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The Impact of Home Ownership on Life Satisfaction in Urban China: A Propensity Score Matching Analysis

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Abstract China has implemented a series of socioeconomic reforms since 1978. One of the reforms allows urban residents to purchase their own houses rather than renting houses from state institutions which has resulted in a rapid increase in home ownership. This paper estimates the impact of home ownership on life satisfaction in urban China on the basis of the 2010 wave of the China General Social Survey. Special attention is paid to the methodological problem of confoundedness between the determinants of home ownership and life satisfaction. Propensity score matching (PSM) is applied to control it. The results show that PSM reduces upward estimation bias caused by confoundedness and that it is more appropriate to control confoundedness than ordered probit regression. The estimates furthermore indicate that home ownership has a significant positive impact on life satisfaction of medium- and high income urban residents. For low income urban residents, the impact is also positive, though insignificant. The outcomes connect to the objectives of national development policy and thus have several important policy implications. First, the central and local governments, especially in provinces where it is still low, may want to continue stimulating home ownership as it enhances life satisfaction. Secondly, specific programs may be designed to make home ownership financially affordable for low income groups. Thirdly, local governments may want to initiate or intensify urban (renewal)

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programs to improve poor public facilities including public transportation, green space and sports accommodations in the immediate vicinity of depressing low income neighborhoods.

Keywords Home ownership · Life satisfaction · Confoundedness · Propensity score matching · Urban China

1 Introduction

China has implemented a series of political and economic reforms since 1978 which have led to substantial social and economic changes. Particularly, most of the Marxist ideology has been gradually abandoned (Appleton and Song 2008), notably the doctrine of “*sacrificing personal life satisfaction to do social duty*” (Diener 2000). In 2007, improvement of life satisfaction became one of the principal objectives of national development policy. Consequently, policy makers have developed interest in life satisfaction (Cheung and Leung 2004). Hence, information on life satisfaction and its determinants have become crucial inputs for developing socioeconomic policies.

In recent years, an increasing number of researches have been conducted on the determinants of subjective wellbeing or life satisfaction in China (see amongst others, Appleton and Song 2008; Brockmann et al. 2009; Easterlin et al. 2012; Shu and Zhu 2009; Wu and Tam 2014).¹ Along with personal and household characteristics (e.g. age, education, income, and household size) and environmental quality, home ownership has been found to be a determinant of life satisfaction (see Cheung and Leung 2004; Lin et al. 2012).

In China, the literature on the impact of home ownership on life satisfaction is mixed. On the one hand, home ownership has been found to result in a decrease of life satisfaction because it leads to a heavy financial burden, *inter alia* because housing prices have been rapidly increasing, and housing affordability has sharply decreased in the aftermath of the 1998 housing reform (Mak et al. 2007).² On the other hand, a positive impact has been discerned as it brings about security and relatively high social-economic status (Hu 2013; Lin et al. 2012).

The mixed literature on homeownership and life satisfaction is likely to be related to two methodological fallacies. First, the disregard of possible differential impacts of home ownership on life satisfaction by income group (see among others, Dietz and Haurin 2003; Hu 2013; Li et al. 2012; Zumbro 2014). Specifically, home ownership may bring about heavy financial burdens to low income households which, *ceteris paribus*, would depress life satisfaction (Cheng et al. 2013). Moreover, low-income households tend to purchase houses in poorly facilitated, depressing neighborhoods where housing is better affordable than in well facilitated neighborhoods (Grinstein-Weiss et al. 2011). Thus, *ceteris paribus*, owning a house in such neighborhoods brings about only a marginal increase to life satisfaction. To high income households, on the other hand, home ownership shows their success and wealth and thus results in higher life satisfaction. The heterogeneity in

¹ The terms of subjective wellbeing, happiness and life satisfaction are used interchangeably in the literature (see Ferrer-i-Carbonell 2005; Haybron 2007; Lu 1999; Welsch 2006). This paper uses life satisfaction.

² Real average housing prices increased by almost 137% after the urban housing reform, from 1854 RMB per square meter in 1998 to 4382 RMB in 2013 (China Statistical Yearbook 2014). As a consequence, most low income home owners in China face financial burdens and restrict their consumption of other goods.

response to home ownership related to income may bring about the mixed findings reported in the literature (c.f. Cheng et al. 2013). To control this methodological fallacy, separate models for low, medium and high income groups are needed. In the context of the present case study, in 2010 (the year of the survey), the low income group earned an annual household income of maximum RMB 22,100 (US\$ 3235), the medium income group an income between RMB 22,100 (US\$ 3235) and RMB 40,800 (US\$ 5973), and the high income group a minimum income of RMB 40,800 (US\$ 5973). The three groups are in line with China's Statistics Yearbook, 2010).

Secondly, many researches on home ownership and life satisfaction ignore confoundedness between their determinants (Rohe et al. 2013). Specifically, individual, household and regional characteristics on the one hand, and home ownership on the other, are typically used as explanatory variables in e.g. a logit or probit model of life satisfaction without accounting for the fact that the former set of variables also impact on home ownership.³ That is, there are both direct and indirect impacts (via home ownership) of these variables on life satisfaction. For instance, urban residents with higher education are more likely to own a house which in its turn improves life satisfaction. Consequently, there is an indirect effect of education on life satisfaction⁴ which implies that part of the housing effect actually is an education effect materializing via owning a house. Without controlling for the confounding impact of education on home ownership, the estimator of the impact of home ownership on life satisfaction is upward biased. Specifically, ignorance of confoundedness leads to model misspecification and biased estimators of the impacts of the explanatory variables -including home ownership- on life satisfaction (Rohe et al. 2013; Ruprah 2010).

This paper addresses the above fallacies as follows. First, the relationship between home ownership and life satisfaction is estimated for different income groups. Secondly, to correct for confoundedness of the determinants of life satisfaction and home ownership, propensity score matching (PSM)—which is a quasi-experimental method—is applied. PSM first predicts the propensity score (probability) to be a home owner for each home owner and renter based on their individual and household characteristics. Next, home owners are matched with renters based on their propensity scores. Finally, the difference in life satisfaction between matched home owners and renters is estimated and tested. PSM thus separates the “genuine” impact of home ownership on life satisfaction from the impacts of home ownership that in fact are caused by individual or household factors like income or education. For illustrative purposes, we also estimate an ordered probit model and compare the results to the outcomes of the PSM analysis.

The remainder of the paper is organized as follows. Section 2 describes the channels through which home ownership impacts life satisfaction for different income groups. It also addresses confoundedness of personal and regional characteristics. Section 3 summarizes the PSM approach. Section 4 presents the data and the empirical results. In addition, it compares PSM and ordered probit regression to control confoundedness. Conclusions and policy implications are presented in Sect. 5.

³ Occasionally, interaction terms are used in logit or probit models of life satisfaction. This, however, is not the same as accounting for both the direct and indirect effects of the confounding determinants and estimating the impact of housing on life satisfaction with the indirect effects of the confounding factors “filtered out”. For applications of logit or probit analyses of life satisfaction for China, see Dietz and Haurin (2003), Hu (2013), Li et al. (2012) and Lin et al. (2012), Parker et al. (2011), Rossi and Weber (1996) and Zumbro (2014) for developed countries.

⁴ There is also a direct effect of education on life satisfaction, as explained in Sect. 2.2.

2 Life Satisfaction, Home Ownership and Confoundedness

Below, we first define life satisfaction and discuss the channels by which home ownership affects it. Next we discuss the covariates that cause confoundedness of home ownership and life satisfaction.

2.1 Life Satisfaction and Home Ownership

Following Bradley and Corwyn (2004) and Veenhoven (1991), we define life satisfaction as the subjective assessment of the degree to which one's needs are met. It is based on the comparison of one's life conditions to one's own internal standards rather than externally imposed, objective standards (Diener et al. 1999; Li et al. 2014; Pavot and Diener 1993; Welsch 2006).

One of the determinants of life satisfaction is home ownership (Dietz and Haurin 2003). It has a positive impact on life satisfaction through five channels. First, self-owned houses provide security for their owners (Lu 1999). Particularly, compared to renters, home owners are less at risk of being involuntarily moved from their homes. Moreover, home owners can alter their housing conditions more freely than renters (Zumbro 2014). For example, home owners can re-decorate and re-arrange their houses to suit their needs. Secondly, home ownership reflects success and wealth (Kalyuzhnova and Kambhampati 2008; Opoku and Abdul-Muhmin 2010) and helps to attract marriage and business partners (Wan 1996; Wang et al. 2012). Thirdly, because house owners generally have less incentive to move out of their current community (Dietz and Haurin 2003; Helderman et al. 2004; Rohe and Stewart 1996), they are more likely to participate in community activities and management, and thus establish social networks of friends and acquaintances which are beneficial to life satisfaction (Pinquart and Sörensen 2000). Fourthly, home ownership has a positive effect on self-esteem in that it provides independence from landlords. Furthermore, it provides a greater sense of control of one's life which contributes to higher life satisfaction (see e.g. Elsinga and Hoekstra 2005; Hu 2013; Parker et al. 2011; Rohe and Stegman 1994; Rohe et al. 2002, 2013). Finally, home ownership provides a vehicle to build wealth through housing price appreciation and decreasing mortgage liabilities (Cheng et al. 2013).⁵ In addition, it may facilitate obtaining credit.

The impact of home ownership on life satisfaction varies along with income according to the Engel curve theory applied to income and housing expenditure (Deaton and Muellbauer 1986). Basically, a rise in income shifts the budget curve outwards which increases the set of housing expenditure possibilities. Furthermore, the greater (smaller) the set of housing expenditure possibilities, the higher (lower) housing quality and life satisfaction associated with home ownership.

To low income earners, with a small set of housing possibilities, home ownership is likely to have a small positive, or a negative, impact on life satisfaction for the following reasons. First, due to high housing prices in urban China and low income, home ownership is likely to bring about relatively heavy financial burdens to the low income group, which in turn depresses life satisfaction (Cheng et al. 2013).⁶ Secondly, as houses in well-

⁵ House ownership brings about financial benefits when housing prices increase but financial losses when they decrease. As housing prices were expected to increase in urban China in 2010 and beyond, this paper considers home ownership as a vehicle to build wealth rather than as a source of financial losses.

⁶ Note that a low income household may benefit from rising housing prices via wealth accumulation. This effect, however, does not reduce financial burdens related to e.g. mortgage.

developed neighborhoods are not affordable to them, low income earners are more likely to own houses in poorly developed neighborhoods on the city fringes (Grinstein-Weiss et al. 2011). Owning a house in such neighborhoods brings marginal or no increase in life satisfaction (Grinstein-Weiss et al. 2011).

To medium income earners with a greater set of housing possibilities than low income earners, home ownership brings about better housing security, more possibilities to accumulate wealth and better opportunities to participate in community activities (Cheng et al. 2013). Hence, for medium income earners home ownership is expected to have a relatively strong positive impact on life satisfaction.

To high income earners, home ownership also positively impacts life satisfaction for the same reasons as for middle income earners. Particularly, home ownership reflects a high-income home owner's success and wealth and provides a channel to accumulate more wealth (Appleyard and Rowlingson 2010). However, the impact is weaker than for the latter. Particularly, home ownership is less of a vehicle to housing security to high income earners as they can easily find decent accommodation whenever and wherever needed (Zumbro 2014).⁷

Based on the above discussion, we hypothesize that:

Hypothesis 1 The size of the impact of home ownership's on life satisfaction varies across income groups. To the medium and high income earners, home ownership has significant positive impacts on life satisfaction. For the low income earners, the impact is marginally positive or negative.

2.2 Confounding Covariates of Home Ownership and Life Satisfaction

Home ownership and life satisfaction are partly driven by the same underlying drivers, which thus leads to confounding covariates. These drivers relate to the household's characteristics, life cycle (Rossi 1955) and the local housing market (Clark and Dieleman 1996; Van der Vlist et al. 2002).

2.2.1 Income

Income is one of the most important, positive drivers of life satisfaction, both in absolute and in relative terms (Ball and Chernova 2008). High income indicates one's success (Easterlin 2001), better enables one to achieve one's goals (Ahuvia and Friedman 1998) and to use time in more satisfying ways (Ahuvia and Friedman 1998; Riddick 1985). Meanwhile, income also has a positive impact on home ownership. People with higher income can afford to purchase houses from the market or to build their own houses (Kain and Quigley. 1972; Kantor et al. 2015). High income also better enables people to pay a down payment and obtain mortgage (Chiuri and Jappelli 2003).

2.2.2 Household Size

Household size has a negative impact on life satisfaction because in large households material resources are shared by a larger number of people than in small households (Blanchflower and Oswald 2004; Li et al. 2014; Van Praag and Baarsma 2005).

⁷ This is in line with the fact that the home ownership rate among high income earners is generally insignificantly higher than among medium income earners (Fisher and Jaffe 2003).

Meanwhile, household size positively impacts home ownership as large households need more space than small households and an own house is easier to adapt to one's needs than a rented house (Huang and Clark 2002).

2.2.3 Age

There is theoretical and empirical evidence of a U-shaped relationship between age and life satisfaction (Appleton and Song 2008; Blanchflower and Oswald 2008). Specifically, younger and older individuals have higher life satisfaction than middle-aged individuals. For older individuals the reason is that they are well aware of the boundary of their time and therefore adjust their needs, aspirations and comparisons downward (Diener and Suh 1998; George 2006). As a result, for older individuals the aspiration-achievement gap decreases. In addition, older individuals can more effectively regulate their emotions than younger individuals, which positively affects life satisfaction (Cheng et al. 2013; Horley and Lavery 1995; Kahneman and Krueger 2006). Young individuals tend to have higher life satisfaction than middle-aged individuals because they have less responsibilities, for instance with respect to spouse or children.

There is an inverted U-shaped relationship between age and home ownership in China for the following reasons (Huang and Clark 2002). Young residents, when they leave their family home, are more likely to rent a house than to buy one, *inter alia* for financial reasons. When they grow older and start a family, they have incentives to buy a house (Li and Li 2006). Finally, aged residents may sell their house for reasons of convenience or to supplement their income.

2.2.4 Education

Education also has a positive impact on life satisfaction and home ownership (Michalos 2008). Individuals with higher education feel more confident and are more likely to succeed in society (Zajacova et al. 2005). They thus feel more satisfied with their life. Meanwhile, individuals with higher education have more human capital. They are thus better informed about the financial and immaterial benefits of owning a home and are more likely to obtain a mortgage. As a result, individuals with higher education are more likely to be home owners (Li and Li 2006).

2.2.5 Health

Individuals with poor health tend to feel less satisfied with their life because of physical and social limitations (Argyle 2003; Easterlin 2003). Meanwhile, poor health has a negative impact on housing tenure. The reason is that residents with health problems expect to have lower future income and higher expenditures to resolve health problems which may induce banks to decline the financing of a home (Eichholtz and Lindenthal 2014).

2.2.6 Employment Status

Employment status has been repeatedly found to be a major positive determinant of life satisfaction in that it offers opportunity to accomplish meaningful objectives (Winkelmann and Winkelmann 1998). Being employed also offers opportunities to develop one's social or professional network. It furthermore strengthens one's self-esteem and one's identity

and standing in society (Melin et al. 2003). On the other hand, being unemployed impairs one's self-esteem, brings about depression and anxiety, and strains personal relationships (Darity and Goldsmith 1996; Feather 1990). Meanwhile, being employed is an indication of financial stability which improves the opportunity to obtain funding to buy a house (Doling et al. 1986; Mulder and Hooimeijer 1995). The opposite holds for being unemployed.

2.2.7 Region

Economic development, and the social and physical conditions vary across regions in China (Demurger 2001; Zhang et al. 2014). For instance, households in the coastal region enjoy better public facilities and infrastructure. The regional disparities may result in disparities in life satisfaction (c.f. Mohan and Twigg 2007). Meanwhile, the development of the housing market also varies across regions in urban China (Yu 2006; Ren et al. 2016). Generally, housing affordability in the inland region is higher than in the central and coastal regions. Thus, the rate of home ownership in the inland region tends to be higher than in the central and coastal regions.

The confoundedness between home ownership and life satisfaction is summarized in Fig. 1.

3 Methodology

Propensity score matching (PSM) is a widely applied approach to assess the impact of a treatment based on non-experimental data (Caliendo and Kopeinig 2008). It estimates the propensity score (probability) to be treated for each treated and untreated individual and

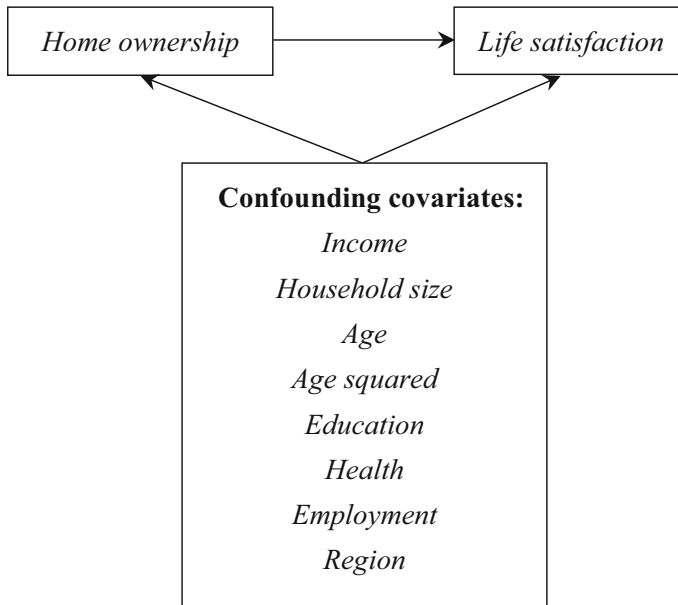


Fig. 1 The confoundedness between home ownership and life satisfaction

matches a treated individual with one or multiple untreated individuals who have the same, or a highly similar, propensity score. The method reduces multiple observable differences to a one-dimensional difference, i.e. the difference due to the treatment (Abbay and Rutten 2016; Dehejia and Wahba 2002). It thus eliminates confoundedness between the treatment and outcome.

In the present case study of home ownership and life satisfaction, the former variable can be viewed as treatment and the latter as outcome. As shown in Fig. 1, in addition to the treatment, there are several other differences between home owners and renters that affect life satisfaction, but also home ownership, i.e. the confounding covariates. The PSM controls the confounding covariates in the estimation of the impact of home ownership on life satisfaction.

PSM is based on two assumptions: conditional independence and common support (Rosenbaum and Rubin 1985). In terms of home owners as the treatment group, renters as the control group and life satisfaction as the outcome, the conditional independence assumption reads:

$$(Y_1, Y_0) \perp D|X, \quad (1)$$

where Y_1 and Y_0 stand for the life satisfaction of the home owners and renters, respectively, D denotes housing tenure ($D = 1$: home owner; $D = 0$: renter), and X stands for the set of observable confounding covariates. The assumption implies that after controlling for X , confoundedness between home ownership and life satisfaction is eliminated, and housing tenure is randomly chosen by individuals.

The common support assumption reads:

$$0 < P(D = 1|X) < 1, \quad (2)$$

where $P(\cdot)$ is the probability of being a home owner conditional on X . This assumption implies that given X , individuals have positive probability of being a home owner. It ensures that there is sufficient overlap in the observable covariates of home owners and renters to obtain sufficient matches.

PSM is conducted in three steps. The first is the estimation of a propensity score for each observation. In this paper, the propensity score is the probability of being a home owner conditional on X :

$$P(D = 1|X) = f(X). \quad (3)$$

To estimate the propensity score, housing tenure choice is taken as the dependent variable. As it is a dichotomous variable, both logit and probit models can be applied. As there is no common rule for choosing one model over the other, we adopt the model which maximizes the likelihood ratio (Wooldridge 2010).

Dehejia and Wahba (1999), and Heckman et al. (1998) argue that estimation of the propensity score should be based on variables that affect both treatment assignment (home ownership) and treatment outcome (life satisfaction).⁸ Furthermore, Smith and Todd (2005) and Tano (2014) argue that inclusion of irrelevant variables in the propensity score estimation can lead to biased estimation. Therefore, following the discussion in Sect. 2.2, we take income, household size, age, age squared, education, health condition and

⁸ From these references it follows that systematic omitted variables that affect both home ownership and life satisfaction lead to omitted variables bias. It also follows that variables that are not significant in the home ownership model need not be considered for matching. To reduce the above two risks, we thoroughly reviewed the literature on the determinants of home ownership and life satisfaction (see Sect. 2.2).

employment status as covariates to estimate the propensity score. Furthermore, two regional dummies (one for the coastal region, the other for the central region; the inland region as the reference group) are included to account for regional disparities.

Note that the confounding covariates income is controlled by estimating separate models for low, medium and high income groups. The reason for this is that the other confounding factors strongly differ by income group (see Table 2; Sect. 4.2.1). See inter alia Long et al. (2009), Manoj and Verma (2015), Scopelliti et al. (2016) and Smith (2003) who also control income by estimating separate models by income group. As observed in Sect. 1, the low and medium income groups are quite narrow. Consequently, within-group income variation and confoundedness caused by it are likely to be small. For the high income group within-group variation is larger and the home ownership impact may be biased upwards.

The second step is to match home owners and renters based on their estimated propensity scores and to estimate the impact of home ownership on life satisfaction. A variety of matching methods can be applied, particularly k -nearest neighbors, kernel, and radius matching.

The k -nearest neighbors method matches a home owner with k renters ($k \geq 1$) who are closest in terms of the estimated propensity score and estimates the impact of home ownership by comparing the life satisfaction of a given home owner with the average life satisfaction of the matched renters. The k -nearest neighbor estimator of the impact of home ownership ($IM^{k\text{-nearest}}$) reads:

$$IM^{k\text{-nearest}} = \frac{1}{n} \sum_{i=1}^n \left(y_{1i} - \frac{1}{k} \sum_{j=1}^k y_{0j} \right), \tag{4}$$

where n is the number of observations of home owners, y_{1i} the life satisfaction of home owner i , and y_{0j} the life satisfaction of renter j . A drawback of this method is that matches are poor, if the closest renters are “far away”.

Kernel matching is a nonparametric method. It estimates the impact of home ownership by comparing each homeowner with a weighted average of life satisfaction of all the renters (Caliendo and Kopeinig 2008). The kernel estimator of the impact of home ownership (IM^{kernel}) reads:

$$IM^{\text{kernel}} = \frac{1}{n} \sum_{i=1}^n \left(y_{1i} - \sum_{l=1}^n w_{il} y_{0l} \right), \tag{5}$$

with w_{il} defined as:

$$w_{il} = G\left(\frac{p_{1i} - p_{0l}}{b}\right) \bigg/ \sum_{l=1}^n G\left(\frac{p_{1i} - p_{0l}}{b}\right) \tag{6}$$

where p_{1i} is the propensity score of home owner i , p_{0l} the propensity score of renter l , $G(\cdot)$ the Gaussian kernel function, and b a pre-defined bandwidth. An advantage of this method is the lower variance as more renters are used. A drawback is that poor matches (renters “far away” from owners) may be included in the estimation (Heinrich et al. 2010).

The radius method matches a home owner with all renters who are within a predefined propensity score range. The radius estimator of the impact of home ownership (IM^{radius}) reads:

$$IM^{\text{radius}} = \frac{1}{n} \sum_{i=1}^n \left(y_{1i} - \frac{1}{r} \sum_{m=1}^r y_{0m} \right). \quad (7)$$

where r is the number of renters within the predefined propensity score range, y_{0m} the life satisfaction of renter m . The radius matching method allows for usage of more renters when more matches are available within the propensity score range (Heckman et al. 1998). However, it excludes good matches which are out of the range. Below, we apply the radius matching method and use k -nearest neighbor and kernel matching for sensitivity analysis.

The third step is to assess the quality of matching. This can be done by testing whether there are significant differences between covariate means of home owners and renters after matching. Insignificant differences indicate that matching has been successful. Following Rosenbaum and Rubin (1985), we apply a series of two-sample t tests to assess the quality of matching.

4 Data and Empirical Results

4.1 Data and Descriptive Statistics

The dataset analyzed in this paper comes from the 2010 wave of the national Chinese General Social Survey (CGSS). This survey covers all 22 provinces, four major metropolitan municipalities, and five autonomous regions in mainland China. It is based on three-stage stratified sampling as follows: (1) county/district, (2) village/community, and (3) household. At the first stage, 140 counties/districts were randomly selected from 2585 counties/districts nationwide. At the second stage, 480 villages/communities were randomly sampled from the 140 counties/districts selected at the first stage. At the third stage, 25 households were randomly selected from each of the 480 villages/communities. One person –18 years old or older—in each selected household was interviewed. Information on personal characteristics, household conditions, life satisfaction and housing tenure was collected.

Based on the three-stage stratified sampling, 4561 rural households and 7222 urban households were interviewed in the 2010 wave of the CGSS. Because of substantial differences in housing supply between urban and rural households,⁹ we only consider urban households and exclude rural households from the analysis. Another 1148 observations (15.90% of total observations in urban areas) were excluded due to incomplete information. Ultimately a data set of 6074 observations was available.

As discussed in Sect. 2, the channels by which home ownership impacts life satisfaction vary across different income groups. We thus categorized the 6074 observations into three, approximately equally-sized income groups.

Descriptive statistics on life satisfaction, home ownership, individual and household characteristics are reported in Table 1.¹⁰ For the entire sample, the home ownership rate is 77.21%. In the three income groups- from low to high- it is 74.37, 77.63 and 79.64%,

⁹ Different from urban areas, in rural areas there is no housing market and few houses are available for renting. In addition, there are few housing development companies in rural areas. Instead of purchasing houses in the housing market, rural residents are able to obtain land in their villages at low cost, and build their own houses. As a result, home ownership in rural areas is substantially higher than in urban areas (97.47 vs 74.24% in 2010) (The 2010 Population Census of China 2012).

¹⁰ t tests for the unmatched groups can be found in “Appendix”.

Table 1 Descriptive statistics

Variables	Poole sample			Low income			Medium income			High income		
	Mean	SD	Max	Mean	SD	Max	Mean	SD	Max	Mean	SD	Max
Home owner												
Life satisfaction	3.85	0.83	5	3.62	0.94	5	3.85	0.79	5	4.07	0.68	5
Household size (persons)	2.92	1.32	10	2.73	1.40	10	2.89	1.24	10	3.12	1.30	9
Age (years)	49.26	15.56	92	51.60	15.52	92	50.36	15.56	90	46.01	15.06	90
Age squared (/100)	26.69	6.04	84.64	29.03	16.58	84.64	27.78	16.01	81.00	23.43	15.00	81.00
Junior high	0.28	0.45	1	0.35	0.48	1	0.32	0.46	1	0.18	0.39	1
Senior high	0.26	0.44	1	0.21	0.41	1	0.30	0.46	1	0.28	0.45	1
Vocational	0.12	0.32	1	0.04	0.19	1	0.12	0.32	1	0.20	0.40	1
Bachelor and higher	0.11	0.31	1	0.02	0.14	1	0.06	0.24	1	0.23	0.42	1
Unhealthy	0.15	0.36	1	0.22	0.42	1	0.16	0.36	1	0.07	0.26	1
Neutral	0.25	0.43	1	0.25	0.43	1	0.27	0.44	1	0.24	0.43	1
Unemployed	0.39	0.49	1	0.50	0.50	1	0.36	0.48	1	0.26	0.44	1
Coastal region	0.51	0.50	1	0.51	0.50	1	0.52	0.50	1	0.51	0.50	1
Central region	0.27	0.44	1	0.26	0.44	1	0.26	0.44	1	0.27	0.45	1
Obs.	4690			1506			1572			1612		
Renter												
Life satisfaction	3.70	0.91	5	3.57	0.98	5	3.64	0.94	5	3.93	0.73	5
Household size (persons)	2.53	1.19	9	2.46	1.19	8	2.60	1.17	7	2.53	1.21	9
Age (years)	43.60	15.21	97	47.00	15.83	97	43.97	14.81	95	38.92	13.60	89
Age squared (/100)	21.32	14.97	94.09	24.59	16.09	94.09	21.52	14.70	90.25	17.00	12.58	79.21
Junior high	0.32	0.43	1	0.35	0.48	1	0.37	0.48	1	0.22	0.42	1
Senior high	0.25	0.43	1	0.24	0.43	1	0.26	0.44	1	0.25	0.43	1
Vocational	0.12	0.32	1	0.07	0.25	1	0.11	0.31	1	0.19	0.39	1
Bachelor and higher	0.10	0.31	1	0.03	0.18	1	0.08	0.27	1	0.22	0.42	1

Table 1 continued

Variables	Poole sample			Low income			Medium income			High income		
	Mean	SD	Max	Mean	SD	Max	Mean	SD	Max	Mean	SD	Max
Unhealthy	0.13	0.33	0	0.18	0.39	0	0.12	0.32	0	0.07	0.26	0
Neutral	0.24	0.43	0	0.27	0.45	0	0.22	0.42	0	0.21	0.41	0
Unemployed	0.51	0.50	0	0.63	0.48	0	0.53	0.50	0	0.37	0.48	0
Coastal region	0.51	0.50	0	0.51	0.50	0	0.50	0.50	0	0.52	0.50	0
Central region	0.29	0.45	0	0.29	0.45	0	0.31	0.46	0	0.26	0.44	0
Obs.	1384			519			453			412		
Home ownership (%)	77.21			74.37			77.63			79.64		

Life satisfaction is measured on a 5-point scale, ranging from 1 (very unsatisfied) to 5 (very satisfied). Household size is the number of family members living in the same house. Education is the highest education degree that the respondent achieved. Health is self-reported health status (healthy/neutral/unhealthy)

respectively. The means of household size, age and age squared differ between home owners and renters in all groups.

Life satisfaction was measured by the response to the question: how satisfied are you with your life as a whole? The responses are measured on a 5-point scale, ranging from 1 (very unsatisfied) to 5 (very satisfied). The descriptive statistics in Table 1 and Fig. 2 show that the majority of the respondents are satisfied which is consistent with Appleton and Song (2008) and Oishi et al. (1999). 74.61% of the respondents is satisfied or very satisfied (see Fig. 2). Only 8.32% is unsatisfied or very unsatisfied. High income individuals have higher life satisfaction than medium and low income individuals. Generally, home owners are more satisfied than renters.¹¹ The difference in life satisfaction between home owners and renters also varies across income groups (see Table 1). The average difference is 0.05 points in the low income group, 0.21 in the medium income group and 0.14 in the high income group.

4.2 Empirical Results

4.2.1 PSM Analysis

We used STATA 12.0 to perform the PSM analysis. Below, we first report steps 1 and 2. Next, we discuss the quality of matching. Finally, we report the results of the sensitivity analysis.

Table 2 reports the estimated home ownership logit models for the pooled sample and for the three income groups. The p value for overall significance is smaller than 1% for all four samples. Furthermore, although the Pseudo R^2 is rather low, most of the explanatory variables are significant at conventional levels.¹² In line with the existing literature (see amongst others Fisher and Gervais 2011; Huang and Clark 2002), household size has a significant positive impact on home ownership for all income groups indicating that individuals who have a larger family are more likely to be home owners. Consistent with Feijten et al. (2003), age has an inverted U-shaped relationship with home ownership for all income groups, although the coefficient of the quadratic term is significant in the pooled sample only. For the medium and high income groups, individuals with higher education are more likely to be home owners. For the low income group, the impact of education is negative, though insignificant. A possible explanation is that individuals with higher education but low income, hold jobs below their qualifications and thus have an incentive to change jobs. To increase their geographical mobility, they prefer to live in rented houses rather than in self-owned houses.

Health has miscellaneous impacts across the income groups. For low and high income groups, unhealthy individuals are less likely to be home owners, although the impacts are insignificant. The only significant health category with a negative sign is neutral for low income earners. For all income groups, being unemployed negatively affects house ownership. Finally, compared with individuals in the inland region, individuals in the coastal

¹¹ Note that this difference is before matching.

¹² Note that low (Pseudo) R^2 s are common in cross section studies. More importantly, a low R^2 does not affect identification of significant determinants and the notion of *ceteris paribus*, if the zero conditional mean assumption holds (Wooldridge 2010).

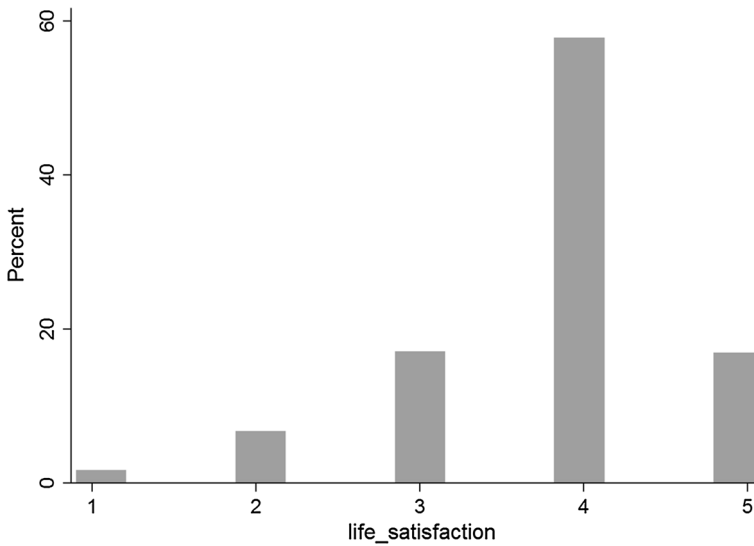


Fig. 2 Frequency distribution of life satisfaction for the pooled sample. 1 very unsatisfied, 2 unsatisfied, 3 neutral, 4 satisfied, 5 very satisfied. Number of observations = 6074

and central regions are less likely to be home owners, although the impact is only significant for medium income earners.¹³

Figure 3 shows the distribution of the propensity scores of home owners and renters for the pooled sample as well as for the different income groups. The figure indicates that there are no comparable matches for two home owners in the pooled sample, ten in the low income group, three in the medium income group, and twelve in the high income group (see the green part in Fig. 3). These home owners were excluded from the analysis to ensure the common support condition, i.e. that there are comparable matches for each home owner.

After estimation of the propensity scores, radius matching was applied to match home owners with renters and to estimate the impact of home ownership on life satisfaction. Table 3 summarizes the results before and after matching. Note that “Matched” stands for the average treatment impact of home ownership after matching and “Unmatched” for the average impact before matching. Table 3 shows that the estimated impact of home ownership (the average life satisfaction score of home owners—the average life satisfaction score of renters) after matching is generally lower than the estimated impact before matching. For the pooled sample, the estimated impacts are 0.12 (3.85–3.73) and 0.15 (3.85–3.70) for the Matched and Unmatched, respectively. After matching, the estimated impact drops by 20.00%. For the low income group, matching causes the estimated impact to decrease from 0.05 to 0.01 (80.00% drop). Meanwhile, for the medium and high income groups, the estimated impacts decrease from 0.22 to 0.21 (4.55% drop) and from 0.14 to 0.11 (21.43% drop), respectively. It follows that PSM eliminates upward bias in this case study. We next discuss the impact of home ownership on life satisfaction after matching.

¹³ We also estimated a model with marital status as an explanatory variable. Its coefficient was highly insignificant for all income groups. Therefore, it was not considered further.

Table 2 Propensity score logit model

Variable	Pooled sample	Low income	Medium income	High income
<i>Dependent variable: home ownership (1 = home owner, 0 = renter)</i>				
<i>Independent variables</i>				
Household size (persons)	0.36*** (0.03)	0.26*** (0.05)	0.33*** (0.05)	0.47*** (0.05)
Age (years)	0.07*** (0.01)	0.05*** (0.02)	0.06*** (0.02)	0.08*** (0.02)
Age squared (/100)	-0.03* (0.01)	-0.03 (0.02)	-0.03 (0.02)	-0.03 (0.03)
Junior high ^a	0.13 (0.09)	0.01 (0.14)	0.09 (0.16)	0.37* (0.22)
Senior high ^a	0.44*** (0.10)	-0.02 (0.16)	0.56*** (0.17)	0.79*** (0.22)
Vocational ^a	0.64*** (0.12)	-0.32 (0.26)	0.78*** (0.22)	0.98*** (0.23)
Bachelor and higher ^a	0.81*** (0.13)	0.01 (0.35)	0.57** (0.26)	1.19*** (0.24)
Unhealthy ^b	-0.12 (0.10)	-0.07 (0.15)	0.01 (0.18)	-0.38 (0.24)
Neutral ^b	-0.13* (0.08)	-0.22* (0.13)	0.05 (0.14)	-0.14 (0.15)
Unemployed ^c	-0.35*** (0.08)	-0.37*** (0.12)	-0.42*** (0.13)	-0.33** (0.15)
Coastal region ^d	-0.15* (0.08)	-0.02 (0.14)	-0.22* (0.15)	-0.13 (0.15)
Central region ^d	-0.15* (0.09)	-0.18 (0.15)	-0.26 (0.16)	0.02 (0.17)
Constant	-2.01*** (0.30)	-1.10** (0.52)	-1.62*** (0.56)	-2.88*** (0.56)
Obs.	6074	2025	2025	2024
Pseudo R ²	0.16	0.14	0.16	0.20
LR χ^2	392.59	92.71	133.05	101.33
p-value	0.00	0.00	0.00	0.00

Standard errors in parenthesis

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ ^a Reference group: Primary school and lower^b Reference group: Healthy^c Reference group: Employed^d Reference group: Inland region

Consistent with Hu (2013) and Lin et al. (2012), we find that home ownership positively impacts life satisfaction. For the pooled sample and the medium income group, the difference is significant at 1%, for the high income earners at 5% while for low income earners the p value is larger than 50%. We furthermore find that the magnitude of the impact varies across income groups. Specifically, home ownership increases life satisfaction by 0.21 and 0.11 points for the medium and high income groups, respectively. For

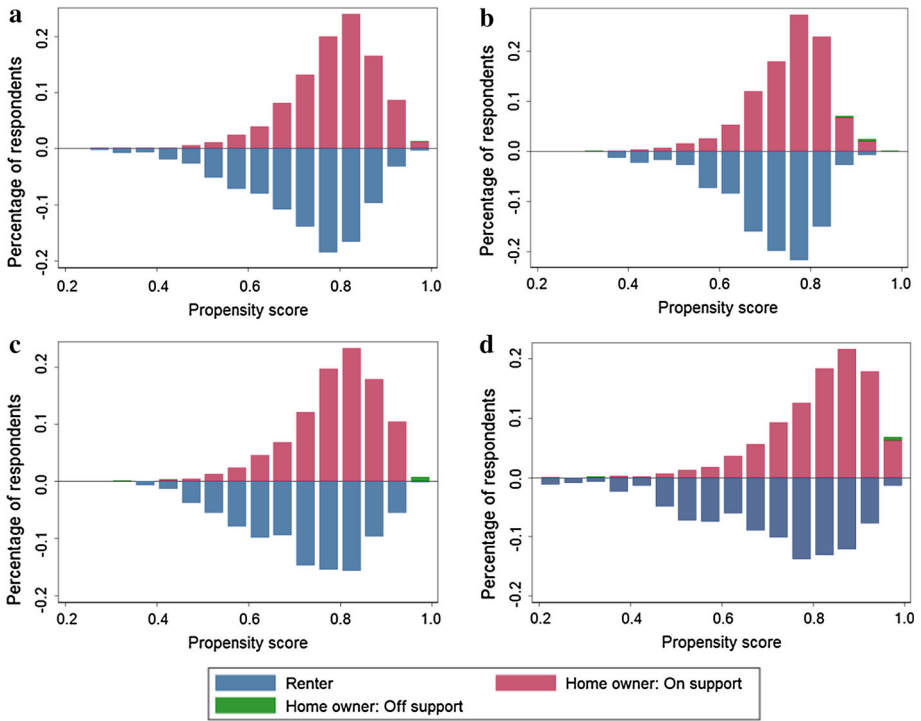


Fig. 3 Propensity score distributions. **a** pooled sample, **b** low income group, **c** medium income group, **d** high income group

Table 3 Radius matching estimation of the impact of home ownership on life satisfaction

Sample	Owner	Renter	Difference	SE	No. owners	No. renters
<i>Pooled sample</i>						
Unmatched	3.85	3.70	0.15***	0.03	4690	1384
Matched	3.85	3.73	0.12***	0.03	4687	1384
<i>Low income</i>						
Unmatched	3.62	3.57	0.05	0.05	1506	519
Matched	3.62	3.61	0.01	0.05	1492	519
<i>Medium income</i>						
Unmatched	3.85	3.64	0.22***	0.04	1572	453
Matched	3.85	3.64	0.21***	0.06	1558	453
<i>High income</i>						
Unmatched	4.07	3.93	0.14***	0.04	1612	412
Matched	4.07	3.96	0.11**	0.05	1600	412

Radius matching with caliper 0.01

** $p < 0.05$; *** $p < 0.01$

the low income group, however, life satisfaction of home owners is only 0.01 point higher than that of renters. This latter result is in line with Hypothesis 1 in Sect. 2 that home ownership for low income earners has a small or negative impact on life satisfaction

because of the heavy financial burden it brings about in urban China (Cheng et al. 2013), and because low income individuals commonly own houses in poorly developed neighborhoods on the city fringes (Grinstein-Weiss et al. 2011; Harkness and Newman 2002).

Note that the impact of home ownership on life satisfaction for the medium income group is the largest and the impact for the low income group the smallest. These results are consistent with the existing socio-psychological literature which shows that the socioeconomic status gap between the high and medium income groups is smaller than between the medium and low income groups (Antonovsky 1967). Therefore, the medium income group is inclined to seek high-status goods ownership (such as home ownership) to raise their socioeconomic status and to narrow the gap with respect to the high income group. The low income group perceives the large status gap as unbridgeable and lowers down the desire for high-status goods (Sivanathan and Pettit 2010).

We next assess the quality of the PSM analysis. For that purpose, we apply t tests of the differences between home owners and renters in the population means of the covariates, i.e. we apply t tests of the balancing hypotheses, as proposed by Dehejia and Wahba (2002) and Rosenbaum and Rubin (1985). The null hypothesis is that there are no significant differences between home owners and renters in population means of the covariates after matching. “Appendix” presents the test results before and after matching. The results indicate that radius matching has substantially reduced the population differences between home owners and renters in means of all covariates, especially of Household size, Age, Age squared divided by 100, Junior high, Unhealthy and Unemployed. After matching, none of the null hypotheses of no difference in the means is rejected at conventional levels indicating that the matching of home owners and renters was successful.

We finally check the robustness of the matching by means of sensitivity analysis using k -nearest neighbor and kernel matching. The results are presented in Table 4. The estimated differences in life satisfaction estimated by k -nearest neighbor(s) and kernel matching are marginally different from those estimated by radius matching in terms of magnitude and significance indicating that the results are robust to matching algorithm.

4.2.2 Ordered Probit Analysis

To illustrate the fact that PSM controls confoundedness, we ran an ordered probit regression of life satisfaction for the three income groups on the same covariates as in Table 2 using STATA 12.0. The estimates are presented in Table 5. We focus the discussion on the coefficient of home ownership. Consistent with Hypothesis 1, the results indicate that home ownership has a significant positive impact on life satisfaction for the medium and high income groups, and insignificant positive impact for the low income group. The confounding variables have expected sign.

Comparing the results presented in Tables 3 and 5 shows that the impact of home ownership on life satisfaction estimated by ordered probit regression is larger than PSM outcomes before and after matching. For the low income group, the ordered probit coefficient is 0.06 which exceeds the before and after matching PSM coefficients of 0.01 and 0.05, respectively. For the medium income group, the ordered probit coefficient exceeds the before and after matching PSM coefficients by 0.03 and 0.04, respectively. For the high income group, the differences are 0.05 and 0.08, respectively. The results indicate that PSM controls confoundedness and reduces estimation bias.

Table 4 Sensitivity analysis of home ownership's impact on life satisfaction

Sample	Radius matching			<i>k</i> -nearest neighbor matching			Kernel matching					
	Owner	Renter	Difference	SE	Owner	Renter	Difference	SE	Owner	Renter	Difference	SE
<i>Pooled sample</i>												
Unmatched	3.85	3.70	0.15***	0.03	3.85	3.70	0.15***	0.03	3.85	3.70	0.15***	0.03
Matched	3.85	3.73	0.12***	0.03	3.85	3.73	0.12***	0.03	3.85	3.72	0.13***	0.03
<i>Low income</i>												
Unmatched	3.62	3.57	0.05	0.05	3.62	3.57	0.05	0.05	3.62	3.57	0.05	0.05
Matched	3.62	3.61	0.01	0.05	3.62	3.60	0.02	0.06	3.62	3.60	0.01	0.05
<i>Medium income</i>												
Unmatched	3.85	3.64	0.22***	0.04	3.85	3.64	0.22***	0.04	3.85	3.64	0.22***	0.04
Matched	3.85	3.64	0.21***	0.06	3.85	3.64	0.21***	0.06	3.85	3.64	0.21***	0.06
<i>High income</i>												
Unmatched	4.07	3.93	0.14***	0.04	4.07	3.93	0.14***	0.04	4.07	3.93	0.14***	0.04
Matched	4.07	3.96	0.11**	0.05	4.06	3.95	0.11**	0.05	4.07	3.97	0.10**	0.05

Radius matching with caliper 0.01, *k*-nearest neighbor matching with *k* = 5, kernel matching with bandwidth 0.01

We also assessed the quality of the *k*-nearest neighbor and kernel matching by means of *t* tests. The results indicate that *k*-nearest neighbor and kernel matching also substantially reduce the differences in population means of all covariates. After matching, there are no significant differences in the means of the covariates between the home owners and renters for these matching procedures

** *p* < 0.05, *** *p* < 0.01

Table 5 Ordered probit regression

Variable	Low income	Medium income	High income
<i>Dependent variable: life satisfaction</i>			
<i>Independent variables</i>			
Home ownership (1 = home owner, 0 = renter)	0.06 (0.06)	0.25*** (0.06)	0.19*** (0.07)
Household size (persons)	0.03 (0.02)	0.01 (0.02)	0.02 (0.02)
Age (years)	-0.04*** (0.01)	-0.04*** (0.01)	-0.02*** (0.01)
Age squared (/100)	0.04*** (0.01)	0.05*** (0.01)	0.03*** (0.01)
Junior high ^a	0.11* (0.06)	0.11 (0.07)	0.03 (0.10)
Senior high ^a	0.11 (0.07)	0.01 (0.07)	0.06 (0.09)
Vocational ^a	0.08 (0.13)	0.10 (0.10)	0.11 (0.10)
Bachelor and higher ^a	0.09 (0.18)	0.03 (0.11)	0.03 (0.10)
Unhealthy ^b	-0.56*** (0.07)	-0.63*** (0.08)	-0.36*** (0.10)
Neutral ^b	-0.31*** (0.06)	-0.37*** (0.06)	-0.33*** (0.06)
Unemployed ^c	-0.08 (0.05)	-0.01 (0.06)	-0.11* (0.07)
Coastal region ^d	0.21*** (0.06)	0.20*** (0.06)	0.13** (0.06)
Central region ^d	0.17*** (0.07)	0.17** (0.07)	0.17*** (0.07)
Observations	2025	2025	2024
Pseudo R ²	0.06	0.05	0.07
LR χ^2	150.48	149.25	73.22
<i>p</i> value	0.00	0.00	0.00

Standard errors in parenthesis

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ ^a Reference group: Primary school and lower^b Reference group: Healthy^c Reference group: Employed^d Reference group: Inland region

5 Conclusions and Policy Implications

This paper has examined the impact of home ownership on life satisfaction in urban China based on the 2010 wave of the China General Social Survey. To control for the methodological problem-confoundedness of the determinants of home ownership and life satisfaction- propensity score matching (PSM) was applied. The adequacy of PSM was checked by comparing its outcomes to the estimates obtained by ordered probit regression. Moreover, as

the channels by which the impacts of home ownership on life satisfaction vary across income groups, the paper estimated separate models for low, medium and high income groups.

The main results are the following. First, differences in population means of the covariates between home owners and renters in urban China were successfully controlled by means of radius matching. Secondly, the estimated impact of home ownership after matching was lower than before matching in all three income groups which indicates that in the present case study confoundedness leads to upward bias of the impact of home ownership on life satisfaction. Thirdly, consistent with existing literature, we found that home ownership has a positive impact on life satisfaction. However, the magnitude of the impact varies across income groups. Specifically, home ownership increases life satisfaction by 0.21 (1% significance level) and 0.11 points (5% significance level) for the medium and high income groups, respectively. For the low income group, the increase is about 0.01 point and is statistically insignificant.

Comparison of the results estimated by ordered probit regression and PSM indicates that the impacts of home ownership on life satisfaction estimated by the former method are larger than those estimated by the latter. These results indicate that PSM enables to control confoundedness and thus to reduce estimation bias and that it is more appropriate to control confoundedness than probit regression while applying cross-sectional survey data.

The results are related to the objectives of China's national and regional development policies and have the following policy implications. First, after the 1998 housing reform, the so-called welfare-oriented housing allocation system was substituted for a market-oriented system. Particularly, houses owned and allocated by governments and institutions were sold to urban residents. As home owners, they could secure their user rights, adjust their houses to suit their needs and obtain a vehicle to increase their wealth. The outcomes of the analysis presented above show that the policy has been successful for medium and high income groups and therefore deserves continuation. This applies especially to provinces where the home ownership rate is still low, notably Guangdong, Fujian, and Beijing, where the home ownership rates are 48, 51 and 57%, respectively.

Secondly, the results of this study show that for the low income group home ownership has not yet started increasing life satisfaction. One main reason for this is that owning a home brings about heavy financial burdens to low income individuals in urban China (Cheng et al. 2013). Another is that low income individuals commonly own houses in poorly developed neighborhoods (Grinstein-Weiss et al. 2011). To make home ownership more beneficial to low income earners, specific programs may be designed to make home ownership financially affordable for low income groups.

Thirdly, local governments may initiate or intensify urban (renewal) programs to improve poor public facilities including public transportation, green space and sports accommodations in the immediate vicinity of depressing low income neighborhoods. However, there is a tendency for lower middle class income groups to buy houses in such renewed neighborhoods which implies a risk of crowding out of low income earners (Susin 2002). Therefore, regulation should be introduced to protect low income earners from competition and crowding out.

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Appendix

See Table 6.

Table 6 Balance tests for radius matching

Variables	sample	Poole sample				Low income				Medium income				High income			
		Mean		t	p > t	Mean		t	p > t	Mean		t	p > t	Mean		t	p > t
		Owner	Renter			Owner	Renter			Owner	Renter			Owner	Renter		
Household size (persons)	Unmatched	2.92	2.53	9.93	0.00	2.73	2.46	3.98	0.00	2.89	2.60	4.49	0.00	3.12	2.53	8.34	0.00
	Matched	2.91	2.92	-0.21	0.84	2.70	2.71	-0.17	0.86	2.87	2.90	-0.78	0.43	3.11	3.10	-0.35	0.73
Age (years)	Unmatched	49.26	43.60	11.95	0.00	51.60	47.00	5.79	0.00	50.36	43.97	7.78	0.00	46.01	38.92	8.69	0.00
	Matched	49.26	49.25	0.04	0.97	51.58	51.64	-0.10	0.92	50.29	50.07	0.39	0.70	45.93	45.63	1.10	0.27
Age squared (/100)	Unmatched	26.69	21.33	11.10	0.00	29.04	24.59	5.31	0.00	27.78	21.53	7.46	0.00	23.43	16.99	8.02	0.00
	Matched	26.69	26.64	0.13	0.90	29.00	29.06	-0.09	0.93	27.70	27.37	0.56	0.58	23.33	22.96	1.32	0.19
Junior high	Unmatched	0.28	0.32	-2.71	0.01	0.35	0.35	-0.11	0.91	0.32	0.37	-2.13	0.03	0.18	0.22	-1.74	0.08
	Matched	0.28	0.28	0.23	0.82	0.35	0.35	0.14	0.89	0.31	0.32	-0.42	0.68	0.18	0.18	0.11	0.91
Senior high	Unmatched	0.26	0.25	1.23	0.22	0.21	0.24	-1.30	0.20	0.30	0.26	1.77	0.08	0.28	0.25	1.19	0.23
	Matched	0.26	0.26	0.76	0.45	0.21	0.22	-0.39	0.69	0.30	0.29	0.25	0.81	0.28	0.26	1.41	0.16
Vocational	Unmatched	0.12	0.12	0.16	0.87	0.04	0.07	-3.20	0.00	0.12	0.11	0.50	0.62	0.20	0.19	0.51	0.61
	Matched	0.12	0.13	-0.96	0.34	0.03	0.04	-0.55	0.58	0.12	0.12	-0.12	0.91	0.20	0.22	-1.43	0.15
Bachelor and higher	Unmatched	0.11	0.10	0.27	0.79	0.02	0.03	-1.78	0.08	0.06	0.08	-1.24	0.22	0.23	0.22	0.41	0.68
	Matched	0.11	0.10	0.91	0.36	0.02	0.02	-0.17	0.87	0.06	0.06	-0.09	0.93	0.23	0.24	-0.66	0.51
Unhealthy	Unmatched	0.15	0.13	1.88	0.06	0.22	0.18	1.83	0.07	0.16	0.12	2.08	0.04	0.07	0.07	0.07	0.94
	Matched	0.15	0.15	-0.22	0.83	0.22	0.22	-0.19	0.85	0.16	0.15	0.06	0.95	0.07	0.07	0.55	0.58
Neutral	Unmatched	0.25	0.24	1.11	0.27	0.25	0.27	-1.08	0.28	0.27	0.22	2.12	0.03	0.24	0.21	1.11	0.27
	Matched	0.25	0.26	-0.83	0.40	0.25	0.26	-0.91	0.36	0.27	0.27	-0.00	1.00	0.24	0.23	0.66	0.51
Unemployed	Unmatched	0.39	0.51	-7.87	0.00	0.50	0.63	-5.08	0.00	0.36	0.53	-6.17	0.00	0.26	0.37	-4.08	0.00
	Matched	0.39	0.39	-0.07	0.94	0.50	0.50	-0.22	0.82	0.36	0.34	0.78	0.43	0.26	0.24	1.50	0.13
Coastal region	Unmatched	0.51	0.51	0.28	0.78	0.51	0.51	0.03	0.98	0.52	0.50	0.65	0.52	0.51	0.52	-0.20	0.84
	Matched	0.51	0.50	0.85	0.40	0.51	0.51	-0.00	1.00	0.52	0.51	0.57	0.57	0.51	0.51	0.02	0.98

Table 6 continued

Variables	sample	Poole sample				Low income				Medium income				High income			
		Mean		t test		Mean		t test		Mean		t test		Mean		t test	
		Owner	Renter	t	p > t	Owner	Renter	t	p > t	Owner	Renter	t	p > t	Owner	Renter	t	p > t
Central	Unmatched	0.27	0.29	-1.49	0.14	0.26	0.29	-1.06	0.29	0.26	0.31	-1.92	0.06	0.27	0.26	0.45	0.66
region	Matched	0.27	0.28	-1.07	0.29	0.26	0.27	-0.13	0.89	0.26	0.27	-0.65	0.52	0.27	0.29	-1.01	0.31

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