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Homeownership in urban China: An empirical study of the Housing Provident Fund

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Abstract

The relentless effort of the government to control rising house prices in urban China have differential impacts on the various segments of the population due to their differential demand for homeownership. Hence, it is important for the government to have a better understanding of the underlying demand for homeownership, especially with respect to the different demographic variables and accessibility to loans and housing providence funds (HPF), in order to provide a more comprehensive strategy and to address some of the equity issues that may arise from these countermeasures. To this effect, this paper develop and estimate a binary logit model of homeownership and accessibility to HPF loans using a variety of demographic variables. Our findings document that high school graduates are less likely to own a house while people with longer duration of employment and households who are married and with children are more likely to own a house. The results also show that gender, marital status, education level, high annual income and duration of employment are significantly related to HPF loan use for homeownership.

JEL Classification: G10, G20, G21

Keywords: housing provident fund, homeownership, loans, logistic regression

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1. Introduction

The housing market in China has experienced significant changes since the housing reform at the end of 1970s. For instance, the Chinese government abandoned the welfare housing system and allowed people to purchase their own houses in 1978. Meanwhile, the acceleration of urbanization causes a dramatic increase in the population of urban China, thereby causes is a strong increase in the demand for housings in urban China (Zhou, 1999). China's urban population increased from 459.06 million to 621.86 million during the period of 2000 to 2009 (National Bureau of Statistics of China, 2009). With the increase in the development of the housing market and rising in housing demand, the housing price surged rapidly over the last ten years, especially in the first-tier cities such as Beijing, Shanghai and Shenzhen. According to the National Bureau Statistic of China (2009), the housing price in Beijing increased from 4557 renminbi (RMB) per square meter to 11648 RMB per square meter for the period 2000 to 2008. To curb the housing price and control the boom in housing market, the government implemented a series of tightening measures in the beginning of 2010, such as increasing the down payment and rising mortgage rates.

With rising house prices, China's housing policy focused on people's affordability in purchasing a new house. The term housing affordability is used to summarize the difficulties individual household faces with accessing adequate housing loans (Hulchanski, 1995). According to Mak, Choy and Ho (2007), affordability is the ratio of the property value over an individual's annual gross income; the ratio of 2.5 was established by Freddie Mac as a benchmark. However, it varied greatly among cities in China. In Shanghai, for the same standard size apartment, it was priced around 273,180 yuan in 2003, the affordability ratio was 13.6, which indicated that an individual would spend 13.6 years to purchase the apartment out rightly. Lau and Li (2006) reported that it was worth 239,700 yuan in Guangzhou, with the same floor space; it was 5.69 times more than the annual gross household income.

Chen, Hao and Turner (2006) and Burell (2006) found that there was a large gap between house prices and people's income in Shanghai; the increase in people's income cannot keep up with the rise in the house prices. They also pointed out that less than 20 percent of Shanghai residents can afford to buy a standardized new home. Similarly, Yang and Shen (2008) and Ahuja et al. (2010) pointed out that house price in Beijing increased at an average rate of 25 percent per year, while the average household disposable income increased at a stable annual rate of 12 percent since 2004; there is a disparity between household income and house price. Hence, the high housing price has led to low level of affordability in urban China. Households that have limited income would switch to public rental housing instead, hence, house rent in the public sector increased (Ahuja et al., 2010; Du, 2006). Meanwhile, various subsidies were introduced by the government, such as Housing Provident Funds (HPF) and affordable housing to help people with middle and low income to achieve their homeownership (Duda, Zhang and Dong, 2005).

HPF refers to a long-term housing savings programme established by the government to assist home financing by people working in different social organisations, such as organization, state enterprises, urban collective enterprises, foreign invested enterprises, urban private enterprises and other urban enterprises, public institutions, and in-service workers (Chen and Wu, 2006; Nie, 2004). The programme aims to ease financial stress of home purchasers and improve housing consumption for low-income class. Compared with the housing loan offered by commercial banks, the housing loan provided from HPF carries lower interest rates (Yeung and Howes, 2006). Although HPF is of the key governmental policy to address homeownership issue in urban China, to be the best of our knowledge, no study has been able to provide empirical evidences to evaluate the influence of the program as well as the determinants of the fund utilisation. Therefore, in this study we attempt to fulfil this gap in the literature.

Generally, urban households can choose to use ordinary commercial mortgage loans or subsidised HPF mortgage loans (if they join HPF programme) to finance their home purchase. However, the HPF loan is always insufficient to purchase a home due to the constantly climbing housing prices, most households apply for both types of mortgage loans. Greater accessibility to housing loans is expected to have a positive effect on consumers' housing purchase decision. What are the impact of socioeconomic attributes, such as age, gender, education attainment, income, marital status, and family life cycle on homeownership and on the use of HPF housing loans in urban China?

Existing studies trying to answer the above questions have been mainly through a qualitative review of housing policy framework (Deng et al, 2011) or narrative assessment of Provision Fund policy (Burell, 2006). The data those studies rely on are macro-aspects data and the analysis are stopped at descriptive statistics. Their work has contributed to show some institutional factors are unique to affect Chinese housing/residential market. However, there is much less empirical analysis and modelling on homeownership and efficient usage of HPF loan at the micro level. To best of our knowledge, this is the first empirical paper that examines those issues at micro level in China. In summary, this study fills the gap by using qualitative choice analysis to examine (1) the determinants of homeownership for individuals and (2) investigate the determinants of HPF loan usage for homeowners. The results may provide useful information to banks to design a better product to target home borrowers and inform the Chinese policy makers to re-evaluate China's HPF policies from the perspective of facilitating usage of HPF loan. The next section presents brief review of characteristics affecting homeownership. This is followed by a section 3 on introduction of Housing Providing Fund Program. Section 4 explains the methodology and data we used in this study. Section 5 involves data analysis and results discussion. Concluding remarks and implications are discussed in section 6.

2 Characteristics affecting consumers' homeownership

General finding of the age effect on homeownership is the comparative lower propensity of being home owners among young people due to the low accumulated wealth (Painter, 2000; Pan, 2004; Song, 2010; Zhou, 2011). However, younger renters are more motivated to transit to home owners than older counterparts (Ho & Kwong, 2002; Lewis & Daniel, 1998; Raya & Garcia, 2012).

There is large consensus among the literature about the effect of gender and education on homeownership. It is proven by previous studies that male head households are more likely to attain homeownership than female head counterparts (Bourassa & Peng, 2011; Ho & Kwong, 2002; Lewis & Daniel, 1998). The same conclusion is found in the case of single men and women (Andrew, Haurin, & Munasib, 2006; Blaauboer, 2010) particularly women with relatively low income and wealth (Haurin, Wachter, & Hendershott, 1995). In term of education, finding from previous studies show the consistently positive effect of education on homeownership (Barakova, Bostic, Calem, & Wachter, 2003; Boehm & Schlottmann, 2014; Calem, Firestone, & Wachter, 2010; Gathergood, 2011; Lewis & Daniel, 1998). High education implies high potential income which results in higher propensity of being a home owner.

According to life course theory, marital status is of the most important demographic determinants of homeownership choice. Ample empirical evidences reveal that married and cohabitation couples tend to have higher likelihood to buy house since they are inclined to stable life and have higher accumulated wealth (Andrew et al., 2006; Calem et al., 2010; Fisher & Gervais, 2011; Lewis & Daniel, 1998; Öst, 2012; Raya & Garcia, 2012). They are also less mobile than singles. On the contrary, single and divorced individuals are less likely to be home owners (Boehm & Schlottmann, 2014; Bourassa & Peng, 2011; Hendershott, Ong, Wood, & Flatau, 2009).

The impact of children on the homeownership likelihood is not equivocal. The presence of children can have positive effect (Aratani, 2011; Barakova et al., 2003; Calem et al., 2010), negative effect (Andrew et al., 2006; Song, 2010) or insignificant effect (Li & Li, 2006). Finding of Aarland and Nordvik (2009) suggest a possible explanation for the difference. They found that preschool children do not have effect on homeownership but school- aged children delay parents' decision to buy house since parents do not want children to change school which may interrupt their study. However, the increase in number of children push parents to purchase house. Similarly, the effect of household size is inconsistent among studies (Bourassa & Peng, 2011; Huang, 2004; Lewis & Daniel, 1998).

Income is one of the many indicators used to measure a household's affordability to buy house. Prevalent literature confirms the determining role of income on household's homeownership, however, the approaches are different. Some studies measure the effect of income on homeownership while others estimate the effect of income constraint on likelihood to buy house (Barakova et al., 2003; Bourassa & Peng, 2011; Calem et al., 2010). The conclusion is consistent among most studies that income have positive affect on household's house ownership regardless the proxies for income used in the studies are nominal income (Aarland & Nordvik, 2009; Gyourko, 1998; Ho & Kwong, 2002), real income (Boehm & Schlottmann, 2014; Lewis & Daniel, 1998), permanent income (Raya & Garcia, 2012) or transitory income (Boehm, 1993; Painter & Redfearn, 2002). Only the study of Huang (2004) find the insignificant impact of income on homeownership in China during the period 1949-1994. The author explained that Chinese average household's income was much lower than the housing market price, thus income was not a major determinant of homeownership.

However, there is inconsistency among the studies on the effect of some type of employers on homeownership. For example, Li and Li (2006) and Mak, Choy, and Ho (2007) reveal the significantly high likelihood of being home owners among governmental agencies, whereas

the studies of Ho and Kwong (2002) find the reverse result. In addition, high job rank which is found to have positive influence on homeownership by Song (2010) and Pan (2004) is proven to have negative impact in the study of Li and Li (2006).

Pan (2004) finds the significant relationship between working experience and commercial homeownership. People having more year of working experiences are more likely to own commercial house. However, it is revealed from this study that years in present job has negative effect on homeownership. The result was not explained by the authors.

The size of the house purchased has received little attention from researchers. Measured by square meters of floor space, house size is used in this study as a factor that contributes to the decision to purchase a house. Creis Research (2010) reported that 42.1% of households choose their houses with floor space of 70-89m^2; 19.3% with the floor space of 50-69m^2; and 18.8% with 90-109m^2. Hence, a relatively smaller size house is more a favourable choice for most households in urban China. However, Aurora (2005) argued that with the increase in personal income and the privatization of the housing market since the late 1990s, most of urban Chinese households have preferred to purchase relatively large apartments.

3 The Housing Providing Fund program

The Housing Provident Fund (HPF) program has been implemented for more than 20 years, became one of the main government's tools that helps privatise urban housing that were publicly possessed before and boosting homeownership in urban China. Despite the contribution of HPF programme to urban housing privatisation, some issues have emerged since its initiation. One major issue is regarding the 'inequality' intrinsic in the programme design. Such inequality is first manifested in the programme participation. As required by the central government, participation in the HPF programme is encouraged for both the public and private sector in urban areas, excluding self-employers, migrant workers and freelances. However not all of those who are eligible to participate have actually joined the programme. For example, the HPF programme reached 63,297 million employees in urban areas in 2006, accounting for only 60% of all salaried employees (Deng et al., 2009). Chen and Wu (2006) noted that a large proportion of employees in private enterprises haven't been involved in the programme in that the employers are reluctant to incur additional costs of paying housing provident funds for their employees. Zhang and Rasiah (2014) argue that state-owned companies and government agencies are the major contributors of the Fund, whereas contributions of foreign companies and small businesses are insignificant. Moreover, Deng et al. (2009) and Burell (2006) studies show a big disparity in participation rate across regions. For example, the programme participation rate is as high as 90% in relatively developed coastal regions, such as Zhejiang and Jiangsu Provinces while the rate is lower than 50% in less developed inland areas.

Fund user rate is much lower and even in some municipal areas, the fund utilisation rate are almost equal to zero (Li & Yi, 2007). Li and Yi (2007) attribute the low participation and user rate to the complicatedness of procedures that discourage both house buyers and sellers to be involved in the fund. In addition, the failure of HPF loan to bridge the gap between individual incomes and housing prices is another reason for low utilisation rate, especially in the case of low and middle income households (Burell, 2006).

Studies of HPF also raise the concern that the program may exacerbate income gaps since employers contributions is based on employee's salary, which means those who have higher salary will get more benefit (Deng, Shen, & Wang, 2011; Wang, 2000). For low-income households, they can only acquire small HPF loans or nothing if they cannot afford to buy a house. For example, about 80% of HPF loans were used for high-cost housing purchase in Beijing. This suggests that HPF lending is a regressive policy where the lower end of income distribution makes contribution but hardly benefits, helping subsidise loans to upper-income HPF participants (Deng et al., 2009; Chiquier, 2009). This indicates that the contribution ratio can differ even within the same region as different employers and employees can adjust the ratio based on salary (Deng et al., 2009; Burell, 2006; Chen and Wu, 2006; Yeung & Howes, 2006; Duda et al., 2005).

Nevertheless, previous studies lack empirical evidence to support for their conclusions. Duda, Zhang, and Dong (2005) and Li and Yi (2007) are few studies attempting to use survey data to measure the importance of HPF to homeownership and housing quality. Duda et al. (2005) reveal that HPF beneficiaries on average possess units which are newer, more expensive, more comfortable and larger than non-beneficiaries. However, as prudently noticed by the authors, the influence of HPF on differentials is inconclusive due to the unavailable information about employee's and employer's contributions to the fund. Similarly, Li and Yi (2007) admit lack of data is the main obstacle to study HPF. Their study about house purchase in Guangzhou province uncovers the surprising low rate of HPF users, especially HPF loan. In 2005, among 1203 sample households, only one borrowed HPF loan to buy house. The number of households using HPF savings to purchase house was also extremely low and followed the downward trend. Again, the study only stops at descriptive statistics.

4 Data and research methodology

A structured questionnaire was used to collect relevant data from household residents (both homeowners and non-home owners) in Dalian, Liaoning Province, China. The questionnaire obtained information on the respondent's homeownership, the type of home owned, factors influencing the decision to purchase a house, housing provident funds programme, choice of financing, and standard demographic characteristics. The questionnaire was pilot tested on a sample of 30 Dalian residents. The respondents were encouraged to comment on any questions or statements they thought were ambiguous or unclear. Some minor wording modifications to the questionnaire were made as a result of this process. The revised questionnaire was then administered to a convenience sample of individuals, irrespective of their homeownership status, gender, occupation, or income. Convenience sampling was used due to the practical difficulties in obtaining a comprehensive listing of and information about our target population.

During the months of June 2013 to August 2013, 760 households in Dalian City were approached and asked to complete the questionnaire. A total of 710 respondents completed the questionnaire, giving an overall response rate of 93%. Refusals, incomplete surveys (composed mostly of those not providing personal or household information) and not-at-homes comprised the remaining 7%. This response rate is much higher than the typical rates

of 3-10% for mailed questionnaires and 20-30% for mall-intercept surveys in China. Of the 710 respondents, approximately 77.8% were homeowners.

The households were purposively selected from four large residential areas. Using mean house price as a proxy measure, the neighbourhoods were identified on the basis of the apparent income homogeneity of residents and levels of prosperity associated with the neighbourhoods. Two of the residential areas were located in the central urban district, where mean house prices are high. The other two neighbourhoods were selected from newly developed residential areas in Dalian. These were not adjacent to the central district, and were situated where mean house prices were substantially lower. This strategy ensured that the responses were by homeowners from distinctly different socio-economic strata.

4.1 Empirical method

4.1.1 Homeownership (model 1)

For many commodities and services, the individual's choice is discrete and traditional demand theory has to be modified to analyse such a choice (Ben-Akiva and Lerman, 1985; Trajtenberg, 1989, 1990; Kim, Widdows and Yilmazer, 2005). Models for determining discrete choice such as whether an individual housing loan is rejected or not is known as a qualitative choice model. Therefore, the decision to own or not to own a home falls into the qualitative choice framework. If the random term is assumed to have a logistic distribution, then the decision to own or not to own a home represents a standard binary logit model. However, if it is assumed that the random term is normally distributed, then the model becomes the binary probit model (Maddala, 1993; Greene, 2000). In this study, we choose logit model because of its simplicity. The model is estimated by the maximum likelihood method used in the STATA software. Homeownership is hypothesized to be affected by the following factors and can be implicitly written under the general form:

$$\text{Homeownership}_{it} = \text{intercept}_{it} + \text{Young Age}_{it} + \text{Gender}_{it} + \text{Married}_{it} + \text{School}_{it} + \text{Low Annual Income}_{it} + \text{Duration}_{it} + \text{Occupation}_{it} + \text{Household with Children}_{it} + \text{Size of House}_{it} + \varepsilon_i \quad (1)$$

The discrete dependent variable, homeownership is based on the question asked in the mail survey: ''Do you own a house, either the one you currently live in or one in another place?'' The homeowner's characteristics such as age, gender, marital status, educational attainment, occupation, duration of employment, annual household income, household with children, and size of house were hypothesized to influence the respondent's decision to own a house. In particular, equation (1) determines what homeowner's characteristics have the significant influence on the respondent's decision to own a house. For example, as the respondent's duration of employment increases, does the probability of homeownership increase?

4.1.2 Housing Provident Fund loan (model 2)

Model (2) tests specific attributes of homeowners who either use HPF housing loans to buy a house or do not use HPF housing loans to buy a house. Similar to model (1), this is a binary choice decision making as the individual can either be a user of HPF housing loans or do not use HPF housing loans to buy a house. The parametric functional form can be written as follows:

$$\text{Use HPF}_{it} = \text{intercept}_{it} + + \text{Gender}_{it} + \text{Young Age}_{it} + \text{Married}_{it} + \text{School}_{it} + \text{High Annual Income}_{it} + \text{Contribution to HPF}_{it} + \text{Occupation}_{it} + \text{Size of Household}_{it} + \text{Duration}_{it} + \varepsilon_i \quad (2)$$

Definitions of variables for models (1) and (2) are presented in Tables 1 and 2.

Table 1: Variable definitions (homeownership model)

Variable Name	Definition
Homeownership	Dummy variable equal to 1 if the respondent owned house; 0 otherwise
Young age	Dummy variable equal to 1 if respondent age is 35 years old or younger; 0 otherwise
Gender	Dummy variable equal to 1 if respondent is male; 0 female
Married	Dummy variable equal to 1 if respondent is never married; 0 otherwise
School	Dummy variable equal to 1 if the respondent education level is high school or lower; 0 otherwise
Low annual income	Dummy variable equal to 1 if the respondent annual income is less than RMB40,000; 0 otherwise
Duration	Dummy variable equal to 1 if the respondent duration of employment is equal or more than 16 years; 0 otherwise
Occupation	Dummy variable equal to 1 if the respondent is employed by state owned organizations or enterprises; 0 otherwise
With Children	Dummy variable equal to 1 if the respondent has children; 0 otherwise
Small house	Dummy variable equal to 1 if size of the house less than 70 square meters; 0 otherwise
ε_i	Error term

Table 2: Variable definitions (HPF loan model)

Variable Name	Description
Use HPF	Dummy variable equal to 1 if the respondent use HPF loan to purchase house; 0 otherwise
Gender	Dummy variable equal to 1 if the respondent is male; 0 female
Young age	Dummy variable equal to 1 if respondent age is 35 years old or younger; 0 otherwise
Married	Dummy variable equal to 1 if respondent is married; 0 otherwise
School	Dummy variable equal to 1 if the respondent education level is high school or lower; 0 otherwise
Duration	Dummy variable equal to 1 if respondent duration of employment is equal or more than 16 years; 0 otherwise
High annual income	Dummy variable equal to 1 if the respondent annual income is more than RMB70,000; 0 otherwise
Contribution to HPF	Dummy variable equal to 1 if respondent contributes 5% to 10% monthly income to their HPF account; 0 otherwise
Occupation	Dummy variable equal to 1 if the respondent is employed by state owned organizations or enterprises; 0 otherwise
Size of household	The number of people living in the household
ε_i	Error term

Equation (2) determines what homeowner's characteristics have significant influence on the respondent's decision to use HPF loan for homeownership. For example, how does contribution to HPF influence the respondent's probability of homeownership?

5 Descriptive statistics

5.1 Homeowners and non-homeowners

Table 3 Panel A shows that 76.2% of the respondents were married and 17.2% were single or never married. The majority of the respondents have either a bachelor's degree (42.9%) or completed three years of college (25.5%). Gender of respondents was not balanced, with males comprising approximately 47.5% of the sample. In terms of occupation 84.8% of the respondents worked as full-time employees, 37% worked in government office and state-owned enterprises and 35.2% had worked 20 years and above. The distribution of annual household income was fairly bimodal, with the 20.000–40,000 RMB and 40,000 RMB above categories quite evenly represented. Analysis also revealed that 61.45% of the households comprised of a couple with children, while 64.2% of the households have at least three persons per household followed by four persons per household (12%). In terms of size of the house, 62.3% of the respondents' house is between 70-129 m^2 and 16.3% own a house greater than 130 m^2.

Table 3 Panel A also shows the sample's socio-economic characteristics, separated into homeowner and non-homeowner groups. Most of the homeowners were female (55%) and married (83.4%) at the time of the survey. In contrast, the majority of non-homeowners were male (57.3%), and half of them were married (51%). With regard to age, 60.2% of homeowners were in the 35 to 44 years group, 17.4% in the 25 to 34 year group, and 4.9% in the under 25 year group. Of the non-homeowners, 40.8% were in the 25 to 34 years age group, 28% were under 25 years of age and 19.7% were between 35 and 44 years old. In terms of educational attainment, 42.9% of the homeowners held a bachelor's degree. Those holding a three-year college degree composed 25.5% of the sample. In comparison with homeowners, 33.8% of the non-homeowners had a bachelor's degree, and 26.1% had a three-year college degree. Table 3 Panel A also shows that 35.3% of the homeowners had an annual household income between 20,000 RMB to 40,000 RMB compared to 42% non-homeowners. In terms of occupation 86.3% of homeowners worked as full-time employees, 38.2% worked in government office and state-owned enterprises and 39.1% had worked 20 years and above. With regards to household size, 67.5% of homeowners lived in three member households compared to 52.9% of non-homeowners. The result also revealed that 70.2% of the homeowners comprised of a couple with children compared to 30.6% of non-homeowners.

5.1.1 Homeowners who used HPF and non-Homeowners who do not use HPF

Table 3 Panel B shows that 83.4% of the respondents were married and 9.8% were single or never married. The majority of the respondents have either a bachelor's degree (42.9%) or completed three years of college (25.5%). In terms of occupation 86.3% of the respondents worked as full-time employees, 38.1% worked in government and state-owned enterprises and 39.1% had worked 20 years or more. The result also shows that 35.3% of the homeowners had an annual household income between 20,000 and 40,000 RMB while 49.5% earned

40,000 RMB and above. Analysis also revealed that 70.2% of the households comprised of a couple with children, while 67.5% of the households have at least three persons per household followed by four persons per household (10.8%). In terms of size of the house, 64% of the respondents' house is between 70-129 m^2 and 15% own a house greater than 130 m^2.

Table 3 Panel B also separates the households into homeowners who used HPF versus those who do not use HPF. Most of the HPF homeowners were female (68.25%) and married (89.4%)

Table 3: Descriptive statistics of homeowners and non-homeowners

Variables	Features	Panel A: Homeowners and non-homeowners						Panel B: Homeowners who used HPF and homeowners not using HPF					
		Total Respondents		Homeowners		Non -Homeowners		Total Respondents		Homeowners-using HPF		Homeowners-not using HPF	
		(No.)	(%)	(No.)	(%)	(No.)	%	(No.)	(%)	(No.	(%)	(No.)	(%)
Gender	Male	337	47.5	247	44.7	90	57.3	247	44.7	63	31.8	177	52.7
	Female	371	52.3	304	55.0	67	42.7	304	55.0	135	68.2	157	46.7
Age group	≤ 24 years	71	10	27	4.9	44	28	27	4.9	4	2.0	23	6.8
	25-34 years	160	22.5	96	17.4	64	40.8	96	17.4	35	17.7	59	17.6
	35-44 years	364	51.3	333	60.2	31	19.7	333	60.2	129	65.2	194	57.7
	≥ 45 Years	108	15.2	93	16.8	15	9.6	93	16.8	28	14.1	58	17.3
Marital status	Married	541	76.2	461	83.4	80	51.0	461	83.4	177	89.4	267	79.5
	Single and never married	122	17.2	54	9.8	68	43.3	54	9.8	7	3.6	46	13.7
	other	36	5	28	5	8	5	28	10	7	3.5	20	6
Education attainment	≤ High school	155	21.8	108	19.5	47	30	108	19.5	31	15.7	71	21
	3-year college	182	25.5	141	25.5	41	26.1	141	25.5	41	20.7	94	28
	Bachelor degree	290	42.9	237	42.9	53	33.8	237	42.9	102	51.5	131	39
	Postgraduate	54	7.6	41	4.4	13	8.2	41	7.4	10	5	29	8.6
Annual household Income	≤ 20,000 RMB	54	7.6	34	6.1	20	12.7	34	6.1	9	4.5	25	7.4
	20,000-40,000	261	36.7	195	35.3	66	42	195	35.3	67	33.8	120	35.7
	≥ 40,000 RMB	338	47.6	274	49.5	64	40.8	274	49.5	103	52.1	163	48.5
Duration of employment	≤ 10 years	156	22.0	80	14.5	76	48.4	80	14.5	9	4.5	69	20.5
	11 to 19 years	297	41.8	241	43.6	56	35.7	241	43.6	112	56.6	125	37.2
	≥ 20 years	231	32.5	216	39.1	15	9.6	216	39.1	74	37.4	130	38.7
Size of household	1- 2 persons	71	10	32	5.8	39	24.8	32	5.8	9	4.5	20	6
	3 persons	456	64.2	373	67.5	83	52.9	373	67.5	154	77.8	206	61.3
	≥ 4 persons	85	12	60	10.9	25	15.9	60	10.8	16	8	43	12.8

Table 3: Continued

Variables	Features	Panel A: Homeowners and non-homeowners						Panel B: Homeowners who used HPF and homeowners not using HPF					
		Total Respondents		Homeowners		Non -Homeowners		Total Respondents		Homeowners-using HPF		Homeowners-not using HPF	
		(No.)	(%)	(No.)	(%)	(No.)	%	(No.)	(%)	(No.)	(%)	(No.)	(%)
Occupation	Government or State-owned enterprise	262	37	211	38.2	51	32.5	211	38.1	62	31.3	144	42.8
	Others	391	55	304	55	87	55.4	304	55	126	63.6	165	49.1
Composition of household	Couple with child(ren)	436	61.4	388	70.2	48	30.6	388	70.2	156	78.8	220	65.5
	Others	225	31.7	126	22.8	69	43.9	126	22.8	31	15.7	90	26.8
Size of house	< 69 s m^2	147	20.7	111	20	36	23	111	20	28	14.1	80	23.8
	70-129 m^2	442	62.3	354	64	88	56	354	64	151	76.3	189	56.3
	> 130 m^2	116	16.3	83	15	33	21	83	15	17	8.6	64	19
Employment situation	Full time	602	84.8	477	86.3	125	79.6	477	86.3	181	91.4	279	83
	Part time	102	14.4	70	12.7	32	20.4	70	12.7	15	7.6	53	15.8

at the time of the survey. The majority of non-HPF homeowners were male (52.73%) and 79.5% were married. With regard to age, 65.2% of HPF homeowners were in the 35-44 age group, compared to 57.7% non-HPF homeowners. In terms of educational attainment, 51.5% of the HPF homeowners held a bachelor's degree while 20.7% held a three-year college degree. In comparison with HPF homeowners, 39% of the non-HPF homeowners had a bachelor's degree, and 28% had a three-year college degree. Table 3 Panel B also shows that 33.8% of the HPF homeowners had an annual household income of 20,000-40,000 RMB compared to 35.7% non-HPF homeowners. In terms of occupation 91.4% of HPF homeowners worked as full-time employees, 31.3% worked in government and state-owned enterprises and 37.4% had worked 20 years or more. The results are quite similar for non-HPF homeowners. With regards to household size, 77.8% of HPF homeowners lived in three member households compared to 61.3% of non-HPF home-owners. The result also revealed that 78.8% of the HPF homeowners comprised of a couple with children compared to 65.5% of non-HPF homeowners. In terms of size of the house, 76.3% HPF homeowners' house size is 70-129m^2 compared to 56.3% non-HPF homeowners.

5.1.2 Housing Provident Fund program participation

Table 4 shows 78.9% of the respondents participated in the HPF and 48.8% contributed 5-10% of their monthly salary into the HPF account. Reasons why some respondents (19.9%) did not participate in the HPF program included not aware of the HPF program (34.8 %), employer not covered by the programme (31.2 %) and employer is covered by the programme but did not enrol the respondent (18.4 %). Almost half of the respondents (44.9%) evaluated the HPF program as very efficient in helping people (especially low-income people) to own a house followed by fairly efficient (23.5%). Surprisingly, only 44.3% of the HPF respondents had applied for a HPF loan to purchase a house, with an approval rate of 96%. A major reason for the unsuccessful HPF loan application (3.6 %) is that the applicants already owned a house. Half of the HPF respondents (48.4 %) who did not apply for a HPF loan did not need to purchase a house (27.3 %) or had sufficient fund to purchase a house (26.2 %).

Table 4 also shows the sample's participation in HPF, separated into homeowner and non-homeowner groups. Most of the homeowners participated in the HPF program (78.3%) and 46.1% evaluated the program as very efficient and 22.4% as fairly efficient. Some of the reasons why homeowners (20.3%) did not participate in the HPF program include not aware of the HPF program (33.9 %), employer is not covered by the programme (33.9 %) and employer is covered by the programme but did not enrol the respondents in the programme (17.9 %). This is similar to non-homeowners who did not participate in the HFP program. However, only 44.1% of the homeowners have applied for a HPF loan to purchase a house with an approval rate of 97.9%. A major reason for homeowners' unsuccessful HPF loan application (2.1 %) is that the applicants owned a house. Nearly half of the homeowners (48 %) did not apply for a HPF loan because they did not need to purchase a house (27.9 %) or had sufficient funds to purchase a house (26%). The survey results also revealed that 49% of the homeowners contributed 5 to 10 percent of their monthly salary into the HPF account and have participated in the program for more than 15 years (22.2%). Further 52.2% of the homeowners withdrew money from the HPF account either to purchase a house (59.7%) or payback a housing loan (34.1%). These results are similar to non-homeowners.

Table 4: Descriptive statistics (Housing Providence Fund program participation)

Variables	Features	Total Respondents		Homeowners		Non-homeowners	
		(No.)	(%)	(No)	(%)	(No.)	(%)
Beneficial of HPF	Very efficient	319	44.9	225	46.1	64	40.8
	Fairly efficient	167	23.5	124	22.4	43	27.4
	Efficient	113	15.9	87	15.7	26	16.6
	Somewhat inefficient/Not efficient	106	15	83	15	23	14.7
	Missing	5	0.7	4	0.7	1	0.6
Participated in the HPF	Yes	560	78.9	433	78.3	127	80.9
	No	141	19.9	112	20.3	29	18.5
	Missing	9	1.3	8	1.4	1	0.6
Reasons of not participating in HPF	Not aware of HPF	49	34.8	38	33.9	11	37.9
	Employer not covered	44	31.2	38	33.9	6	20.7
	Employer is covered, I did not enrol	26	18.4	20	17.9	6	20.7
	Others	12	8.5	10	8.9	2	6.9
	Missing	10	7.1	6	5.4	4	13.8
Monthly contribution to HPF account	Less than 5%	185	33	137	31.6	48	37.8
	5% to 10%	273	48.8	212	49	61	48
	Above 10%	72	12.9	57	13.2	15	11.8
	Others	8	1.4	6	1.4	2	1.6
	Missing	22	3.9	21	4.8	1	0.8
Whether applied for HPF loan to purchase house	Yes	248	44.3	191	44.1	57	44.9
	No	271	48.4	208	48	63	49.6
	Missing	41	7.3	34	7.9	7	5.5
Reasons not apply for HPF	Not purchase house	74	27.3	58	27.9	16	25.4
	Have fund to buy house	71	26.2	54	26	17	27
	Access to cheaper credit sources	32	11.8	22	10.5	10	15.8
	Not eligible for HPF	22	8.1	20	9.6	2	3.2
	Prefer mortgage loan	23	8.5	15	7.2	8	12.7
	Others	9	3.3	7	3.4	2	3.2
	Missing	40	14.8	32	15.4	8	12.7
Whether succeed in getting HPF loan	Yes	238	96	187	97.9	51	89.5
	No	9	3.6	4	2.1	5	8.8
	Missing	1	0.4	0	0	1	1.7
Whether have withdrawn money from HPF	Yes	298	53.2	226	52.2	72	56.7
	No	260	46.4	205	47.3	55	43.3
	Missing	2	0.4	2	0.5	0	0
Purpose of the withdrawal	Home purchase	184	61.3	135	59.7	49	68.1
	House improvement/repair	14	4.7	11	4.9	3	4.2
	Pay back housing loan	93	31	77	34.1	16	22.2
	Emergency medical expenses	2	0.7	2	0.9	0	0
	Quit job	5	1.6	3	1.3	2	2.8
	Others	2	0.7	2	0.9	0	0
	Total	300		230		70	
	Missing	18	6	14	6.2	4	5.6
Duration of participating in the HPF	Less and equal to 15 years	394	70.4	304	70.2	90	70.9
	More than 15 years	127	22.7	96	22.2	31	24.4
	missing	39	6.9	33	7.6	6	4.7

5.2 Discussion of empirical results

Empirical estimates of the logit model via maximum likelihood assures large sample properties of consistency, efficiency, normality of the parameter estimates and validity of the t-tests of significance. The estimated logit results are presented in Tables 5 and 6. In general, the models fitted the data quite well. The chi-square test strongly rejected the hypothesis of no explanatory power for both equations (χ^2 = 154.86, p = 0.0000 for the homeownership model; χ^2 = 46.52, p = 0.0000 for the HPF loan model). The percentage of observations that are correctly predicted by the homeownership model is 83.14% and 64.95% by the HPF loan model. The average VIF were 1.42 for the first model and 1.24 for the second model with the highest VIF, which confirms both models do not suffer from multicollinearity.

Table 5 shows the significant effect of married, school, duration of employment and household with children on the respondent's likelihood of owning a house. The negative effect of school implies that a respondent who has completed only high school is less likely to own a house. The result supports the findings of Gan, Hu, Gao, Kao and Cohen (2014), Boehm & Schlottmann, (2014), Gathergood, (2011) and Calem, Firestone, & Wachte (2010) who argued that higher level of education implies higher potential income which results in higher propensity of being a home owner. Educational attainment could be considered a proxy of economic success. A respondent with a relatively high level of education often has a good job with a steady income to afford the down payment for a house.

The effect of married, duration of employment and household with children were found to be positive and significant, implies that the respondents whose employment is equal or more than 16 years exhibit a higher probability in owning a house. This result supports the findings of Burrell (2006), Thompson (2006) and Crook, Hamilton & Thomas (1992) where homeowners with longer and more reliable employment history are associated with less risk and default. Similarly, households who are married and with children are more likely to be homeowners. This result supports the findings of Fisher & Gervais (2011), Calem et al. (2010) and Ying, Luo and Chen (2013) who reveal that married and cohabitation couples tend to have a higher likelihood to own a house since they are inclined to stable life and have higher accumulated wealth to afford the down payment for a house. Household with children are more likely to be homeowners. Previous studies report that the presence of a child in a household has a positive effect on homeownership (Haurin and Hendershott, 1994; Gyourko and Linnerman, 1996; Hood, 1999 and Blaauboer, 2010). Blaauboer (2010) study suggests both married and cohabiting couples are more likely to be homeowners when they have children. Another possible explanation is that parents do not want their children to change school often which may interrupt their study (Aarland and Nordvik, 2009). Huang and Clark (2002) conclude that married couples with children are more likely to own houses which provide a stable environment for raising children.

Table 5: Logit model 1 (homeownership model)

Number of observation = 522
Log Likelihood function= -200.3216
Pseudo R-squared= 0.2788
LR chi2 (9) = 154.86
Prob > chi2 = 0.000000
Percentage of Right Prediction= 83.14%

Variables	Coefficient	Standard Error	T-statistics	P-value	Marginal Effects	Ranking
Young age	- 0.541	0.337	-1.60	0.109	- 0.074	
Gender	0.108	0.261	0.41	0.680	0.014	
Married	0.689**	0.341	2.02	0.043	0.102**	3
School	- 0.538*	0.298	-1.80	0.071	- 0.077*	4
Low annual income	- 0.322	0.260	-1.24	0.216	- 0.042	
Duration	1.582***	0.312	5.07	0.000	0.238***	1
Occupation	0.213	0.258	0.83	0.408	0.027	
Household with children	0.830***	0.324	2.56	0.010	0.118***	2
Small house	0.189	0.318	0.59	0.554	0.023	
Constant	- 0.141	0.474	-0.30	0.766	- 0.072	

*denotes statistically significant at the 0.1 level of significance
** denotes statistically significant at the 0.05 level of significance
*** denotes statistically significant at the 0.01 level of significance

Additional information can be obtained through an analysis of the marginal effects calculated as the partial derivatives of the non-linear probability function, evaluated at each variable's sample mean (Greene, 2000). The marginal effects uncover that among factors affecting the respondents' homeownership, duration of employment has the strongest marginal effect on the probability of homeownership followed by household with children, married and education level. The last column 'Ranking' in Table 5 is based on the magnitude of marginal effect. For example, a respondent whose employment duration is 16 years or more will result an increase in the probability of homeownership by 23.8%.

Table 6 shows that the coefficients of gender and education level are statistically significant at the 1 percent level, high annual income and duration of employment at the 5% level and marital status (married) at the 10% level. With the exception of duration of employment and marital status, these variables have a negative impact on the respondents' likelihood to use HPF loan to own a house.

The results support the findings of Ying, Luo, Chen (2013), Deng, Shen and Wang (2011) where male Individuals with lower educational attainment are expected to have a lower income. Both HPF savings and loan size are tied to salary income (Deng, Shen and Wang, 2011). It is very difficult for low income individuals to accumulate the fund for the down payment. The potential support offered by the HPF program is often limited for low-income individuals (Deng, Shen and Wang, 2011; Burell, 2006). There are also strict limitations using HPF loans to purchase a house. According to Beijing housing provident fund management committee, when the qualified HPF contributor uses the HPF loan to buy their second house to improve

the living condition, the down payment loans should be no less than 50% (Yang and Shen, 2008).

Table 6: Logit model 2 (HPF loan model)

Number of observation = 331
Log Likelihood function= -199.34415
LR chi2(9) = 46.52
Prob > chi2 = 0.0000
Pseudo R-squared = 0.1045
Percentage of Right Prediction= 64.95%

Variables	Coefficient	Standard Error	T-statistics	P-value	Marginal Effects	Ranking
Gender	- 0.683***	0.263	-2.59	0.010	- 0.157***	4
Young age	0.310	0.411	0.76	0.450	0.074	
Married	1.016*	0.521	1.95	0.051	0.206*	2
School	- 1.090***	0.423	-2.58	0.010	- 0.221***	1
High annual income	- 0.635**	0.253	-2.51	0.012	- 0.147**	5
Contribution to HPF	0.324	0.243	1.33	0.182	0.076	
Occupation	- 0.272	0.258	-1.05	0.293	- 0.063	
Size of household	- 0.107	0.211	-0.51	0.611	- 0.025	
Duration	0.844**	0.386	2.19	0.029	0.189**	3
Constant	- 1.143	0.886	-1.29	0.197		

* denotes statistically significant at the 0.10 level of significance
** denotes statistically significant at the 0.05 level of significance
*** denotes statistically significant at the 0.01 level of significance

Table 6 shows marriage and duration of employment positively impact the use of HPF. Married couples tend to have higher likelihood to buy a house (Calem et al., 2010; Fisher and Gervais, 2011). Further, being married could help individuals in accumulating more personal wealth to afford the down payment for a house (Ying, Luo and Chen, 2013). The HPF is accumulated from employee's monthly income. The longer duration of employment the higher probability that the accumulated savings in HPF is qualified for down payment and eligible for a sufficiently large HPF loans to finance a home purchase (Burell, 2006)

Similar to model (1), the marginal effects uncover that among factors affecting the respondents' use of HPF loan for homeownership, education has the strongest marginal effect (Table 6). For example, a high school leaver will result in a decrease in the probability of using HPF loan to buy a house by 10.9%. Marital status is ranked as the second most important factor that impacts HPF loan followed by duration of employment, gender, and annual household income as the fifth.

6 Conclusions and implications

Our research findings show respondents with low level of education (high school or lower) are less likely to be homeowners. The result is consistent with Gan et al. (2014), Chua and Miller (2009) and Hood (1999) studies, where the authors reported that a household with a higher level of educational attainment is almost always associated with a good job, a stable

income and higher credit history, characteristics that increase the likelihood of homeownership. The respondents whose duration of employment are 16 years or longer, married and have children are more likely to be homeowners. The longer the duration of employment is, the higher possibility that an individual can save enough to qualify for a loan to finance a house purchase. Similarly, Pan (2004) finds that people with significant years of working experiences are more likely to own a house. In addition, Ying, Luo and Chen, (2013), Calem et al., (2010) and Fisher and Gervais (2011) contest that married couples are more likely to be home buyers because marriage could help individuals to accumulate more personal wealth to afford the down payment for a house. Gyourko and Linnerman (1996) study showed a 20 percent increase in the probability homeownership with children compared to those without children. Married couples often forecast a future with children and will want to provide a stable home environment to raise them (Hood, 1999).

The HPF is not a compulsory housing savings plan and is exempt from income tax. It is designed to help ordinary low income earners to buy a house. However, our result indicates that male respondents with low education level are expected to have lower income which inhibit them to participate in HPF since HPF savings and loan size are tied to individual salary (Ying, Luo, Chen, 2013; Deng, Shen and Wang, 2011). Therefore, high-salary employees are entitled to higher HPF contribution from their employers while low-salary employees will receive less contribution. There is also the lack of coverage where many employers refuse to deposit housing provident fund for their employees because employers are reluctant to incur additional costs of paying housing provident funds for their employees (Chen and Wu, 2006).

Our HPF results favour married couples who are able to accumulate more savings in HPF because HPF is accumulated from employee's monthly income. Further, the duration of employment also positively influence HPF loans. The longer duration of employment is, the higher and the greater the probability that an individual qualifies for a sufficiently large HPF loans to finance a home purchase (Burell, 2006).

These research findings provide banks with a better understanding of homeowners' characteristics. For example, it can be assumed that first-time homeownerships require affordable financing. Given that, banks should consider repackaging their home loan products to make them more attractive to those with limited means. Such products should focus on making loans more affordable in real terms. Further, China's house price index has risen by at least 70 percent since 2000, with house prices increasing by around 10 percent every year (Rapoza, 2011). A focus on first-time homebuyers would be especially prudent, given that these consumers are almost always single and earn low incomes. If the goal is a higher, society-wide rate of homeownership, first-time home buyers must be better served by financial institutions in China. For example, the government can develop a better affordable housing, such as stabilize the high housing price and increase the number of economic affordable housing with the aim of improving the homeownership rate in urban China. Such implication supports the recent government policy that aimed at controlling the overheated housing market and increasing the availability of affordable housing in China (People's Bank of China, 2010)

Given the employment-based nature of HPF programme, the programme has been criticised for missing the targeted goals. The programme was initially formulated to alleviate the housing difficulty of middle and low income people. The reality, however, is that the vast majority of needy people consisting of the unemployed or marginally employed are not reached by the programme. This is exacerbated by the fact that most low-income households work in informal sectors and their jobs do not carry HPF benefit. As demonstrated in Yan (2009) study, most beneficiaries of HPF programme are wealthy and HPF programme has strayed from its original purpose of creating housing equity between the poor and rich. Thus the result of the policy design is that the higher the income level, the greater chances and amount to get HPF loans. The low-income households who were not eligible for HPF loans but were required to contribute to the fund withstand the interest losses and subsidize upper-income HPF loans beneficiaries. To some extent, it is the reverse redistribution. For those who did not use the HPF loans, they suffer from the double benefit loss.

Li (2010) study shows nationwide HPF is still of minor importance to homeownership. The majority of homebuyers still rely heavily on personal savings and parental contributions to purchase their homes. Homebuyers with higher monthly incomes prefer to pay cash than depend on government loans. Our results show 30.2% of homeowners used personal funds to purchase a house compared 21.7% who used HPF loans and 8.9% used commercial bank loans to purchase a house. In addition, many developers refuse to do business with homebuyers using HPF loans due to bureaucratic inefficiency. They are often slower to disburse the cash, hurting developer cash flows. The current scheme negatively impacts migrant workers who can find it difficult to get their money back when they leave the cities in which they have been employed loans (Week in China, 2013). This points out that the effectiveness of HPF does not meet the government's housing policy expectation. This suggests that people's decision to own a house is not related to their own HPF status.
HPF has largely failed as an institutional device aimed at promoting homeownership in China. The role of the HPF has changed to become a supplement to the retirement fund. The ability of HPF in home financing remains limited (Li, 2010).

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