Zheng, S., Cao, J., Kahn, M. E., & Sun, C. (2014). Real estate valuation and cross-boundary air pollution externalities: evidence from Chinese cities. *The Journal of Real Estate Finance and Economics, 48*(3), 398–414.

Wei, S. J., & Zhang, X. (2011). The competitive saving motive: Evidence from rising sex ratios and savings rates in China. *Journal of political Economy, 119*(3), 511–564.