



# Effects of housing wealth on subjective well-being in urban China

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## Abstract

Homeownership means not only having a permanent residence but also generating a considerable financial gain from house value appreciation. This study investigates how housing characteristics affect individuals' subjective well-being (SWB) in China by using 2011 China Household Finance Survey data. The findings suggest that the channel through which housing characteristics significantly affect SWB mainly depends on housing assets. House value appreciation significantly improves SWB; however, housing debt does not affect the role of house value in SWB. Furthermore, housing wealth has a more significant impact on SWB for low-income homeowners and those living in the eastern region of China. Our findings shed light on potential solutions to enhance the SWB of urban residents. In particular, the government should pay more attention to raising their life satisfaction under the background of high house prices.

**Keywords** Housing wealth · House value appreciation · Housing debt · Subjective well-being · Urban China

## 1 Introduction

For most households, housing is viewed as both a consumption good and an asset. Households tend to be happier if housing is more available and more affordable (Florida et al. 2013). Indeed, a link has been found between mental well-being and housing tenure: renters tend to have lower welfare than owners, all things being equal, which is partly attributed to the lower social status of renting (Graham et al. 2009). On the contrary, homeownership means not only having a permanent residence, but also generating a considerable financial gain from house price appreciation, with evidence suggesting a strong association

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between consumption utility and experienced well-being (Dolan et al. 2008). However, little is known about the extent to which housing as an asset affects people's subjective well-being (SWB).

China has experienced rapid and sustained economic growth for four decades, including in the housing market. Since China's urban housing reform started in the early 1990s, House value appreciation has accelerated rapidly, doubling between 2007 and 2014 (Chivakul et al. 2015). Fang et al. (2015) report a real annual house price growth of 13.1% in the largest Chinese cities between 2003 and 2013.

Despite soaring house prices, Chinese households favor homeownership, partly due to the tradition of living and working in peace and contentment (*An Ju Le Ye* in Chinese), and are prepared to spend their life savings to purchase their own properties. According to the 2011 Chinese Household Finance Survey (CHFS), the rate of homeownership is about 90% in urban China and housing assets as a proportion of households' total assets are around 66%. Hence, rapid house value appreciation may affect Chinese residents' SWB.<sup>1</sup>

The literature on the relationship between homeownership and SWB focuses on the effects of specific housing conditions (e.g. living standards, number of rooms) (Knight et al. 2009; Knight and Gunatilaka 2010, 2011; Chyi and Mao 2012; Hu 2013; Cheng et al. 2016). However, these studies fail to explore the impact of housing characteristics on an individual's SWB, especially during house value appreciations rising rapidly. To bridge this knowledge gap, the present study uses 2011 CHFS data to investigate how housing characteristics influence people's SWB in urban China from the aspect of housing as an asset.<sup>2</sup> Our study differs from the previous literature such as Hu (2013) and Cheng et al. (2016) in two ways. First, the previous studies have simply considered the homeownership, however we aim to explore more various influence of different types of housing characteristics, especially housing as an asset, on SWB. Second, we examine the differences among income groups and regions in China.

The main findings of this study show that homeownership significantly improves SWB through the accumulation of housing wealth, but having housing debt and having one or more properties do not significantly impact on SWB. However, although housing wealth generally has a positive effect on SWB, this effect is only significant for low-income homeowners and just for the residents of the eastern region.

There are five sections in this paper. In Sect. 2, we review the literature and provide the conceptual framework of this study. Section 3 describes the questionnaire survey and primary statistics of the dataset and explains the various estimations and tests. Section 4 elaborates on the findings of this study and Sect. 5 concludes.

## 2 Literature review and conceptual framework

Homeownership reflects the long tradition of preferring to live and work in peace and contentment in China; as such, owning one's home costs a great deal of thought, effort, and financial resources for Chinese people (Zhang et al. 2018). Headey and Wooden (2004) and Clark et al. (2008) reveal the close relationship between household wealth and SWB/

<sup>1</sup> Indeed, rapid price appreciation will accumulate household wealth and optimize the portfolio allocation, thereby serving as collateral for households who live in their own homes (Flavin and Yamashita 2011).

<sup>2</sup> The CHFS has conducted several follow-up surveys since 2011; however, only the 2011 wave is publicly available.

life satisfaction. As housing is the most significant component of household wealth, this so-called “wealth effect” of homeownership has attracted the attention of many scholars (Stutzer and Frey 2002; Campbell and Cocco 2007; Gan 2010; Davies et al. 2011; Senik 2014). In this section, we investigate the wealth effect of housing on SWB by focusing on three perspectives: homeownership, house price appreciation, and housing debt. We also propose three hypotheses as the basis for our conceptual framework.

## 2.1 Homeownership and SWB

At the earlier stage, Galster (1987) has explored the correlates of dwelling satisfaction by using a 1980 sample of Minneapolis homeowners and found nonlinear relationships between residential context and their associated levels of satisfaction. The empirical studies of relationships between homeownership and life satisfaction have started from 1990s. Rossi and Weber (1996) investigate homeownership and social interaction in USA, and find that owners tended to be higher in life satisfaction and self-esteem and more likely to be members of community improvement groups. Then, Rohe and Basolo (1997) also suggest homeownership has strong long-term effects of the self-perceptions and social interaction of low-income persons in USA. More recently, Clapham et al. (2018) explain the concept of “housing tenure” as the rights and responsibilities that an individual has over his or her living environment, beyond the physical characteristics of housing. Herbers and Mulder (2017) examine the association between housing tenure and SWB of older adults in Europe, finding that owning (renting) a house has a positive (negative) effect on SWB. Homeownership affects SWB through two dimensions: as a social norm and as a positional good (Foye et al. 2018). In Germany, Oswald et al. (2003), Nakazato et al. (2011) and Zumbro (2014) generally demonstrate that homeownership has a greater marginal effect on life satisfaction, especially for homeowners. Furthermore, Elsinga and Hoekstra (2005), Diaz-Serrano (2009) and Diaz-Serrano and Stoyanova (2009) claim a significant effect of homeownership on housing satisfaction through EU countries’ samples. Specifically, some studies examine the association between homeownership and SWB from the perspectives of community activities (Kingston and Fries 1994 for US; Rohe and Stegman 1994 for Baltimore in US; Green 2001 for US), children’s education (Green and White 1997 for US; Haurin et al. 2002 for US), physical health (Nettleton and Burrows 1998 for UK; Dunn 2000 for review and prospects of housing and inequalities research), psychological feelings (Balfour and Smith 1996 for Cleveland in US; Clapham 2010 for general discussion) and lifestyle (Bucchianeri 2009 for US). Dietz and Haurin (2003) comprehensively summarize the effects of homeownership on several individuals and social variables taken from economics, sociology, geography, political science, psychology, and other disciplines.

In urban China, Hu (2013), Zhou et al. (2017) and Zhang et al. (2017) explore the effect of homeownership status on individual SWB. Li et al. (2011), Sun and Zheng (2013) and Cheng et al. (2016) find that not only homeownership but also the types of property rights one acquires, a matter for happiness. To sum up, the first hypothesis is proposed as follows:

**H<sub>1</sub>** Homeownership has a positive effect on SWB.

## 2.2 House prices and SWB

According to Searle et al. (2009), the link between housing wealth and wellbeing may, in part, be accounted for by the way in which housing assets are valued in the UK. Since

housing is the single largest cost factor for most individuals and households, it might be expected that happiness is higher in places where housing is more available and more affordable in US (Florida et al. 2013). However, Rentfrow et al. (2009) find happiness to be associated with higher median house value at the state level in the United States. A positive correlation between house prices and SWB is thus likely to exist among homeowners. On the contrary, for non-homeowners, this correlation reflects a (causal) wealth effect and other factors drive both house prices and SWB (Ratcliffe 2010). Hamoudi and Dowd (2014) draw a similar conclusion for older Americans, finding that the effects of house value appreciation are concentrated on homeowners, as opposed to renters, because of the existence of wealth-driven effects. However, Ratcliffe (2015) finds a positive correlation between house prices and mental wellbeing for both homeowners and non-homeowners in the United Kingdom, which is inconsistent with a pure wealth effect. His finding shows that local house prices reflect the available amenities and economic opportunities in the area. Likewise, Foye (2017) suggests that house value significantly affects British life satisfaction through the size of the living space, which signals wealth.

Compared with studies of the house prices–SWB relationship in developed countries, the literature on Chinese households is rather thin. On the one hand, Sun and Zheng (2013) illustrate that both house prices and house value appreciation have positive effects on the happiness of urban Chinese. On the other hand, the findings of Lin et al. (2012), Zhang et al. (2015) and Tong and Xia (2018) prove that both house prices and the expectation of house price fluctuations have a significant correlation with a household's life satisfaction. To sum up, the second hypothesis is proposed as follows:

**H<sub>2</sub>** House value and house value appreciation have a positive effect on SWB.

### 2.3 Housing debt and SWB

Housing, as an important type of household asset, also affects a household's SWB through the wealth effect of its consumption behaviours (Muellbauer and Murphy 2008 for UK; Case and Quigley 2008 for US). Theoretically, when a mortgage becomes the major debt of a household, homeownership—as a considerable financial burden—should reduce people's SWB by restraining consumption. A number of scholars apply empirical works to verify this hypothesis. For example, Nettleton and Burrows (1998, 2000) explore the consequences of whether mortgage indebtedness has an independent negative effect on homeowners' psychosocial well-being in UK. Taylor et al. (2007) also compare the impact of different types of debts on British psychological wellbeing and conclude that longer-term housing payment problems and arrears have significant detrimental effects. Becchetti and Pisani (2012) observe the negative impact of household debt on the life satisfaction of Italian secondary school students who are similar in terms of education and background. Andre et al. (2017) suggest that a house may not always act as a nest egg and can become a burden affecting homeowners' life satisfaction because of high monthly mortgage repayments, for example in the event of divorce.

However, the findings on the relationship between housing debt and SWB are mixed. For instance, Brown et al. (2005) find that unsecured (non-mortgage) debt has a greater negative influence on psychological well-being than secured (mortgage) debt in the UK. As for the role of housing wealth in consumption, the findings of Searle et al. (2009) indicate no straightforward link between debt and depression or between spending and satisfaction in UK.

Research on housing debt affecting SWB in China is extremely limited and undeveloped. In Chinese literature, Li et al. (2011) indicate that housing debt significantly affects Chinese happiness in a negative direction. Later, Cheng et al. (2016) explore how different types of home loans affect SWB, finding that having an informal home loan from friends and relatives is negatively related to life satisfaction relative to those who own home without such a loan. To sum up, the third hypothesis is proposed as follows:

**H<sub>3</sub>** Housing debt has a negative effect on SWB.

## 3 Data and methodology

### 3.1 Data description

This study employs data from the 2011 CHFS,<sup>3</sup> a comprehensive nationwide survey in China that provides detailed information about household finance and assets, including housing and other household assets. In recent years, the CHFS database has become popular for studying the behavior and financial decision making of Chinese households (Gan et al. 2013; Liang and Guo 2015; Cheng et al. 2016). The 2011 CHFS survey applies a three-phase stratified sampling approach to identify the sampled households: counties or districts, villages or residential committees, and households. It contains a sample size of 8438 households and 29,463 individuals from 28 provinces, municipalities, and autonomous regions in Mainland China.<sup>4</sup> Since our research focuses on urban China, we use the samples of 5194 urban households and 9414 individuals (i.e. respondents and their spouses). “Appendix” detailedly demonstrates the original questionnaire of 2011 CHFS we used.

In the self-evaluation section, the individual SWB assessment is based on a five-point Likert-type scale (1 = very unhappy, 2 = unhappy, 3 = neutral, 4 = happy, 5 = very happy). The CHFS database collects many variables for housing characteristics including home-ownership, the number of properties, time of owning this house, current housing price, house area, house value at the time of purchase, current house value, house value appreciation, housing debt, whether owning a local house or not, and travel time to the city or town centre.

In addition, the 2011 CHFS includes information on household features and individual characteristics such as household income, household financial wealth, family size (number of members), gender, age, education, religion, employment (with “unemployed” as the default group), marital status (“single”, “separated”, “divorced”, and “widowed” with “unmarried” as the default group), and health status. Table 1 summarizes the descriptive statistics of the explained variable and explanatory variables.

<sup>3</sup> The CHFS 2011 was conducted by the Survey and Research Center for China Household Finance, a non-profit institute for academic inquiry based at Southwestern University of Finance and Economics, in summer 2011.

<sup>4</sup> There are 31 provinces in Mainland China. The three missing provinces in the survey are Xinjiang, Tibet, and Inner Mongolia. The omission of these three provinces does not affect the national representativeness of the survey, as the population in these regions only accounts for a very small proportion of the whole nation.

**Table 1** Descriptive Statistics

Variable	Description	Obs.	Mean	SD	Min	Max
<b>Subjective wellbeing</b>						
SWB	1 = very unhappy, 2 = unhappy, 3 = neutral, 4 = happy, 5 = very happy	9397	3.738	0.801	1	5
<b>Housing characteristics</b>						
Homeownership	1 = have homeownership, 0 = others	9414	0.886	0.318	0	1
Mp	Whether the household has multiple properties: 0 = no, 1 = yes	8332	0.184	0.388	0	1
Old house value	House value at the time of purchase (US dollar)	9414	18,439,387	36,569,128	0	588,326,366
House area	House area (m <sup>2</sup> )	8275	120.1	98.27	6.650	2270
House value	Current house value (US dollar)	7675	86,406,564	118,609,692	15,482	774,113.64
Housing price	Current housing price (US dollar/m <sup>2</sup> )	7637	895.495	1182.226	0.074	9289.364
Distance	Travel time to the city or town centre (min)	8305	27.36	31.59	0	720
Appreciation	House value appreciation = the current house value (House value)—the purchase house value (Old house value) (US dollar)	7675	65,071,993	99,520,05	-131,367,085	774,113.64
Debt	1 = have debt, 0 = no debt	8336	0.116	0.32	0	1
Time of buying this house	Time of buying this house	8210	12.47946	9.15889	0	92
Local house	Whether owning a local house or not	8336	0.943	0.231	0	1
<b>Household characteristics</b>						
Income	Household income (US dollar)	9414	10,317,232	25,283,635	0	464,468,184
Financial wealth	Household financial wealth (US dollar)	9414	8998,297	32,661,867	0	1,119,368,323
Family size	Family size (number of family members)	9414	3.325	1.336	1	13
<b>Individual characteristics</b>						
Gender	1 = male, 0 = female	9414	0.493	0.5	0	1
Age	The regressions include another variable: Age <sup>2</sup> (age*age)	9414	47.24	14.2	2	99
Education	1 = no education, 2 = primary school, 3 = junior high school, 4 = senior high school, 5 = technical school, 6 = college, 7 = undergraduate (Bachelor degree), 8 = postgraduate (Master degree), 9 = postgraduate (Doctor degree)	9327	3.891	1.738	1	9
Migration	1 = yes, 0 = no	9313	0.897	0.304	0	1

**Table 1** (continued)

Variable	Description	Obs.	Mean	SD	Min	Max
Married	1 = married (married or cohabiting), 0 = unmarried (single, separated, divorced, or widowed)	9321	0.913	0.281	0	1
Currently working	Currently working status: 1 = employed, 0 = others	9406	0.582	0.493	0	1
Health	1 = worse health, 2 = poor health, 3 = neutral, 4 = good health, 5 = better health	7388	3.472	0.89	1	5

According to the announcement of the People's Bank of China, the exchange rate of the US dollar to the RMB in 2011 was 6.459:1

**Table 2** *T* test results for SWB among households

SWB of owner-occupied households	3.518 (0.894)
Mean SWB of non-owner-occupied households	3.767 (0.784)
SWB of all households	3.738 (0.801)
SWB difference between owner-occupied and non-owner-occupied households	-0.249*** (0.0259)

(1) the number in brackets denotes the standard error of the SWB *t*-test

(2) \*\*\* indicates significance at the 1% level

Table 2 shows the *t* test results for the SWB of households, including the differences between owner-occupied and non-owner-occupied households. We find that the average SWB of households with homeownership is 0.249 larger than that of households without homeownership and that the differences in SWB between owner-occupied and non-owner-occupied households are significant.

### 3.2 Methods and variables

Since the dependent variable of SWB is ordinal, we employ the ordered probit model to investigate the effects of various determinants on SWB (Greene 2012; Brooks 2008):

$$y_i^* = \alpha + \beta_1 \text{Housing} + \beta_2 X_i + \varepsilon_i \quad (1)$$

where  $y_i^*$  is the unobservable “true rating” (or “an uncovered continuous variable”). In our model,  $y_i^*$  thus denotes SWB. The vector *Housing* stands for a household’s housing characteristics (i.e. homeownership, number of owned properties, housing area, house value, distance to the city or town center, housing age, house price appreciation, and mortgage). In line with the relevant literature (Elsinga and Hoekstra 2005; Knight et al. 2009; Chyi and Mao 2012), the vector *X* includes two major categories of explanatory variables: individual characteristics (i.e. age, age squared, gender, marital status, education level, health status, currently working status, and migrant status)<sup>5</sup> and household characteristics (i.e. log of household income, household financial wealth, and family size).

To investigate the mechanisms behind the effects of housing wealth on SWB, three ordered probit models are established: the first one explores whether house value appreciation exists among owner-occupied households; the second one estimates the impacts of mortgage debt for owner-occupied households, and the third model distinguishes the purpose of buying a house (i.e. self-occupation and investment) by dividing families into those that own one property and those that own multiple properties. Finally, our study explores how housing wealth affects SWB among three income groups and three regions.

<sup>5</sup> Because age might have a non-linear relationship with SWB (Chyi and Mao 2012; Hu 2013), both age and age squared are included in the model.



**Table 3** Effects of housing characteristics on SWB

Variable	(1) Homeownership SWB	(2) Housing price SWB	(3) House value SWB	(4) House area SWB
Homeownership	0.240*** (0.049)			
Ln (housing price)		0.014 (0.018)		
Ln(house value)			0.040** (0.018)	
Ln(house area)				0.110*** (0.030)
Lndistance		-0.037*** (0.014)	-0.032** (0.014)	-0.044*** (0.013)
Time of buying this house		-0.045** (0.022)	-0.039* (0.022)	-0.043** (0.021)
Local house		0.202** (0.089)	0.176** (0.087)	0.256*** (0.083)
Ln(financial wealth)	0.041*** (0.007)	0.036*** (0.008)	0.035*** (0.008)	0.038*** (0.008)
Lnincome	0.019** (0.008)	0.016* (0.009)	0.014 (0.009)	0.018** (0.009)
Family size	-0.055 (0.038)	-0.024 (0.042)	-0.039 (0.042)	-0.065 (0.042)
Age	-0.047*** (0.007)	-0.050*** (0.007)	-0.050*** (0.007)	-0.044*** (0.007)
Age2	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Gender	-0.045* (0.027)	-0.039 (0.030)	-0.037 (0.030)	-0.039 (0.029)
Edu	0.007 (0.009)	-0.005 (0.011)	-0.009 (0.010)	0.006 (0.010)
Married	0.485*** (0.057)	0.482*** (0.067)	0.487*** (0.067)	0.487*** (0.065)
Currently working	-0.021 (0.047)	-0.059 (0.052)	-0.056 (0.051)	-0.071 (0.049)
Migration	0.074 (0.049)	-0.060 (0.067)	-0.058 (0.067)	-0.050 (0.067)
Health	0.267*** (0.017)	0.261*** (0.019)	0.260*** (0.018)	0.262*** (0.018)
Observations	7083	5829	5851	6236
Provincial FE	YES	YES	YES	YES
Pseudo R-squared	0.0497	0.0497	0.0497	0.0497

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

**Table 4** Marginal effects of housing characteristics on SWB

Variable	(1) Homeownership	(2) House price	(3) House value	(4) House area	(5) Housing distance
1._predict	-0.004*** (0.001)	-0.000 (0.000)	-0.000** (0.000)	-0.001*** (0.000)	0.000*** (0.000)
2._predict	-0.017*** (0.004)	-0.001 (0.001)	-0.003** (0.001)	-0.007*** (0.002)	0.003*** (0.001)
3._predict	-0.062*** (0.012)	-0.004 (0.005)	-0.010** (0.005)	-0.029*** (0.008)	0.011*** (0.003)
4._predict	0.029*** (0.006)	0.001 (0.002)	0.004** (0.002)	0.012*** (0.003)	-0.004*** (0.001)
5._predict	0.054*** (0.011)	0.003 (0.004)	0.009** (0.004)	0.025*** (0.007)	-0.009*** (0.003)
Observations	7083	5829	5851	6236	6262
Provincial FE	Yes	Yes	Yes	Yes	Yes

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

## 4 Empirical findings

### 4.1 Housing characteristics and SWB

Table 3 indicates the effects of housing characteristics on SWB. From Model (1), it is found that homeownership has significant effects on SWB, which are consistent with the findings of previous studies in China (Li et al. 2011; Hu 2013; Sun and Zheng 2013; Cheng et al. 2016; Zhang et al. 2017; Zhou et al. 2017). In particular, we find that house value and house area both have significant effects on SWB in Models (3) and (4), but house prices are not significant [see Model (2)]. This finding means that homeownership can improve individual happiness only through house value, and not through rising house prices. In addition, a larger living area, a shorter time of owning a house, owning a local house, and a lower time to travel to a city or town center increase people's SWB. Further, household income and household financial wealth improve SWB, while the individual characteristics of age, gender, marital status, and health status significantly affect SWB as well.

Table 4 explores the marginal effects of housing characteristics on SWB, such as homeownership, house price, house value, house area, and location. We find that housing characteristics have different marginal effects across the spectrum of SWB. Specifically, house prices have no significant impact on SWB at all; homeownership, house value, and house area have negative effects for respondents who rated themselves as very unhappy, unhappy, or neutral, but positive effects if they rated themselves as happy or very happy. For instance, the marginal effects of homeownership, house value, and house area from 3 (neutral) to 4 (happy) responses are 2.9%, 0.4% and 1.2%, respectively. The significant marginal effects of travel time to the city or town center turn positive to negative at the point between neutral and happy as well.

## 4.2 House value appreciation and housing wealth

Following previous studies on housing wealth effects, we firstly analyze the impact of house price appreciation, which is a direct path of the wealth effect. Model (1) illustrates the impact of house value appreciation on SWB; we also divide households into families with house value appreciation [Model (2)] and families without [Model (3)]. Then, the interaction term of house value and whether house appreciation exists or not (*ifapp*) is employed to test whether the wealth effect of housing affects SWB through house value appreciation [Model (4)].

Table 5 shows that house value appreciation significantly ameliorates SWB, especially for families with positive house price appreciation. Specifically, a 1% increase in house value increases people's SWB by 7%. Furthermore, the results of Model (4) with the interaction term remain significant. The other household and individual characteristics have similar impacts on SWB to those shown in Table 3.

## 4.3 Housing debt and housing wealth

Table 6 presents the impact of housing debt on a household's housing wealth. Here, Model (1) tests the effect of having housing debt on SWB, Models (2) and (3) demonstrate the results for families with and without housing debt, respectively, and Model (4) introduces the interaction term of house value and housing debt ( $\ln(\text{house value}) * \text{debt}$ ). Although there is no notable evidence of housing debt affecting SWB, house value affects families both with housing debt (3%) and without housing debt (14.4%) significantly. By adding the interaction term, Model (4) shows that having housing debt decreases the effect of house value on SWB to some extent. However, having housing debt does not change the fact that a higher house value improves SWB.

## 4.4 Multiple houses and housing wealth

The purposes of purchasing houses (e.g. self-occupation and investment) might affect households' SWB differently. We distinguish the purpose of buying a house between self-occupation and investment by dividing families into those that have one property and those that have multiple properties (see Table 7). Model (1) examines how having multiple properties (*Mp*) affects SWB, Models (2) and (3) divide the observations into a group with one property and a group with more than one property, and Model (4) includes the interaction term of multiple properties and house value. Our findings suggest that the dummy of having multiple properties improves SWB. However, house value does not affect SWB through the number of properties (*Mp*), which may indicate that it affects SWB through total wealth instead [see Models (3) and (4)].

## 4.5 Effects of housing wealth on SWB: group-level analysis

### 4.5.1 SWB among income groups

Table 8 divides households into three categories directly based on household total income of homeowners: low-income households (annual household income from 0 to 3715 US

**Table 5** House value appreciation and housing wealth

Variable	(1)	(2)	(3)	(4)
	House value appreciation	With appreciation	Without appreciation	Appreciation*House value
	SWB	SWB	SWB	SWB
Appreciation	0.001*** (0.000)			
Ln (house value)		0.070*** (0.018)	-0.003 (0.077)	-0.111** (0.049)
Ifapp				-0.410*** (0.128)
Ifapp*Ln(house value)				0.183*** (0.050)
Time of buying this house	-0.055** (0.022)	-0.050** (0.023)	0.389*** (0.149)	-0.041* (0.023)
Lndistance	-0.037*** (0.014)	-0.033** (0.014)	-0.160* (0.088)	-0.031** (0.014)
Local house	0.184** (0.086)	0.164* (0.089)	0.188 (0.395)	0.175** (0.086)
Ln(financial wealth)	0.035*** (0.008)	0.034*** (0.008)	-0.066 (0.067)	0.034*** (0.008)
Lnincome	0.014 (0.009)	0.012 (0.010)	-0.031 (0.068)	0.013 (0.009)
Family size	-0.035 (0.042)	-0.047 (0.043)	0.202 (0.330)	-0.044 (0.042)
Age	-0.050*** (0.007)	-0.049*** (0.008)	-0.130** (0.066)	-0.051*** (0.007)
Age2	0.001*** (0.000)	0.001*** (0.000)	0.001* (0.001)	0.001*** (0.000)
Gender	-0.037 (0.030)	-0.030 (0.030)	-0.109 (0.181)	-0.035 (0.030)
Edu	-0.008 (0.010)	-0.012 (0.011)	0.037 (0.079)	-0.011 (0.010)
Married	0.488*** (0.067)	0.469*** (0.069)	1.174** (0.491)	0.493*** (0.068)
Currently working	-0.061 (0.051)	-0.056 (0.052)	-0.092 (0.591)	-0.064 (0.051)
Migration	-0.066 (0.067)	-0.070 (0.069)	0.285 (0.473)	-0.058 (0.067)
Health	0.259*** (0.019)	0.259*** (0.019)	0.284** (0.136)	0.261*** (0.018)
Observations	5851	5687	164	5851
Provincial FE	YES	YES	YES	YES
Pseudo R-squared	0.0502	0.0502	0.0502	0.0502

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

**Table 6** Housing debt and housing wealth

Variable	(1)	(2)	(3)	(4)
	Housing debt	Housing with debt	Housing without debt	Having debt*House value
	SWB	SWB	SWB	SWB
Ln(house value)	0.040** (0.018)	0.030* (0.018)	0.144** (0.071)	0.036** (0.018)
Debt	-0.030 (0.047)			-0.350** (0.175)
Ln(house value)*debt				0.081* (0.044)
Lndistance	-0.033** (0.014)	-0.041*** (0.015)	0.012 (0.038)	-0.034** (0.014)
Time of buying this house	-0.042* (0.023)	-0.061** (0.024)	0.083 (0.069)	-0.043* (0.023)
Local house	0.179** (0.087)	0.124 (0.092)	0.703*** (0.251)	0.174** (0.087)
Ln(financial wealth)	0.035*** (0.008)	0.037*** (0.009)	0.005 (0.025)	0.034*** (0.008)
Lnincome	0.014 (0.009)	0.014 (0.010)	0.016 (0.031)	0.014 (0.009)
Family size	-0.039 (0.042)	-0.021 (0.044)	-0.313* (0.170)	-0.037 (0.042)
Age	-0.050*** (0.007)	-0.051*** (0.008)	-0.065* (0.034)	-0.050*** (0.007)
Age2	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.001*** (0.000)
Gender	-0.038 (0.030)	-0.031 (0.032)	-0.055 (0.082)	-0.037 (0.030)
Edu	-0.008 (0.011)	-0.013 (0.011)	-0.013 (0.030)	-0.010 (0.011)
Married	0.487*** (0.067)	0.420*** (0.071)	1.023*** (0.224)	0.486*** (0.067)
Currently working	-0.055 (0.051)	-0.076 (0.053)	0.364 (0.257)	-0.057 (0.051)
Migration	-0.060 (0.067)	-0.102 (0.075)	0.062 (0.147)	-0.055 (0.067)
Health	0.260*** (0.018)	0.267*** (0.020)	0.234*** (0.055)	0.260*** (0.018)
Observations	5851	5087	764	5851
Provincial FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.0487	0.0487	0.0487	0.0487

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

**Table 7** Multiple houses and housing wealth

Variable	(1)	(2)	(3)	(4)
	Multiple houses	No multiple houses	Having multiple houses	Multiple house*Value
	SWB	SWB	SWB	SWB
Ln(house value)	0.041** (0.018)	0.046** (0.020)	0.007 (0.039)	0.041** (0.019)
Mp	0.117*** (0.038)			0.116 (0.108)
Mp*Ln(house value)				0.000 (0.029)
Time of buying this house	-0.039* (0.022)	-0.055** (0.025)	0.031 (0.051)	-0.039* (0.022)
Ln(distance)	-0.029** (0.014)	-0.035** (0.016)	-0.007 (0.030)	-0.029** (0.014)
Local house	0.165* (0.087)	0.255*** (0.098)	-0.072 (0.212)	0.165* (0.087)
Ln(financial wealth)	0.032*** (0.008)	0.033*** (0.009)	0.034* (0.018)	0.032*** (0.008)
Ln(income)	0.011 (0.009)	0.008 (0.011)	0.018 (0.019)	0.011 (0.009)
Family size	-0.047 (0.042)	-0.073 (0.048)	0.016 (0.094)	-0.047 (0.042)
Age	-0.051*** (0.007)	-0.052*** (0.008)	-0.026 (0.019)	-0.051*** (0.007)
Age <sup>2</sup>	0.001*** (0.000)	0.001*** (0.000)	0.000 (0.000)	0.001*** (0.000)
Gender	-0.036 (0.030)	-0.037 (0.033)	-0.039 (0.068)	-0.036 (0.030)
Edu	-0.011 (0.010)	-0.016 (0.012)	0.011 (0.022)	-0.011 (0.010)
Married	0.493*** (0.067)	0.523*** (0.076)	0.446*** (0.152)	0.493*** (0.067)
Currently working	-0.064 (0.051)	-0.058 (0.057)	-0.114 (0.128)	-0.064 (0.051)
Migration	-0.057 (0.067)	-0.119 (0.077)	0.116 (0.136)	-0.057 (0.067)
Health	0.259*** (0.018)	0.248*** (0.021)	0.310*** (0.041)	0.259*** (0.018)
Observations	5848	4680	1168	5848
Provincial FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.0489	0.0489	0.0489	0.0489

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

**Table 8** SWB among household income groups of homeowners

Variable	(1)	(2)	(3)
	Low-income household	Middle-income household	High-income household
	SWB	SWB	SWB
Ln(house value)	0.063** (0.027)	0.026 (0.032)	0.049 (0.034)
Time of buying this house	-0.002 (0.043)	-0.056 (0.038)	-0.038 (0.037)
Local house	0.219 (0.167)	0.166 (0.190)	0.155 (0.120)
Ln(financial wealth)	0.030* (0.016)	0.015 (0.015)	0.038*** (0.014)
Lnincome	-0.021* (0.013)	-0.058 (0.110)	0.036 (0.046)
Family size	0.002 (0.082)	-0.104 (0.074)	-0.059 (0.070)
Age	-0.055*** (0.016)	-0.042*** (0.012)	-0.050*** (0.012)
Age2	0.001*** (0.000)	0.000*** (0.000)	0.001*** (0.000)
Gender	0.003 (0.062)	-0.024 (0.051)	-0.060 (0.047)
Edu	-0.061** (0.025)	0.010 (0.019)	-0.027* (0.016)
Married	0.513*** (0.119)	0.408*** (0.120)	0.508*** (0.110)
Currently working	0.011 (0.104)	-0.235*** (0.088)	0.041 (0.083)
Migration	-0.139 (0.140)	-0.154 (0.130)	0.057 (0.094)
Health	0.221*** (0.036)	0.259*** (0.031)	0.321*** (0.031)
Observations	1360	2119	2384
Provincial FE	Yes	Yes	Yes
Pseudo R-squared	0.0502	0.0502	0.0502

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

dollar), middle-income households (3716–8423 US dollar), and high-income households (8484–464,468 US dollar). The results illustrate that housing wealth only positively affects SWB for low-income households, perhaps because middle- and high-income households are likely to buy houses for investment purposes, whereas low-income households do so for self-occupation.

#### 4.5.2 SWB in different regions

There is a wide development gap between different regions in urban China. The average house price in developed regions (e.g. Beijing and Shanghai) is much higher than that in developing regions (e.g. Yunnan and Sichuan). Thus, we analyse the differences in the impacts of house value appreciation on people's SWB across China. Following the National Bureau of Statistics, the full sample is divided into the eastern region (including the provinces of Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Shandong, and Guangdong), central region (Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan), and western region (Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, and Qinghai). We find that housing wealth has a positive impact on SWB in all models, but this effect is significant only in the eastern region. On the one hand, this might be because house prices have increased more dramatically in eastern China than in other regions, making the responses of households in the eastern region to house value appreciation more obvious. On the other hand, the eastern region sample is larger than those of the other two regions, which may have affected the significance of the results (Table 9).

### 5 Discussion and conclusion

This study investigates the extent to which housing characteristics, especially housing wealth, affect an individual's SWB in urban China. We find that homeownership significantly improves SWB through the accumulation of housing wealth. Of the channels of housing wealth affecting SWB, the house value appreciation of owner-occupied households raises SWB notably. However, having housing debt and having one or more properties do not significantly impact on SWB, which indicates that housing wealth affects SWB through total house value; by contrast, the reason for purchasing houses and financing sources play a smaller role. However, although housing wealth generally has a positive effect on SWB, this effect is only significant for low-income homeowners of the eastern region. In summary, we confirm that housing characteristics influence peoples' SWB. Further, they affect different groups in different ways, which is an important finding.

The background of house value appreciation being able to improve residents' SWB is China's economic development being over-reliant on real estate over the past two decades. Hence, the government should keep the real estate market developing steadily because property depreciation and debt repayment pressure would cause a double blow to residents' sense of SWB. Moreover, considering our finding that a greater distance between home and the city center reduces SWB, the government should pay more attention to the separation of occupations and residences, especially by supplying basic public service facilities in suburban areas. In addition, it is necessary to improve the education level of residents to enhance their economic and financial knowledge, strengthen their asset management capability, reduce the loss of the happiness caused by the household assets depreciation, thereby further increasing SWB.

This study suffers from the following limitations. Although we include a much richer set of relevant housing-related determinants in the proposed models compared with previous studies, the estimation of happiness may still be biased. On one hand, the estimation may suffer from measurement error bias, as these variables only concern an individual's current residence given the available information in the dataset. On the other hand, some unobserved variables (e.g. risk attitude and social capital) that influence the explanatory



**Table 9** Effects of housing wealth on SWB in different regions

Variable	(1)	(2)	(3)	(4)
	Eastern region	Central region	Western region	Whole of China
	SWB	SWB	SWB	SWB
Ln(house value)	0.058** (0.023)	0.036 (0.030)	0.013 (0.059)	0.046*** (0.017)
Time of buying this house	-0.028 (0.030)	-0.058 (0.037)	-0.071 (0.080)	-0.037* (0.022)
Local house	0.165 (0.108)	0.208 (0.171)	0.005 (0.254)	0.164* (0.086)
Ln(financial wealth)	0.024** (0.011)	0.053*** (0.014)	0.059* (0.031)	0.035*** (0.008)
Lnincome	0.021* (0.011)	0.007 (0.017)	0.001 (0.042)	0.014 (0.009)
Family size	0.013 (0.054)	-0.144* (0.075)	-0.099 (0.160)	-0.051 (0.042)
Age	-0.047*** (0.009)	-0.056*** (0.013)	-0.051 (0.034)	-0.049*** (0.007)
Age2	0.001*** (0.000)	0.001*** (0.000)	0.001* (0.000)	0.001*** (0.000)
Gender	-0.035 (0.040)	-0.042 (0.050)	-0.009 (0.103)	-0.037 (0.030)
Edu	-0.007 (0.013)	-0.022 (0.018)	0.044 (0.038)	-0.006 (0.010)
Married	0.556*** (0.087)	0.344*** (0.118)	0.492** (0.221)	0.487*** (0.067)
Currently working	-0.011 (0.069)	-0.126 (0.082)	-0.145 (0.216)	-0.061 (0.051)
Migration	-0.104 (0.082)	0.211 (0.133)	-0.305 (0.228)	-0.052 (0.067)
Health	0.272*** (0.025)	0.274*** (0.030)	0.178** (0.069)	0.264*** (0.019)
Observations	3299	2075	489	5863
Provincial FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.0483	0.0483	0.0483	0.0483

(1) For the explanatory variables, the value in brackets denotes the standard error of the respective coefficients

(2) \*\*\* indicates significance at the 1% level, \*\* indicates significance at the 5% level. \* indicates significance at the 10% level

variables used in this study may also affect happiness, again causing bias if these variables influence the independent variable set we use. Moreover, owing to the restrictions of the survey, we could not include more relevant factors behind housing conditions affecting SWB, such as access to gas, heating, water, and so on.

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## Appendix

Variables	Question code	Questions	Answers
2011 CHFS Questionnaire			
Subjective wellbeing			
<i>SWB</i>	A4011c	Overall, do you feel happy now?	1. Very happy; 2. Happy; 3. Normal; 4. Unhappy; 5. Very unhappy
Individual characteristics			
<i>Gender</i>	A2003	Gender	1. Male; 2. Female
<i>Age</i>	A2005	Date of Birth	d/m/y
<i>Education (Edu)</i>	A2012	What's the education level?	1. No schooling at all; 2. Primary school; 3. Junior high school; 4. Senior high school; 5. Technical high school; 6. College/Vocational school; 7. Bachelor degree; 8. Master degree; 9. Doctor degree
<i>Migration</i>	A2018	Is <i>Hukou</i> registered in the villages/streets/towns where you currently live?	1. Yes; 2. No
<i>Married</i>	A2024	What's the marital status at present?	1. Unmarried; 2. Married; 3. Cohabitation; 4. Separated; 5. Divorced; 6. Widowed
<i>Job</i>	A3000	Do you have a job, including individual business, online-shop, farming, helping with the family business or agricultural production, freelancer, doing odd jobs?	1. Yes; 2. No
<i>Health</i>	F2021	What's your health status compared with your peers?	1. Very good; 2. Good; 3. Normal; 4. Bad; 5. Very bad
Household characteristics			
Household income ( <i>income</i> )	A3020	What's your total income last year?	yuan
Family size	A2000	How many family members do you have?	/
Family financial wealth ( <i>financial wealth</i> )	/	Comprehensive financial assets held by households such as cash, stocks, funds, bonds, etc.	yuan
Housing characteristics			
<i>Homeownership</i>	C2001	Do you have your own house?	1. Yes; 2. No

Variables	Question code	Questions	Answers
Multiple properties ( <i>Mp</i> )	C2002	How many houses does your family possess?	/
<i>House area</i>	C2003a	What is the floor area of this house?	m <sup>2</sup>
<i>Distance</i>	C2010	How long time does it take from the house to the city/town center?	Minute
<i>Time of buying this house</i>	C2012	Which year did you purchase this house?	/
Local house	C2009a	Whether do you own a local house or not?	1. Yes; 2. No
House value at the time of purchase ( <i>old house value</i> )	C2013	What is the purchase price of the house?	yuan
Current house value ( <i>house value</i> )	C2016	How much is the imputed value of this house now?	yuan
Housing price	C2016/C2003a	Imputed value of this house/ the floor area of this house	yuan/m <sup>2</sup>
Housing debt ( <i>debt</i> )	C2024	Does the family have any outstanding loans for purchasing, decorating, remodeling, or expanding the house?	1. Yes; 2. No

In China's special Household Registration System, migrants without the official transformation of household registration (*Hukou*) are defined as a "floating" population and usually excluded from the urban population in the official statistical survey and census in China

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