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Regional Disparity in Homeownership, Investment Choice, and Intra-Household Bargaining: Evidence from Chinese Household Surveys

by

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Thesis submitted in fulfilment of the requirement for
the degree of Doctor of Philosophy.

October 2017

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Abstract

This thesis contains three studies that provide theoretical and empirical evidence on household decisions in housing and investment portfolios in China, using 2010-2014 data from the China Family Panel Studies (CFPS).

The first study investigates regional disparities in homeownership and value of owner-occupied housing in Chinese cities by using panel data from 2010-2014 CFPS. The results show that demographic characteristics actively shape the housing outcomes of urban households in different regions. The results also reveal development trajectories of regional economies. The findings indicate that while urban households benefit from an emerging population and an enormous growth in the private sector in the Eastern and Central regions, in the Northeastern region households are hindered in homeownership by an ageing population and an economy dominated by oversized but inefficient state-owned enterprises (SoEs).

The second study adopts a nested logit approach, applying three data sets from the 2010-2014 CFPS. This approach explores how household investment choice differs with personal and household characteristics (e.g., such as health, demographic features, and institutional factors) across the broad investment categories of financial assets, private businesses, and real estate. I also employ a sub-sample from the 2012 CFPS that is restricted to parental households to examine how parenthood alters household investment decisions by building a binomial logistic model. The empirical results show that migration and income have a positive effect on investment decisions in the nested logit models. The evidence from the subsample finds that there are significant differences in the impact of demographic composition between investment categories.

Using the 2010-2014 CFPS panel data, the third study investigates how household investment holdings vary according to demographic composition and intra-household bargaining strength in urban China. In addition, to explore the allocation of household investment, a further examination is carried out in the fixed-effect model with the specification of the Working-Leser function and in a Tobit model with two limits. Empirical evidence supports the following hypotheses: (a) changes in demographic composition considerably alter household investment holdings; and (b) the existence

of a higher proportion of female children is strongly associated with an increase in household investments in financial assets.

Keywords: Homeownership, Housing value, Household Investment, Intra-household Bargaining, Gender of Children

Acknowledgements

I would like to express my sincere gratitude to my supervisor, Professor Lina Song, who have continually advised, supported, guided, and encouraged me throughout this research.

I am also grateful to Dr Jing Zhang, who patiently provided me with thoughtful insights and critical comments. I could not have asked for better supervisors.

A special thank-you goes to all the people at the University of Nottingham for helping to make a warm environment.

I am especially thankful for my friends who have shared and spiced up my life in Nottingham.

This thesis would not have been possible without the love and support of Mum and Dad.

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List of Abbreviations

BHPS British Household Panel Survey.

CCP Chinese Communist Party.

CFPS China Family Panel Studies.

CGSS Chinese General Social Survey.

CHFS China Household Finance Survey.

CHIP Chinese Household Income Project.

HPF Housing Provident Fund.

HRP Household Reference Person.

IIA Independence of irrelevant alternatives.

MNL Multinomial Logit.

MOHURD Ministry of Housing and Urban-Rural Development.

NBSC National Bureau of Statistics of China.

PBC People's Bank of China.

PoEs Private-owned Enterprises.

SoEs State-owned Enterprises.

Chapter 1

Introduction

Campbell (2006) defines household finance as a new field of finance analogous to corporate finance. This new field is important and challenging for at least three reasons. First, household behaviour in the financial market affects asset pricing and consequently determines market efficiency (Dumas, Kurshev, and Uppal, 2009). Second, the outcomes of household investment play an increasingly critical role in household wealth accumulation, which is one of the basic concerns of economics. Furthermore, some evidence shows that different outcomes in wealth accumulation can further enlarge existing income inequalities (Piketty, Yang, and Zucman, 2017). Third, there have been few studies in this field, particularly in developing countries. Since most works on household investment rely on surveys, data quality is pivotal. Lack of reliable data is a barrier to investigate household finance in those countries. In this context, household finance has significant implications for both academics and policymakers.

The field of household finance has developed considerably, since Campbell's 2006 presidential address to the American Financial Association (Guiso and Sodini, 2013). Many studies have paid increasing attention to this field (Campbell, 2006; Calvet,

Campbell, and Sodini, 2007; Brown and Taylor, 2014; Campbell et al., 2011). Over the past decade, much research has attempted to build and examine models in the field of household finance in China. However, those works have focused on some fractions, like the saving puzzle (Feng, He, and Sato, 2011; Wang and Wen, 2012; Chamon, Liu, and Prasad, 2013; Curtis, Lugauer, and Mark, 2015, 2017), portfolio selection with cash, bonds, and stocks (Li, 2006b,a; Wu, Yi, and Zheng, 2010; Yin, Song, and Wu, 2014; Chu et al., 2016), and entrepreneurship (Wei and Zhang, 2011; Li and Wu, 2014, 2017).

Although household investment in China has recently attracted academic interests, it still lacks theoretical definition and empirical analysis to capture more factors that affect household investment decisions regarding both participation and diversification. Along with the rapid growth of the economy, both the financial and housing markets in China have been booming. China's stock market has become the second largest market with over 3,400 firms listed and 57.5 trillion RMB in market capitalisation (equivalent to US \$8.5 trillion) by October 2017 (Wu, 2017). The markets for equity mutual funds and derivatives, though under-developed, still hold nearly 10% of the tradable part of the stock market (Carpenter, Lu, and Whitelaw, 2018). In spite of the fact that almost one-tenth of urban households participate in the stock market, shares, equity, and mutual funds only account for less than 2% of total household wealth in China on average ¹, in comparison with a relatively high level in Eurozone where those assets represent around 5% of household wealth.

By contrast, nearly four-fifths of household wealth are held as housing assets in Chinese cities, and the primary residences account for over 60% of these assets², in the background of a great housing boom with an average annual real growth of 13% in

¹The proportion of financial assets is calculated from the household dataset in the 2016 China Family Panel Studies (CFPS). The reason that the thesis did not include the fourth wave of the CFPS is that the dataset that contains the information of household members to generate the key variable that this study examines was not available. See Table B.1 for further explanation.

²Also see Table B.1 for further details in wealth composition of urban households.

first-tier cities, 10% in second-tier cities, and 8% in the third-tier cities in the last decade (Fang et al., 2015). In other words, Chinese households surpasses the households in both Eurozone at slightly over 50% and the United States at 49% in terms of share of housing assets in total household wealth (Bricker et al., 2017).

However, most studies of household investment in China limit their focuses on the decision either to invest in financial assets that contain stocks, funds, and market bonds (Li, 2006a; Yin, Song, and Wu, 2014; Chu et al., 2016), or to purchase second homes (Huang and Yi, 2011), instead of examining portfolio choices over a broad category of investment assets such as residential housing and private businesses.

This thesis aims to fill these research gaps in the field of household finance and contribute to the literature by extending the understanding of household investment within the framework of intra-household resource allocation. By redefining working-leisure model, this research takes a new approach in methodology to solve the overlapping issues in investment choice model and demonstrates how gender of children alter household asset holdings. It also provides insights into the relationship between women's bargaining power and household investment decisions. This research also can contribute to the growing literature on housing behaviour in China by extending our knowledge of the housing outcomes shaped by regional disparities. Its innovative analysis attempts to create new insights and ideas that may help to improve the housing policy at the provincial level.

1.1 Background and Issues

This thesis sits at the intersection of housing studies, specifically regionalised housing outcomes, and the study of household investment. To contextualise the research, the following section will give a brief introduction of housing in urban China, along with

institutional changes since China's market-oriented reform, and then addresses the issues illuminating the three studies in this thesis.

1.1.1 Housing in Urban China

Since 1998, China has undergone a series of housing reforms which brought significant changes to the composition of urban housing. Those changes not only led to an increasing number of homeowners in cities but also rendered new issues of housing inequality. The circumstances under which housing was mostly owned and built by State-owned Enterprises (SoEs) or other state organisations has been transformed. In 1981, over 82% of urban housing was in public ownership, but by 2002, 80% of public housing had been sold, mainly to their occupiers (Wang et al., 2012). As a result, almost half of current homeowners gained their ownership via the purchase of their pre-rental dwellings at a discounted price—evidence of successful privatisation in the housing sector during the 1980s and 1990s. With the addition of the holdings that urban households obtained via commercial transactions, homeownership eventually became the most common tenure in China's cities. In 2016, there were 82% of households that owned their primary homes.³

With the high return on real estate investment in the booming housing market and a dramatic increase in household income, second-home ownership is also emerging in Chinese cities. In 2002, approximately 6.6 % of urban households owned extra dwellings other than their primary residences (Mo, 2002), and by 2016, this percentage had increased to 21.8%, based on the CFPS. This massive growth and the high rate of second-home ownership are particularly alarming, taking account of the fact that a shortage of housing supply prevails, as well as a renter-dominated market, in recent decades (Fang et al., 2015).

³The rate of homeownership is calculated from the 2016 CFPS.

However, as the price of housing per square meter nearly doubled between 1999 and 2010, the ratio of housing price to annual family income averaged often over 10 in first- and second- tier cities, which is significantly higher than the international standard (Zhang and Tan, 2013). Some homeowners who benefited from the officially promoted process of privatisation are not satisfied with their housing quality, but cannot afford to buy new homes. Wang (2013) believes there are a considerable number of households that struggle to improve their living conditions. As a result, housing satisfaction remains low, based on data collected from Beijing in the fall of 2003 (Fang, 2006) and the latest Blue Book in 2013 (Chinese Academy of Social Sciences, 2013). After all, owning a home is not equal to high-quality of the housing.

The following summary introduces the changes in housing tenure, source of housing finance, and institutional setting during the reforms, and provides the necessary knowledge for a general picture of China's housing market.

Housing Tenure: the Road to Homeownership

China's housing reform began with three rounds of pilot housing reform experiments in a number of cities from 1979, and launched nationwide in 1988.⁴ The reform introduced market mechanisms to the housing system that covered more than 90% of the urban labour force by the 1980s and heavily relied on government funding via work units (Zhou and Ronald, 2017). Its aim was to free the government from such financial burden by transforming housing from a welfare good (as a part of employee benefits package) to a commodity. Dualism has been taken to smooth the process of marketisation: the emergence of housing market and the persistence of work units-based welfare, as State Council (1998) instructed 'new policies for the new housing

⁴That State Council released 'the implementation plan for gradual housing system reform in cities and towns' marked the start of nationwide housing reform. See Yang and Chen (2014) for a summary of housing policies since 1980.

stock, old methods for the old housing stock’.

China’s urban residents who queued for housing allocation in the pre-reform era are able to choose both housing type and tenure. On the one hand, the existing tenants of welfare housing were given the option of either staying renters by paying higher rental or becoming owners by purchasing their current dwellings at discounted prices (Logan, Bian, and Bian, 1999). On the other hand, for those who did not have access to housing welfare system, they either brought the newly built housing from real estate developers, or financed to built their own homes since the late 1990s (Zhang, 1998). Given more freedom in housing choice, there has been a dramatic change in the composition of housing tenure in urban China. The dominant position of public rental housing has been replaced by a mixture of public and private housing, and of rental and owner-occupied housing. **Table 1.1** presents the 2011 distribution of housing tenure in urban China. According to the National Bureau of Statistics of China (NBSC, 2011), 89.3% of urban dwellings are privately owned, and less half of them had been converted from pre-public housing.⁵

Table 1.1: Tenure Composition of Housing in Urban China, 2011

Housing Tenure	Description	%
Owned		89.3
Private Housing	Self-built after 1949 or old private housing before 1949	11.2
Market Housing	Bought through the market and built by developers	38.0
Pre-Public Housing	Bought during the 1980-2000 housing reforms	40.1
Rented	both private and public rental housing	10.7

Sources: NBSC (2011).

⁵This rate was also repeatedly quoted by the Ministry of Housing and Urban-Rural Development (MOHURD). It is worth to note that the National Bureau of Statistics of China (NBSC) calculated the homeownership rate as the percentage of residential households that are privately owned. In the United States and many other countries, the homeownership rate is defined as the share of households that own their homes. This thesis adopts the latter standard.

Housing Finance: the Housing Provident Fund and the Mortgage Market

Along with the reforms that privatised the existing stock of housing and introduced a housing market, China's government adopted a variety of strategies to expand funding sources for housing. The Housing Provident Fund (HPF) was one of the major innovations for housing finance in the 1980s and early 1990s and its many variants have been successfully implemented in several developing economies.⁶ Modelled on the Central Provident Fund in Singapore, China's HPF initiated in 1991 as a local experiment in Shanghai and became a national housing program in 1995.

The HPF is a saving scheme in which both employers and employees of public and private enterprises are required to contribute a certain percentage of the employees' salaries, normally 5%, to employees' HPF accounts with the China Construction Bank, later with commercial banks. The contribution from both sides are exempt from tax (Xu, 2017). Though unable to manage their accounts, employees can use the joint funds for buying homes or repairing or even building new homes. Additionally, they may apply for a HPF loan with relatively low downpayment and interest, after make a deposit for the first 12th consecutive month (Burrell, 2006). Until August of 2017, HPF had already collected the total saving of 11.83 trillion RMB from millions of employees. Nearly 60% of the savings has been withdrawn, and 88% of the left savings has been used for housing loans (MOHURD, 2017). Xu (2017) find a positive effect of HPF participation on access to homeownership, although the length of the enrolment history matters more.

The mortgage market did not play an important role until the mid-1990s. On the one hand, the purchase of subsidised dwellings hardly required external help. On the other hand, the state-owned banks were reluctant to loans individuals and often set harsh

⁶Examples include Brazil's Federal Severance Indemnity Fund-Retirement Institutional Fund, Nigeria's National Housing Fund, and Philippine's Home Development Mutual Fund. See Chiquier and Lea (2009) for further details.

restrictions on loan originations. As a result, only those who had bank savings equal to 30% of the home's value would be granted a loan with a short-term maturity of up to five years (Zhang, 2000). As the government officially terminated the welfare housing system in 1998, the People's Bank of China (PBC) set up basic lending standards to support households' purchase in the market. The establishment of lending standards and the changing attitude of state-owned banks, coupled with strong housing demand led to unprecedented growth in the housing and mortgage markets in subsequent years.

China's mortgage market is composed of commercial mortgages, HPF loans, and their hybrid. Due to the relatively low ceiling of borrowed amount, the HPF loans cannot cover many transactions as housing prices soar in Chinese cities. Therefore, the home buyers supplement their funds by combining the maximum amount of HPF loan with commercial mortgage. Overall, commercial mortgages have dominated the market. The share of HPF loans was over 20% of the total share of commercial mortgages in the end of 2016 (MOHURD and Ministry of Finance, 2017). The rate of residential mortgages in China are adjustable. Although the baseline is set by the PBC, but commercial banks are allowed to adjust the rates for their business operations. The HPF interest rate is much lower than that of commercial mortgages. In fact, the over-five-year interest rates for commercial mortgages and HPF loans were 6.55% and 3.25% respectively in the December of 2017 (MOHURD et al., 2017). According to the rules of the PBS, the downpayment at least accounts for 20% of the value of the mortgaged property, the maximum mortgage maturity is 30 years, and the applicant's age plus mortgage length should not exceed 65 years.

Residential Choices of Migrants

With China's economic reforms that have carried out since the 1980s, there has been increasing demand for labour in the cities. The 1985 reform in China's household reg-

istration (hukou) system made it easier for rural migrants with national identification cards to legally reside in cities after 1988. As a result of both the widening economic gap among regions and the deregulation of the migration policy, the floating population in China had dramatically increased from 6.6 million in 1982 to the peak of 253 million in 2014, and then slightly dropped to 245 million in 2016 (Department of Service and Management for Migrant Population on National Health and Family Planning Commission of the PRC, 2015, 2017). The proportion of this segment has also increased from less than 1% to nearly 20% of the total population in over three decades. The housing issues of rural migrants have been well documented (Huang and Clark, 2002; Huang and Jiang, 2009; Logan, Fang, and Zhang, 2009; Liu, Wang, and Tao, 2013; Tao et al., 2015). On the one side, migrants without local hukou is generally placed at a disadvantaged position in host cities where accessibility to public housing is associated with the local welfare system.⁷ On the other side, temporary migrants are expected to use company-owned dormitories. Based on data collected in the late 1990s, Wu (2002) found that 75% of labor migrants employed by enterprises live in dorms or temporary housing on construction sites. To a certain extent, living close facilitates long hours of work.

As the hukou reforms decentralised, municipal governments adopt a new hukou policy: the blue-stamped hukou that differs from the official red-stamped one. A migrant who owns an urban dwelling of a certain size can apply for switching his or her hukou to the local status in the late 1990s (e.g. Shanghai Municipal Government, 1993; Guangzhou Municipal Government, 1999). This policy created a new challenge for migrants and has been widely criticised, considering that most migrant labourers could not afford to purchase urban residence and were unable to apply for a mortgage for which holding an urban hukou is a precondition (Wu, 2013). After 2000, the hukou reform took a more aggressive step. China's central government expected that the new

⁷Although migrant workers substantially contribute to the locality, they are largely excluded from the local public housing system, with the exception of public rental housing in some cities or housing for the highly educated and highly skilled workers.

urban population, mostly migrants, could be enticed to purchase market-rate housing. Therefore, the provincial governments started to offer hukou access through housing qualification (e.g. Jiangsu Provincial Government in 2003 Huang et al., 2017). When purchasing a dwelling, the new owner could transfer the origin- municipality hukou for a host-municipality hukou.

However, the reaction of migrants was passive. Only a small fraction of first-generation migrants transferred their hukou, due to the fear to lose their lands that plays a special role as security in case of unemployment, sickness and old age (Fan and Wang, 2008). Since much of this floating population is circular, migrants maintain strong link with home area (Zhao, Liu, and Zhang, 2018). In the cases of rural-urban migration, those labours, especially the first generation, demonstrate strong attachments to their lands and rural households. On the one hand, a large share of their income is remitted to the families left behind in rural areas, mainly invested in housing renovation and construction. On the other hand, those migrants, more specifically, women aged 25 to 35 and men at their mid-30s, tend to return their hometown eventually. On average, rural migrants stay in cities for only approximately 7 years (Zhao, Liu, and Zhang, 2018). Although Meng (2012) claims that more complete integration⁸ of rural migrants into the urban economy will be important for sustaining growth, most migrants do not plan on remaining in cities.

1.1.2 Regional Inequality in China

Since 1978, China's economic development has grown at a dramatic but considerably varied pace across regions. Many studies have documented a persistent and increasing regional inequality in the transitional period of China (Chen and Fleisher, 1996; Kanbur and Zhang, 2005; Wan, Lu, and Chen, 2007; Fleisher, Li, and Zhao, 2010; Peng

⁸The hukou system is regarded as an institutional barrier to full integration of rural migrants into China's urban economy, rather than being a continuous factor to undermine mobility.

and Swider, 2017; Ying et al., 2017). A greater demand for labour in China's coastal cities has disproportionately driven urbanisation in the Eastern region, which has exacerbated regional differences. China's major cities, such as Beijing, Tianjin, and Shanghai, are all located in the East. Coastal provinces often stand out with higher per capita income levels than inland provinces. For example, in 2015, the averaged income of urban residents in the coastal province, Jiangsu, was \$6,043 one-third higher than one in the inland province, Guizhou, at around \$4,000 (Chinapower Project, 2017). As a consequence of the uneven distribution of income and economic development, housing prices substantially vary across the regions and thus widen the regional gaps in housing outcomes.

Regional inequality in China appears to be persistent and even growing in the last three decades, which is mainly due to China's economic strategies that encouraged certain regions to 'get rich first' and had a preference for the coastal region (Fan, 2006; Li and Haynes, 2011). China's approach to reform has improved the overall living condition of its population, and created dramatically economic growth. Nevertheless, the strategies were very favourable to some coastal areas in eastern China. The provinces like Guangdong Fujian, Zhejiang, and Jiangsu emerged in the transitional period, and recorded dramatic growth due to the export-oriented manufacturing. Meanwhile, inland regions had to play supporting roles in the rise of the East, and were lagging far behind (Wei, 1999).

As China deepened its ties with the international trade, the inland provinces left even further behind due to their geographical disadvantage and unprofitable industrial structure. As the status of China's traditional industrial bases declined in the Northeast and central regions and the new private sector boomed in the East, millions of rural migrants have flown into coastal cities to seek for job opportunities. To a certain extent, internal migration did reduce economic inequality among regions because of the large flows of remittances, but such massive migratory flows led to dramatically

socio-demographic changes in both origin and destination areas which aggravate the issues of ageing population in the less-developed areas, and generated the problem of overcrowded housing in the host cities (Wang and Murie, 2011; Peng and Swider, 2017).

Inequality and poverty alleviation became the major concern to the Chinese government in the 11th Five-year Plan (2006-2010), and a series of programs have been implemented to support development in rural areas and solve the dilemma of inland regions by investing massively in infrastructure (Li, Sato, and Sicular, 2013; Shi and Huang, 2014). However, there has been a debate over the efficacy of these policies for mitigating regional disparities and the effect of large-scale infrastructure projects on regional economies (Chen and Groenewold, 2010). To a certain extent, a narrower gap in GDP per capita between the two areas confirmed Chen and Groenewold's finding. For example, the ratio of per capita GDP in Shanghai to Heilongjiang was 3.6 in 2007, dropping down to 2.8 in 2016 ⁹.

1.1.3 China's Emerging Middle Class

The explosive growth of an emerging middle class has been one of the long-run drives for economic changes and social transformation in China. Since the early 2000s, China's middle class has been among the fastest growing in the world, swelling from 29 million in 1999 to roughly 421 million in 2013 (Kharas, 2017). The upper middle class is defined as a group with annual household disposable incomes ranging from US \$16,000 to US \$34,000 (Barton, Chen, and Jin, 2013). Based on the above standard, China's middle class only accounted for 14% of the population in 2012 but is growing larger and younger in contrast to the ageing issue of China's population. Moreover, the members of this new and booming middle class have access to more opportunities

⁹Compiled by the author from National Bureau of Statistics, 2007–2016.

than their predecessors had a decade ago.

A larger middle-class population and market has significant social and economic implications. First, middle-class growth is associated with migration from rural to urban areas (World Bank and PRC Development Research Center of the State Council, 2014). Second, from a demand-side perspective, the middle class enjoys stable housing, health, and educational opportunities. Schor (1999) thinks that a growing middle class leads to new consumerism, characterised by discretionary income to spend on leisure activities. Kharas (2010) states that middle-class consumers pay extra for quality, value-added brands, and product differentiation. Barton, Chen, and Jin (2013) also emphasise on the increasing willingness of China's middle class to spend on luxury goods and to increase household wealth through investments.

1.1.4 The Changing Position of Urban Women

In 2015, the Chinese government ended the one-child policy that had been implemented for 36 years. This policy not only left an ageing population and imbalanced sex ratio in mainland China, also led to an era of families with just one daughter in a society characterised by patrilineal kinship. Dramatic demographic changes have taken place in China that has a deep-seated cultural preference for sons over daughters. There is much evidence showing that female offspring have benefited from these demographic changes in urban China, where the government enforced the one-child policy more strongly. The absence of male siblings leaves the parents no other choice but pass the resources completely to the girl. There is an evident trend towards more women receiving higher education degrees than men. For example, the share of female students has surpassed that of their male counterparts, doubling from 23.4% in 1980 to 50.8% in 2010 (Liu, Li, and Yang, 2015). As a result of these changes, urban daughters now provide more physical and emotional support to parents, whereas this

is not true in rural areas.

Additionally, a continuous decline in fertility rates also contributes to a substantial improvement in urban women's position, since low fertility rates free women from the responsibilities of motherhood and enable them to engage in education and employment. In China, the number of births per woman dropped from over six during the 1960s to 1.4 by the late 1990s and has remained at around 1.5 since then (World Bank, 2017a). Researchers have well documented a strong correlation between women's employment and a low fertility rate in prior studies (Abadian, 1996; Duflo, 2012). Earning an independent income also increases daughters' ability to provide financial support to their parents (All-China Women's Federation and National Bureau of Statistics of China, 2011). More importantly, Xie and Zhu (2009) suggest that traditional norms are no longer valid in urban China since married daughters provide more financial resources to their parents than their brothers. With more years of schooling, increasing financial ability, and access to property rights, urban women have enhanced their impact on household decisions, and much evidence shows that children benefit from women's empowerment. The question to answer is: What types of outcomes will intra-household bargaining over investment allocations lead to?

1.2 Objectives and Structure

Evidence in the previous section gives an overview of issues for Chinese households. Housing is a dominant component in household wealth in China. Homeownership prevails in the presence of the deepening gaps among regions. The emerging middle class tends to manage household wealth in favour of investment. The new position of urban women leads to changes in household distribution of resource. Therefore, this thesis separates main residences from household investment assets, and addresses three interrelated studies. The specific objectives are summarised as follows:

Chapter 2 provides an overview of intra-household theory that gives a theoretical foundations for the whole study. It also introduces the data used for empirical analysis, and explain the formation of panel data and the challenges during data analysis.

Chapter 3 explains the regional disparities in homeownership and value of owner-occupied housing. Longitudinal data from the 2010–2014 CFPS is then used to empirically examine the demographic and socio-economic effects on housing outcomes across the Eastern, Central, and Northeastern regions in China. The research is limited to urban areas to better explore and understand these influences.

Chapter 4 describes the determinants of household investment choice. It investigates the decision patterns of household investment and gives a further examination of the choices across three broad categories: financial assets, private businesses, and real estate, considering personal and household characteristics that may have an influence. The hypotheses are tested in nested logit models for three CFPS waves that took place in 2010, 2012, and 2014. A sub-sample of parental households is used to examine how parenthood alters household investment decisions.

Chapter 5 examines how households allocate their wealth across three investment categories. A short-panel data is employed from the 2010–2014 CFPS to test the impact of changes in demographic composition by the fixed-effect model with the specification of the Working-Leser function. A Tobit model with two limits is used to explore two stages of decision-making, including the chance to invest and the extent of holdings.

Finally, Chapter 6 concludes the key findings of this thesis that add evidence to the literature of this area of study. Following a reflection on the limitations of this research, the possibilities for future search are discussed.

Appendix A contains criteria for selecting Household Reference Person (HRP) and

the definitions of explanatory variables used in the empirical analysis. Appendix B includes supplementary materials and side discussions.

Chapter 2

Theory and Data

2.1 Theoretical Framework

2.1.1 Intra-Household Resource Allocation

Over the past several decades, a number of theoretical models have been developed to provide a better understanding of intra-household bargaining process, in response to the increasing concerns of gender issues in development policy-making. Early theories assume a unitary framework in which the household is treated as a single unit (Samuelson, 1956; Becker, 1965, 1974). Becker (1974) regards the household as maximising a single utility function, and thus the household behaves in ways that are empirically identical to the behaviour of a single utility maximising individual. Therefore, terminologically speaking, this is a unitary model. Since all members have the same utility function, they have the same preferences. In other words, this unitary approach implies that the distribution of income or other measures of bargaining power within the household does not alter the outcomes. More specifically, there is no correlation between household consumption and who make the decision. These models assume that

households reach Pareto efficiency.

However, these notions were challenged, and an extensive literature demonstrated that the unitary models did not hold under many circumstances (Alderman et al., 1995; Strauss and Thomas, 1995; Doss, 1996). Given the lack of empirical support for the unitary models, a different approach has been adopted by a number of researchers (Donni and Chiappori, 2011). These new models are based on a non-unitary description of household decision-making, and so share a basic theoretical trait: each household member has a different utility function and therefore has different preferences. Since the models follow game theory (Cournot-Nash equilibrium), each member within a household is assumed to maximise their own utility subjective to their own budget constraint, keeping in mind of the decisions of other members. A process of intra-household bargaining occurs and the decisions are made according to each members bargaining power. The outcome of these bargaining process varies depending on who makes the decision. In these non-unitary models, there are two factors that determine household expenditures and other financial outcomes: each members' bargaining power and their preferences.

2.1.2 Bargaining Power

The existing studies on the processes of intra-household decision making find that bargaining power relies on the relative income that each partner or household member contributes to the household income (Manser and Brown, 1980). If a husband earns a higher income or receives a positive income shock, his relative bargaining power increases and therefore the bargaining process will end in his favour. A growing literature has documented that control over resources leads to control over decisions (Doss, 2001; Lundberg, 2005, 2008; Lukea and Munshi, 2011; Wang, 2014). For example, if women become empowered within the household, expenditures will change to line up

with their preferences.

However, a number of research shows that control over resources and relative income is not the only determinant of bargaining power. Ashraf (2009) states that information and communication plays an important role in intra-household decision making in the Philippines. The finding of her experimental study points out that only men respond to the information and communication treatment to the cultural background in the Philippines, where women are mostly in charge of household finance. Also in a developing country, Li and Wu (2011) find that a woman with a first-born son has a greater effect on household decision-making than a woman with a first-born daughter, and thus adopts a new measure of bargaining power in China where son-preference prevails. Using a representative dataset from the United States, Smith, Mcardle, and Willis (2010) find that there is a strong tendency for men to be the financial decision makers in their study. The influences of the husbands are slightly reduced, if the wives are considerably older and have higher cognitive abilities than their partners.

2.1.3 Preferences

An extensive literature with the non-unitary models shows gender differences in preferences. Generally speaking, women's preferences are favourable to the next generation. A massive number of studies have hence looked at how exogenous changes to women's bargaining power reflect the changes in household expenditures. Duflo (2003) finds that an exogenous increase in pensions that is given to grandmothers raises nutrition exclusive to girls. A considerable amount of evidence on the effect of increased bargaining power comes from conditional cash transfer programs that in many countries specifically target women. In the study of the effect of a cash transfer program given to women in Mexico, Bobonis (2009) finds that the program increases investment in children via a shift in women's relative bargaining power. de Brauw

et al. (2014) conclude similar findings in their research examining the cash transfer programs in Brazil. Conducting an experiment that randomly appoints commitment savings accounts to the clients in the Philippines, Ashraf, Karlan, and Yin (2010) find an increase in women's self-reported bargaining power and in household spending on female-orientated durables. These studies provide the empirical evidence to reject the unitary-model and to confirm that women's preferences differ from men. Those results also support the view that women's preferences align with the wellbeing of children. A large number of experimental studies have also shown that women and men have different preferences innately. Women tend to be more patient (Dittrich and Leipold, 2014) and more risk averse (Dohmen et al., 2011), but less trusting (Buchan, Croson, and Solnick, 2008).

2.2 Data

2.2.1 Household Panel Data

The data used for this thesis was taken from the CFPS, which is an ongoing, nationally representative, longitudinal survey of Chinese communities, households, and individuals. This survey is being carried out by the Institute of Social Science Survey of Peking University, China. Its main objective is to document changes in contemporary China in multiple areas such as economic activities, education, family dynamics, migration, and health and to identify, model and forecast such changes, their causes and consequences in relation to a range of socio-economic variables. The CFPS is the first project to collect large-scale academic-oriented longitudinal data in China and covers 25 provincial regions representing 94.5% of the Chinese population, in order to provides the academic community with the most comprehensive and highest-quality survey data on contemporary China (Xie and Lu, 2015).

The sample for the 2010 baseline survey is drawn with implicit stratification through a multi-stage probability. It is designed to be multi-stage so as both to reduce the operational cost of the survey and to allow for studies of social contexts. Each subsample in the CFPS is drawn through three stages: county (or urban district), then village (or urban community), then household. Five provinces -Liaoning, Hebei, Shanghai, Guandong, and Gansu - are chosen for initial oversampling (1600 households in each) to be representative at the provincial level for the purpose of regional comparison. The rest of the CFPS sample (8000 households) is drawn from the other 20 provinces so as to make the overall sample representative of the country through weighting. In 2010 a total of 14,798 households and 42,590 individuals, all household members over the age of 9 years in a sampled household, were interviewed as the first wave of the CFPS survey. The rate of response is approximately 79%. These individuals became core members of the survey, and all core members would be followed up to elicit information on topics such as household composition, housing tenure, employment and income on a biennial basis. In the follow-up survey conducted in 2012, about 85% of the original households surveyed were successfully interviewed (Xie and Lu, 2015).

This thesis chooses the CFPS for empirical analysis. The CFPS has several advantages over the other large data projects in China, including the Chinese General Social Survey (CGSS), the Chinese Household Income Project (CHIP), and the China Household Finance Survey (CHFS). Firstly, the CFPS contains four waves, covering the period 2010 to 2016, and two pilot waves conducted in Beijing, Shanghai and Guangdong in 2008 and 2009. It is the longest longitudinal data of Chinese households, while the public access to CHFS is limited to the 2011-13 waves. Secondly, the CFPS collect the details on household finances and household members, which make it suitable for analysing intra-household bargaining and household investment behaviour. Unlike the CFPS, the CHIP focus on migration and income inequality and thus it collect data from migrant households based on a specific questionnaire that differs from the local household. As one of the oldest surveys, the CGSS was initiated in 2003 and covers

various topics, but is only allowed for cross section study.

Thirdly, the survey has been widely used to examine various issues, such as household structure, children's wellbeing, housing tenure, and entrepreneurship. The reliability of the CFPS has been recognised by many core journals in the field of economics. For example, Lei et al. (2017) use the 2010 CFPS to examine the effect of family structure, in particular sibling gender composition, on education accomplishments of men and women. Xu, Liu, and Zhang (2015) use the 2010 and 2012 CFPS data to investigate inequality changes in children's well-being. Combining the 2009 pilot survey and the 2010 data, Li and Wu (2014) examine the effect of house ownership on entrepreneurship in China.

However, there are several issues in the empirical analysis of housing outcomes and household investment with the CFPS. The following part of this section explains the challenges and how this study deal with them.

2.2.2 Issues in Empirical Analysis

One common challenge in the use of household panel data is how to define a household longitudinally when its composition may change over time. The usual approach to this problem is to follow individuals, rather than attempt to track households, with analyses based on person-year observations. Since the measurement unit of the analysis is the household, it is necessary to select one person in the household to follow over time and to indicate the characteristics of the household more generally. Considering that the information for head of household is not always available over the survey waves, after reviewing other panel datasets, I follow the approach of the British Household Panel Survey (BHPS) in using the HRP to represent the household's social and economic position. The HRP is defined as the person 'legally or financially responsible

for the accommodation or the elder of two people equally responsible' (Taylor, 2010, pp.A2-4). For a person living alone, that person is the HRP. If a household contains more than one person, the HRP is the member of the household in whose name the dwelling is owned or rented or responsible for the accommodation. Among the household members who jointly own or rent the dwelling, the one with the highest income is taken as the HRP. When two members have the same income, the older member is taken as the reference. However, if the HRP is not a permanent member in the survey, a priority order is applied to select one of permanent members in the sample to serve the same purpose as the HRP (See **Appendix A** for HRP selection criteria).

Another issue is a substantial proportion of missing data that mainly results from some slight changes and modifications in the CFPS questionnaires over the surveyed period. Many of the questions asked in the first wave (the CFPS 2010) have been repeated in subsequent waves: the core questions are repeated in all waves; and the set of questions for community only appear on a cyclical basis. The troubles come from the changing part. Some questions are added in the following waves to collect the information on the issues the CFPS did not realise in the original design. For example, in each surveyed year, of about 700 sampled households that invested in businesses, only 31% report the value of their shares in business in 2010, in contrast with 98% in 2012, and 94% in 2014. A large percentage of missing data in 2010 is due to the fact that the CFPS did not collect data on the number of firms, firm size, and value of business assets from the households with individual-owned business ('getihu') (CFPS, 2010, p.52). Fortunately, the missing data does not cause attrition bias in the empirical analysis, since the 2010 data is automatically dropped with the addition of the lagged income to the fixed-effect model.

However, in the analysis of parental households' investment pattern, I have to carry out a cross-section study, instead of using panel data, to deal with the changing variables in household expenditures over the waves. Besides, controlling lagged variables in the

models also reduces the sample size due to the nature of the unbalanced panel. Since the level of such attrition is quite low and random, the results are still statistically reliable.

Finally, this thesis has to use a short-panel that covers only three waves instead of all four CFPS waves. Since the complete datasets for 2016 are not released until April 2018, the final wave has to be excluded from this research. The key variables, like household age-gender composition and women's relative bargaining power, in analysis of household investment are unable to be calculated from the available dataset of the 2016 CFPS. A priority is thus to update the sample and revise the research to be published in future.

Chapter 3

Regional Disparity in Homeownership and the Value of Housing

3.1 Introduction

Since the late 1980s, there has been a substantial increase in the homeownership rate in urban China. The existing stock of housing has been privatised, a housing market has emerged, and the rate of homeownership has reached 80% by 2004 (Deng, Shen, and Wang, 2009). In contrast, only one-fifth of urban residences were privately owned in the 1980s. Decades of unprecedented expansion in the housing market has resulted in a dramatic shift. However, the distribution of homeownership and housing wealth is uneven across different regions of China. On the one hand, there are significant disparities in the homeownership rate in urban China. In 2014, the Eastern¹ and Northeastern regions² have ownership rates of 68.5% and 73.6%, respectively, while the Central re-

¹The Eastern region contains three municipalities (Beijing, Tianjin, and Shanghai) and seven provinces (Hebei, Shandong, Jiangsu, Zhejiang, Guangdong, Fujian, and Hainan).

²The Northeast region is composed of Liaoning, Jilin, and Heilongjiang provinces.

gion³ has a substantially higher rate of 80.2%. On the other hand, the housing value gap between inland and coastal regions widens continuously. The average value of housing units owned by households in the Eastern region is approximately double the value of homes owned by households in the Northeastern and Central regions (See **Table B.2**).

Previous studies have found wide regional disparities in homeownership trends (Simmons, 2001; Coulson, 2002; Myers et al., 2005) and in housing values (Roback, 1982; Baffoe-onnie, 1998; Luttik, 2000). Myers et al. (2005) carefully investigate the homeownership trends by limiting their research to metropolitan areas to better represent actual housing markets. However, most works documented the regional disparities with a focus on the United States. There are few studies regarding the link between housing outcomes and regional differences in China that geographically covers five time zones⁴ and where demographic pattern and the level of economic development vary across regions.

Existing research on the determinants of housing outcomes for Chinese households has abounded with a regression of tenure choice on a set of variables that represent housing market and individual- and household-specific characteristics. Examples include Logan, Bian, and Bian (1999), Huang and Clark (2002), Huang (2004), Huang and Yi (2011), Cai and Huang (2013), and Ren and Treiman (2015). However, the issue of regional disparity in homeownership and quality of living has been widely ignored⁵. Those studies merely adding regional dummies into the models, which merely obtains

³The Central region covers six provinces (Shanxi, Henan, Anhui, Jiangxi, Hubei and Hebei) and 10 provincial-level divisions (Chongqing, Sichuan, Guizhou, Yunan, Shaanxi, Gansu, Inner Mongolia, Guangxi, Ningxia, and Xinjiang).

⁴Geographically, China covers five time zones. However, the standard times used in Mainland China, Hong Kong, Macau, and Taiwan Province are the same, for they are all in the same time zone (UTC+8).

⁵An interesting but partial exception is Ren and Hu (2016) which investigates housing difficulties in urban China and highlights the effect of regional variation. Using the data from five Chinese provinces that were selected and over-sampled for the purpose of regional comparison, they add four variables (housing price-income ratio, Gini coefficient, and GDP per capita) and regional dummies to capture regional differences.

an estimate of the differences in housing outcomes, conditional on the covariates.

Using a short panel from the 2010–2014 CFPS that gives greater capacity for capturing the complexity of urban households' decision on housing, this chapter aims to explore regional variations empirically: first, identify the patterns of homeownership; second, investigate the determinants of homeownership; and finally, look into the regional differences in demographic and socio-economic characteristics at the household level and thus discover what may alter the rate of homeownership across regions. Along with the line, this chapter also examines the regional trends in housing values that represent the quality of housing. The following questions will be answered: (1) Do regional differences in household characteristics contribute to variations in homeownership? (2) What household characteristics can explain the regional disparities in housing quality counted as the market value of dwellings in which householders reside?

Section 2 reviews previous literature that defines the determinants of homeownership and discrepancy in housing quality. Section 3 presents a descriptive portrait of influences on homeownership and the value of self-owned dwellings. Section 4 shows the regional disparities in demographic and socio-economic characteristics. Section 5 explains the sample and the formation of models used in this chapter. Section 6 provides empirical analyses that employ binary logistic regressions as well as fixed-effects regressions to estimate homeowner groups and assess the differential impacts of the explanatory factors on the market value of owner-occupied housing. The final section summarises the key findings and their relevance to the literature.

3.2 Review of the Related Literature

Despite China's nation-wide reforms on housing system, housing gains are clearly substantially greater in some metropolitan and coastal areas than in others. The following

section takes an approach to explain the regional difference in housing outcomes by reviewing the literature from two strands: the determinants of homeownership and the influence on quality of housing.

3.2.1 Homeownership

Many researchers have elucidated the demographic and socio-economic sources of disparities in homeownership. Studies on housing generation effects have shown age-generation inequality in homeownership as a reflection of age group differences in income, life-cycles, savings and consumption behaviour, and retirement preferences (Myers et al., 1992; Browning and Crossley, 2001; Scanlon and Whitehead, 2004; Aronowitz, 2009; Helbrecht and Geilenkeuser, 2010). Some studies have examined the financial constraints of the first-time home buyers on climbing the ladder to homeownership (Chiuri and Jappelli, 2003) and intergenerational help (Engelhardt and Mayer, 1998; Guiso and Jappelli, 2002; Charles and Hurst, 2003). Few have focused on the unexplained trend toward younger homeowners in China where a considerable number of middle-aged families have struggled to save up for a downpayment (Zhou, 2010).

It is important to acknowledge that an association between homeownership and household's gender is much more complicated because there are fundamental differences between single and two-parent households, especially in traditional societies like China. Previous literature has preferred to examine how the combination of gender and other demographic characteristics, such as marital status and number of children, affect homeownership in different household types (Ling, 1998; Sedo and Kossoudji, 2004). Prior studies in China have concentrated on married couples and their eagerness to own dwellings and ignored single-parent households (Zhou, 2010).

Housing inequality is a type of wealth inequality. The uneven distribution of homeownership is widely viewed as a reflection of a difference between groups in income and wealth across societies (Krivo and Kaufman, 2004; Barth, Lea, and Li, 2012). Studies on some developed countries have supported this view, concluding that differences in household income (Painter, Gabriel, and Myers, 2001; Kuebler and Rugh, 2013) and in family wealth (Hilber and Liu, 2008) contribute to inequality in homeownership. However, there is a consensus in the previous studies in China that income only partially explains inequality in housing (Bian et al., 1997; Huang and Clark, 2002). Many scholars have discussed institutional disparities resulting from implicit but consistent involvement of work units in the housing market (Chiu, 1996; Zhou and Logan, 1996; Logan, Bian, and Bian, 1999; Zhang, 2000; Pan, 2004; Li and Yi, 2007). Lee (2000) and Wang and Murie (1999) address the distributional injustice in access to housing ownership in urban China.

It is also conceivable that spatial residential patterns contribute to the disparate outcomes of housing tenure. Some research on minority groups (e.g., Asians in the U.S.A.) tend to concentrate in a few regions and metropolitan areas where demand is typically high and supply is limited, and conclude that affordability problems reduce the likelihood of ownership (Deng, Ross, and Wachter, 2003; Hilber and Liu, 2008). Previous literature on inter-migration in China shows there is a large flow of migration moving towards coastal cities as well as metropolitan Beijing and Shanghai (Zhang and Song, 2003; Bao et al., 2007). Such concentration of migrants in specific areas not only reduces the possibility of ownership for migrant households but also puts pressure on both rent and housing prices that may raise the affordability of urban housing for the local residents. However, there is little evidence that migrant concentration deters urban residents from homeownership in China. For migrants, economic considerations may be dominant in tenure choice, which renders ownership impractical in host cities.

3.2.2 Quality of Housing

A number of existing studies have partially examined the effect of demographic and socio-economic characteristics on the quality of dwellings that households own. Of the demographic factors, age of the householder clearly shows positive influences on both size and facilities of the household's main residence (Logan, Bian, and Bian, 1999; Pan, 2003). The connection between age and housing quality could be explained in two ways. On the one hand, the life-cycle theory of saving and consumption indicates that individuals tend to save at a younger age (or during the high-income period) to smooth consumption over the course of a lifetime. Since the acquisition of housing requires a substantial amount of saving as a preparation fund, an older householder is more likely to move into a better home. Helbrecht and Geilenkeuser (2010) point out that upgrading in size and housing quality reflects the increasing accumulation of household wealth, which does not end until retirement. On the other hand, under the socialist institutional setting, being older was observed as an advantage to obtain work-unit housing (Logan and Bian, 1993). Housing allocation is partly based on seniority, and there is a continuous process over time of negotiating for larger or better-equipped housing that naturally benefits those who have been in the system longer. In other words, the effect of age on housing quality works in both direct and indirect ways.

Prior research has been linked gender to housing quality by evaluating the effect of marital status of the householder and the existence of children on housing outcomes. Instead of focusing on the sole effect of gender on housing quality, many studies on the field of gender and housing have found that discrepancies in household composition (e.g., single-parent and one-person households) resulted in the different outcome of housing (Gibbons and Silva, 2011; Natalier, 2012). Sainsbury (2008) points out that, in well constructed social welfare states, housing allowances give single mothers more accessibility to high-quality housing than single fathers. However, some studies have found relatively worrying conditions of single-parent households, and Cook and

Bruin (1994) cite that the absence of another parent is a key barrier to better housing conditions. The dilemma of single parents is more likely to be observed in China due to the lack of official social welfare for vulnerable households and the widespread discrimination against unmarried single mothers (Yangpu Women's Federation, 2012). Sedo and Kossoudji (2004) elucidate that, in financial terms, housing conditions are similar for single males and females, but for unmarried single parents, there is a large discrepancy in housing wealth.

It has been proven that education has a positive effect on specific aspects of quality of housing such as size and facilities (Logan, Bian, and Bian, 1999; Pan, 2003; Huang and Jiang, 2009). Education functions via other factors, which is due to a strong relationship repeatedly found between education inputs and outputs, notably income. Financial ability affects housing facilities through purchasing power because, within certain constraints, both public-housing tenants and private-housing owners can pay for improvements to their homes. In the post-socialist countries, many researchers have discovered a bias in housing allocation that favours those with higher incomes, education, or occupational skills (Szelenyi, 1983; Ciechocinska, 1987; Hegedus, 1987; Musil, 1987). An important insight comes from Szelenyi (1983, p.6), who argues, 'those with higher incomes get the better housing, and these inequalities are created by administrative allocation...by the distinctively socialist mechanism which was supposed to replace the capitalist market method of allocation'. However, Wang, Wang, and Wu (2010) believe that educational attainment had a weakly but consistently positive impact on housing quality in both pre- and post-reform China.

The work units, known as employers in public sector, have played an important role in explaining the effect of institutional factors on housing inequality in China and other socialist countries (Szelenyi and Manchin, 1987; Pickvance, 1988; Logan, Bian, and Bian, 1999; Yusuf, Nabeshima, and Perkins, 2006). Prior to the collapse of SoEs in the 1990s, lifetime employment was tied to full enterprise-based pension rights,

including the right to enterprise-built housing, hospitals, and schools. The work unit's involvement in housing was reduced when the economic reform was introduced in this sector (Wu, 1996; Zhou and Logan, 1996). However, work units remain to subsidise employees in several ways. For example, SoEs and government agencies are more generous contributors of the HPF, whereas foreign companies and small businesses simply do their duty. Some work units start their own real estate projects or play as the housing wholesalers. Of course, this mainly depends on the financial resources that work units can manage (Deng, Shen, and Wang, 2009).

Additionally, Logan and Bian (1993) identify several determinants of work units that affect their ability to allocate or offer subsidised housing to their employees. Those key factors of work units are administrative rank, ownership (i.e., government agencies, SoEs, collective-owned enterprises, and other forms), and size (Walder, 1992; Logan and Bian, 1993). Work units at the municipal level are less competitive in the distribution of the housing fund than are those administrated by the central government, while SoEs are more competitive than collective-owned enterprises. In the post-reform era, some work units are still powerful in the market economy and are able to offer more housing aid to employees due to their monopolistic control over some key resources (e.g., those in the energy, tobacco, and telecommunications industries (Mina and Perkins, 1997). In contrast, employees in the private sector have to purchase dwellings in housing market.

Many works have found that migrants tend to occupy less desirable housing than urban locals in many countries. For example, the studies on cities in less-developed countries are included in both Goldscheider (1987) and Sclar, Garau, and Carolini (2005); Costello (1987) and Dutt, Tripathi, and Mukhopadhyay (1994) examine slum dwellers in India and the Philippines, and Pero (1997) reaches the similar conclusion in his study on residential arrangement of immigrants in Bologna of Italy. The housing issues of migrants have been also consistently researched in China (Huang and

Clark, 2002; Wu, 2003, 2006; Huang and Jiang, 2009). Most believe that the underlying cause is institutional discrimination. In other words, China's rural-urban division rooted in the household registration (hukou) system made migrants excluded from the housing system due to lack of non-local urban identification.

3.3 Influences on Housing Outcomes

3.3.1 Determinants of Being a Homeowner

The first part of **Table 3.1** shows how the rate of homeownership changed from 2010 to 2014 at national level. Despite a downward tendency where the rates had ranged from 80.8% to 74.6% during a five-year period, the proportion of urban households that own their main residences is extremely high in China,⁶ which far exceeds the average levels for some developed countries such the United States, United Kingdom, and Germany, at around 60%. However, more than one-third of owner-occupied dwellings are built by their owners, while over 26% of homeowners bought their dwellings from work units at a much lower price than the housing market price, based on the urban sample from the 2010 CFPS. Therefore, it is unknown whether or not most households can actually afford main residences in Chinese cities.

Starting with age-effect on homeownership, it is interesting but unexpected that 63% of young householders are homeowners aged between 13–18 years. It is most likely that this figure reflects the financial abilities of their parents. An upward trend in ownership starts at the ages of 19–25 years, and the proportion of homeowners increases from slightly over the half to less than seven-eighths among urban households. These householders begin to consider buying their first homes in their mid 20s to mid 30s.

⁶However, this figure is still lower than the 87.7% figure published by (Liu et al., 2011, p.46) and the 85.4% figure from the CHFS survey.

Table 3.1: Changes in Homeownership by HRP and Household Characteristics

	Homeownership				Total	Obs
	No		Yes			
	%	SE	%	SE		
Survey Year						
2010	19.2	1.985	80.8	1.985	100.0	4,571
2012	17.8	1.879	82.2	1.879	100.0	3,872
2014	25.4	2.528	74.6	2.528	100.0	4,131
HRP Characteristic						
Age Group						
13-18	37.1	9.197	62.9	9.197	100.0	73
19-25	49.1	3.943	50.9	3.943	100.0	588
26-35	34.3	2.852	65.7	2.852	100.0	1,704
36-45	20.7	1.904	79.3	1.904	100.0	3,052
46-55	14.2	2.122	85.8	2.122	100.0	2,926
56-65	13.6	2.011	86.4	2.011	100.0	2,373
66+	19.2	3.828	80.8	3.828	100.0	1,855
Gender						
Female	23.3	2.932	76.7	2.932	100.0	4,160
Male	19.2	1.594	80.8	1.594	100.0	8,414
Marital Status						
Never Married	52.7	3.999	47.3	3.999	100.0	701
Having Spouse	17.6	1.828	82.4	1.828	100.0	10,468
Divorced	32.8	5.443	67.2	5.443	100.0	392
Widowed	24.0	2.868	76.0	2.868	100.0	1,010
Educational Attainment						
Primary School	17.4	1.655	82.6	1.655	100.0	4,341
Middle School	21.7	2.521	78.3	2.521	100.0	3,944
High School	22.5	2.85	77.5	2.85	100.0	2,445
3-year College	19.3	2.413	80.7	2.413	100.0	1,079
BA & Higher Degrees	24.7	3.341	75.3	3.341	100.0	762
Institutional Factors:						
Hukou-Migration Status						
Rural Locals	13.1	1.316	86.9	1.316	100.0	4,872
Rural Migrant	63.9	5.388	36.1	5.388	100.0	663
Urban Locals	17.8	2.109	82.2	2.109	100.0	6,262
Urban Migrants	44.1	5.103	55.9	5.103	100.0	549
CCP Membership						
No	22.3	1.963	77.7	1.963	100.0	10,695
Yes	12.8	2.856	87.2	2.856	100.0	1,777
Job-related Variables:						

Continued on next page

Table 3.1: – continued from previous page

	Homeownership					Obs
	No		Yes		Total	
	%	SE	%	SE	%	
Employment Status						
Employed	25.9	2.733	74.1	2.733	100.0	4,160
Self-Employed	21.2	2.728	78.8	2.728	100.0	1,161
Farming	6.8	1.549	93.2	1.549	100.0	1,520
Other Type	20.0	2.466	80.0	2.466	100.0	1,130
Out of Labour Market	18.9	2.352	81.1	2.352	100.0	4,603
Ownership of Employer						
Governments	13.1	3.876	86.9	3.876	100.0	463
Public Service	18.2	3.281	81.8	3.281	100.0	554
State-owned Enterprise	21.4	2.497	78.6	2.497	100.0	934
Private-owned Enterprise	33.3	4.120	66.7	4.12	100.0	1,841
Individual Enterprise	21.1	2.493	78.9	2.493	100.0	1,117
Others	18.3	1.939	81.7	1.939	100.0	7,665
Seniority:						
Administrative Postion						
No	20.7	1.957	79.3	1.957	100.0	11,603
Yes	20.9	3.112	79.1	3.112	100.0	971
Household Characteristic						
Household Income pc Quartiles						
Bottom 25%	19.5	1.420	80.5	1.42	100.0	3,177
Lower 25%	17.3	1.795	82.7	1.795	100.0	2,903
Upper 25%	20.1	2.419	79.9	2.419	100.0	2,745
Top 25%	21.9	3.659	78.1	3.659	100.0	2,606
Owning Second Homes						
No	20.0	2.097	80.0	2.097	100.0	10,384
Yes	23.6	2.249	76.4	2.249	100.0	2,188
Observations	12,574					

Note: (d)-dummy variable. Use household as measurement unit.

Source: Calculated from the Sample of Urban Households in the 2010-2014 CFPS.

Apparently, a substantially increase in the homeownership rate of the householders aged 26–35 years show a turning point of age for climbing the ladder of homeownership. This pattern follow the life-cycle model that individuals tend to borrow during their high-income period. Or they simply get extra financial help to purchase homes from their parents in most cases of China. For urban householders, the peak timing

to be a homeowner is around in their late 50s to mid 60s (86.4%). However, the percentages of staying as a renter experience a sudden decline in the householders late 60s (from 13.6 to 19.2 per cent). It is mostly likely that urban householders are given a final chance for achieving to ownership before retirement.

In terms of gender and marital status, the households without ownership stand out with relatively high proportions of female and never-married householders. Being married has a clear advantage over the other relationship types, although Sedo and Kossoudji (2004) claim that it is not clear why marriage so strongly influences housing outcomes. Male householders are more likely to be homeowners. However, gender differences may reflect marriage differences more than anything else. Marriage-as opposed to being single or in unstable cohabitation-is associated with a higher likelihood of homeownership. It is surprising that past marital experiences (divorce or widowhood) are also associated with greater access to homeownership compared to the single, never-married group. It is interesting to note the difference in questionnaire design between the surveys conducted in Western societies and China like the CFPS. There is no ‘Separated’ option for marital status in most surveys designed to collect data on Chinese households (e.g., CFPS, CHFS, and CHIP), even though separation is not a rare choice for Chinese couples, according to a report on marriage in China (Xu, Li, and Yu, 2013).

The educational characteristics reveal a more complex picture.⁷ A relatively high proportion 82.6% of householders who only completed elementary level studies became homeowners compared to householders with higher educational levels. For instance, the proportion of householders with a 3-year college education was 80.7%, and the proportion of high school graduate householders was 77.5%. It is also surprising to find that nearly a quarter of those who attained bachelor’s degrees or higher are not homeowners.

⁷Educational attainment refers to the highest degree of education an individual has completed, according to the definition in the U.S. Census Bureau Glossary.

Having rural hukou status is not a disadvantage to becoming a homeowner if the hukou is locally registered. In fact, rural locals stand out with the highest proportion of ownership at 87%; meanwhile, only 36.1% of rural migrants own their residences in cities. However, it is quite odd that many rural householders residing in Chinese cities are not labelled as migrants. Urbanisation in China has not only turned once small cities into large cities and large cities into metropolises, and it has also transformed villages into cities administratively. This means that rural dwellers may become urban dwellers without actually leaving their hometowns. Like their counterparts still in the countryside, they own land on which they farm and build their own dwellings.

For those with urban hukou, the variations in migrant homeownership follow a similar pattern, although to a lesser extent. The local-migrant gap has narrowed to 26.3% from 50.8% among two rural groups. A substantial high proportion of urban locals are homeowners (82.2% compared to 55.9% for the migrant group). Clearly, under the existing Hukou system, rural migrants cannot access subsidised housing in cities or purchase migrant housing provided by work units (State Council, 2007). Although they can purchase private housing, it is often too expensive for them to afford (Huang and Yi, 2011).

Another institutional variable is whether or not the householder holds membership of the Chinese Communist Party (CCP). To date, China remains a one-party state. CCP membership enhances access to housing resources (Walder, 1995; Logan, Bian, and Bian, 1999). The homeownership rate of party members (87.2%) far exceeds the level reported for those without CCP membership at 77.7%.

Job-related characteristics vary greatly by housing tenure. The farmers stand out with a considerably high rate of homeownership (93.2%) compared with the self-employed at 78.8% and the employed at 74.1%. Turning to ownership of employer, those working in government have a clear advantage over the other five groups, from public service,

SoEs, Private-owned Enterprises (PoEs), individual enterprises, to other forms. For instance, the rate of homeownership for employees in government is 86.9%, followed by those in public services at 81.8%. Among the other four groups, working for SoEs compares favourably with individual enterprises, and 78.9% of them are the homeowners. However, employees working for PoEs lag behind by about twelve percentage points. Although Logan and Bian (1993) and Wang and Murie (2000) emphasise on the positive relationship between ranking level and order in housing allocation, there is no difference in homeownership between the householder holding an administrative position and the other. Therefore, two proxies for seniority are proposed in empirical analysis of this study, and are discussed in the following sections (See the side discussions in **Appendix B** for further details).

Table 3.1 also displays the relationship between income and housing tenure. The rates of homeownership are calculated for four household groups divided by net income quartiles.⁸ Nearly 83% of the households at the lower 25% are homeowners, and this proportion decreases to 78.1% for households with net income per capita in the top 25%. Owning extra dwellings (other than main residences) or second homes shows a crowding-out effect for homeownership. There is a gap of three percentage points between the proportion of households that own second homes and the proportion of those that don't. However, homeowners do enjoy extra dwellings with higher values, although the difference is insignificant. In fact, the mean value of investment in real estate is 81,000 RMB for homeowners, followed by 79,400 RMB for those without homeownership (See **Table B.4**).

⁸The number of observations is not equally distributed among the four groups, since the descriptive statistics use the weighted sample.

Table 3.2: Variations in Housing Value by HRP Characteristics

	Self-Estimated Market Value of Owner-occupied Dwelling		
	Mean	SE	Std.Dev
Survey Year			
2010	29.10	4.090	43.61
2012	40.50	5.844	73.68
2014	46.26	5.867	58.45
HRP Characteristic			
Age Group			
13-18	56.59	26.12	76.58
19-25	41.88	6.02	53.70
26-35	36.20	3.47	38.82
36-45	31.81	2.83	42.51
46-55	37.04	5.29	53.67
56-65	40.28	5.58	59.47
66 Plus	44.08	8.62	90.13
Gender			
Female	37.32	4.97	51.12
Male	37.96	4.86	65.69
Marital Status			
Singled	47.10	9.04	52.66
Having a Spouse*	37.85	4.72	62.09
Divorced	37.98	7.61	54.93
Widowed	32.33	4.97	53.87
Educational Attainment			
Primary School	30.38	4.24	86.30
Middle School	31.38	3.53	43.22
High School	40.88	6.48	48.80
3-year College	53.08	8.10	56.68
Bachelor & Higher Degrees	58.68	9.25	47.61
<i>Institutional Factors:</i>			
Migration by Hukou			
Rural Locals	26.47	4.01	96.95
Rural Migrant	34.80	4.03	46.86
Urban Locals	40.57	5.79	45.84
Urban Migrants	63.55	12.47	71.55
CCP Membership			
No	35.08	4.24	62.07
Yes	47.89	7.64	51.21
<i>Job-related Variables:</i>			

Continued on next page

Table 3.2: – continued from previous page

	Self-Estimated Market Value of Owner-occupied Dwelling		
	Mean	SE	Std.Dev
Employment Status			
Employed	39.21	4.57	48.52
Self-Employed	38.42	3.54	55.80
Farming	20.45	3.89	39.17
Other Type	42.59	5.61	59.00
Out of Labour Market	38.82	6.48	69.21
Ownership of Employer			
Governments	46.55	6.12	60.71
Public Service	46.21	9.01	47.40
State-owned Enterprise	39.08	6.19	38.63
Private-owned Enterprise	38.19	4.39	50.96
Individual Enterprise	30.42	3.09	55.82
Others	37.14	5.45	66.74
Seniority:			
Holding Administrative Post			
No	37.18	4.69	61.51
Yes	51.27	6.55	65.14
Household Characteristic			
Owning Second Homes			
No	29.03	3.647	57.9
Yes	36.38	5.069	52.0
Observations	10,080		

Sources: *Calculated from the Sample of Urban Households in the 2010-2014 CFPS.*

Note: (d)-dummy variable. Use household as measurement unit.

3.3.2 Variations in Housing Value

Table 3.2 shows how market values of owner-occupied housing units varied from 2010 to 2014. Generally speaking, the value of self-owned housing increases considerably from 291,000 RMB in 2010 to 405,000 RMB in 2012. However, in 2012 this upward trend starts to weaken with the value rising by less than 60,000 RMB from 2012 to 2014. Additionally, the standard deviations fall sharply from 2012 to 2014. That is to say, the distribution of value of housing tends to be more equal. Although inequality in urban housing has increased substantially in five years, there has also been a decline

in growth of housing value. The mean of market value of the housing unit varies considerably by age group. The youngest group stands out with the highest average value of 565,900 RMB, followed by the householder group aged over 66 years at 440,800 RMB. It is more likely that parents contribute the relatively higher value reported by young homeowners. Insight into housing inequalities within each age group shows extraordinarily high standard deviations ranging from the eldest at 901,300 RMB to homeowners in their late 20s at 388,200 RMB, where the youngest age group ranks at second position. The value of owner-occupied dwellings increases when the householders enter their late 40s. Based on the theory of age generation (Helbrecht and Geilenkeuser, 2010) and the data collected in 2010–14, those homeowners are likely to be beneficiaries of China's planned economy system, and the time of their employment would coincide with the first and second five-year plans.

There is no clear difference in mean value of self-owned housing between female and male householders, but the distribution for female homeowners is relatively more equal due to its larger standard deviation than for male householders. Never-married householders live in the most valuable dwellings at 471,000 RMB, followed by the divorced and those with spouses (married or cohabited), and with widowed householders lagging behind by about 150,000 RMB. The reason for combining marriage and cohabitation into one category is because getting married is the leading outcome of cohabitation (by a bit more than half), followed by being ongoing and breaking up. No matter how a cohabiting relationship ends in marriage or breaks up, the average duration of cohabitation is over 2 years, though varying across countries (Heuveline and Timberlake, 2004; Kuperberg, 2014). Xu, Li, and Yu (2013) observe a rise of cohabitation in their study on gender and family in China, and find out that nearly one-third of married couples were in premarital cohabitation during 2010–12.

The effect of education on housing outcomes demonstrates a clear pattern: a higher level of education the householder achieved, a more valuable the housing unit he or

she owned. For example, the holders of the bachelor's or advanced degrees reside in dwellings with an average value of 586,800 RMB, almost double the average dwelling value of 303,800 RMB for householders who merely finish elementary school. The interesting part of this pattern is the trend in the distribution of housing value. In general, the inequality in value increases as the householder achieves a higher educational level. However, householders who only attend primary school report the highest value in standard deviation. The distribution of value tends to be more even for those who hold a bachelor's or higher degree compared to the graduates from 3-year colleges.

For migrant householders, rural identification has been cited as a key barrier that restrains their access to the urban housing system. The effect of migrant factors on housing outcomes shows a departure from the pattern found in previous literature (Sclar, Garau, and Carolini, 2005; Pero, 1997). Market value of a housing unit varies substantially by its owner's hukou status. Except in the case of moving from another city, homeowners without local hukou live in more valuable dwellings than native householders. Urban migrants live in dwellings with an average value of 405,700 RMB, far exceeding their rural counterparts at 348,000 RMB and rural locals at 264,700 RMB. I also note that the extremely high value in standard deviation for rural locals is possibly due to regional differences in housing prices. It is not surprising to find that householders with CCP membership enjoy higher housing values (Walder, 1995; Logan, Bian, and Bian, 1999). In fact, CCP membership is associated with a value gap of about 128,100 RMB.

In terms of employment status, being employed greatly contributes to a higher-quality dwelling. Among the other four groups, farmers live in residences with considerably lower value at 204,500 RMB. The link between workplace and housing outcomes has loosened as economic reforms continue in China; however, housing inequality still exists as the ghost of the pre-reform era or shadow of the socialist market economy. The characteristics of firms are largely varied by ownership category. Homeowners

Table 3.3: Descriptive Summary of HRP and Household Characteristics by Homeowner Group

	Household Groups by Housing Value			
	Bottom 25%	Lower 25%	Upper 25%	Top 25%
HRP Characteristics				
<i>Seniority</i>				
No. of Subordinates				
Mean	1.33	1.00	3.22	7.76
SE	0.459	0.232	1.043	3.488
Std.Dev	49.96	10.32	83.79	79.86
Length of Current Post				
Mean	12.10	11.73	11.43	9.91
SE	0.600	0.610	0.550	0.459
Std.Dev	12.10	11.73	11.43	9.91
Household Characteristics				
No. of Household Members				
Mean	2.89	3.50	3.45	3.45
SE	0.089	0.127	0.089	0.143
Std.Dev	1.50	1.60	1.39	1.49
No. of Children				
Mean	1.05	1.36	1.23	1.14
SE	0.052	0.075	0.042	0.045
Std.Dev	1.08	1.06	0.94	0.81
Total Household Income				
Mean	3.75	3.22	4.52	7.09
SE	0.249	0.079	0.167	0.469
Std.Dev	4.25	2.93	5.80	7.71
Household Income PC				
Mean	1.59	1.04	1.49	2.48
SE	0.146	0.049	0.064	0.212
Std.Dev	2.10	0.99	2.31	3.94
Value of Extra Dwelling				
Mean	2.58	3.97	8.12	19.71
SE	0.30	0.50	1.09	3.22
Std.Dev	13.30	14.20	23.32	53.21
Observations	10,080			

Sources: Calculated from the Sample of Urban Households in the 2010-2014 CFPS.

Note: The measurement unit of household finance is 10,000s RMB.

working for governments and for public service live in dwellings with the considerably high market values, on average, more than 462,100 RMB, but those working in

SoEs and PoEs lag behind by about 71,300 to 80,200 RMB. Although both privately-owned and individual enterprises belong to the private sector, employees for the former have a clear advantage over the others with respect to the mean value of self-owned residences. However, the distribution tells a different story. The standard deviation of housing value is unusually high for those working in governments. It may be due to the effect of seniority, such as ranking and experience. For example, the mean housing value of householders who hold administrative posts is 512,700 RMB, which is considerably higher than the others at 371,800 RMB.

Two proxies are proposed to represent seniority: the number of subordinates and working experience (see the first part of **Table 3.3**). In terms of quartile value classification of self-owned housing, the top group stands out with most subordinates. The number of subordinates shows a clearly positive relationship with housing value. The number of years for staying in the same job is also used to measure the effect of seniority on housing outcomes. Generally, additional housing value is linked to short duration for current post. In fact, on average, homeowners with dwellings valued at the top 25% work 9.91 years in the same job, which is nearly 2.2 years less than those who owned the dwellings valued at the bottom 25%.

Turning to the demographic factors of homeowners, it can be seen that the sampled households that reside in the dwelling at the lower 25% value range reported larger household size and more children. Except these households whose main residences are valued at the bottom 25% standing out with relatively smaller number of household members and children, the number of children shows a consistently negative impact on housing values. In terms of household finance, the positive effect of income on housing outcomes is obvious, whether in terms of total or per capita income. To calculate net household income, household expenditures are removed from annual gross income. Since housing expenditures include rental and mortgage repayments, it is not surprising to observe that the households in the bottom 25% value range reported rel-

atively higher income than those living in higher-value dwellings. In contrast to the crowding-out effect of second homes on ownership of main residences, the owners of extra dwellings enjoy a higher value of self-owned housing units. In fact, the mean value of housing for second homeowners is 363,800 RMB, far exceeding households without extra dwellings at 190,300 RMB (see the final part of **Table 3.2**).

3.4 Regional Disparities

Table 3.4 presents the weighted means of demographic and socio-economic characteristics of a sample of urban households from the 2010–2014 CFPS survey, and it contains the variables used in this chapter for the three regional groups. Urban households are regionalised, based on the criterion from the NBSC. The Eastern region contains three municipalities (Beijing, Tianjin, and Shanghai) and seven provinces (Hebei, Shandong, Jiangsu, Zhejiang, Guangdong, Fujian, and Hainan). The second group covers six provinces from the Central region (Shanxi, Henan, Anhui, Jiangxi, Hubei and Hebei) and ten provincial-level divisions (Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Inner Mongolia, Guangxi, Ningxia, and Xinjiang). The Northeast region is composed of Liaoning, Jilin, and Heilongjiang provinces. The homeownership rate in the Central region (83.9%) far exceeds the levels calculated for the Eastern region at 75.6% and the Northeastern region at 76.5%. Turning to the value of owner-occupied housing, the Eastern region has a clear advantage over the Central and Northeastern regions. In fact, the average value of self-owned dwellings in the Eastern region is 604,250 RMB, almost twice the value of these dwellings in Northeastern region and more than twice the value of these dwellings in the Central region.

In terms of demographic variables at the individual level, the HRP is used to replace the traditional selection of head of household since longitudinal data is used to examine regional disparities in this study. The HRP provides an individual person within a sur-

Table 3.4: Descriptive Summaries for Three Regions

	Eastern Region	Central Region	Northeastern Region
Housing Outcomes			
Homeownership(d)	0.756	0.839	0.765
East-other regions Gap		-0.083	-0.009
Market Value of Current Dwelling	60.425	26.453	31.270
HRP Characteristic			
Age	50.483	48.876	51.528
Marital Status			
Never Married	0.075	0.048	0.047
Having a Spouse	0.806	0.856	0.772
Divorced	0.022	0.031	0.069
Widowed	0.098	0.065	0.112
Female(d)	0.338	0.339	0.374
Year of Schooling	8.685	9.357	10.466
Educational Level			
Primary School	0.355	0.287	0.188
Middle School	0.283	0.298	0.315
High School	0.205	0.235	0.253
3-year College	0.091	0.109	0.130
BA & Higher Degrees	0.066	0.071	0.114
<i>Institutional Factors:</i>			
Hukou-Migration Status			
Rural Local	0.321	0.293	0.072
Rural Migrant	0.069	0.038	0.044
Urban Local	0.549	0.630	0.809
Urban Migrant	0.061	0.039	0.076
CCP Membership(d)	0.152	0.167	0.211
<i>Job-related Variables:</i>			
Employment Status			
Employed	0.336	0.336	0.364
Self-employed	0.095	0.097	0.052
Working at own Farm	0.072	0.115	0.018
Out of Labour Market	0.406	0.360	0.455
Other Types	0.099	0.100	0.116
Ownership of Employer			
Governments	0.026	0.041	0.056
Public Service	0.042	0.052	0.041
State-owned Enterprise	0.068	0.083	0.158
Private-owned Enterprise	0.166	0.122	0.118

Continued on next page

Table 3.4: – continued from previous page

	Eastern Region	Central Region	Northeastern Region
Individual Enterprise	0.082	0.100	0.044
Others	0.617	0.603	0.583
Seniority			
Being in Administrative Post(d)	0.086	0.097	0.100
No. of Subordinates	1.938	3.103	7.756
Duration in Year	9.484	10.554	10.441
Household Characteristic			
No. of Household Members	3.432	3.613	2.740
No. of Children	1.305	1.286	0.948
Household Finance(10,000s)			
Household Income per Capita	1.844	1.235	1.922
Owning Second Homes(d)	0.219	0.173	0.140
Market Value of other Dwellings	12.354	6.456	5.651
Observations	4602	5684	2288

Sources: *Calculated from the weighted sample of urban households in the 2010-2014 CFPS.*

Note: (d)-dummy variable. Use household as measurement unit.

veyed household to act as a consistent reference for characterising a whole household over the survey period (See Section 2.2.2 in Chapter 2 for further explanation). Apparently, the demographic characteristics vary considerably by geographic location. The Northeastern region stands out with relatively high proportions of female and older householders, nearly three years older than the averaged age of the householders in the Central region. In terms of the gender variable, Eastern region householders look similar to Central region householders.

The regional variations in marital status of urban householder follow a different pattern. The highlights of this variable are a high proportion of divorced (6.9%) and widowed (11.2%) householders in Northeastern cities. Among the other two regional groups, the levels of divorce are considerably lower, ranging from 2.2% for the Eastern region to 3.1% for the Central region, while widowed householders account for nearly one-tenth and one-fifteenth of the urban samples in the Eastern and Central regions,

respectively. However, the Northeastern region compares favourably with the Central region in terms of single status, while the Eastern and Central regions are quite similar regarding marital status, with the Northeastern region lagging behind by about three to eight percentage points.

In terms of educational and institutional variables, the Northeastern region has a clear advantage over the other two regions. In fact, the urban households in the Northeastern region enjoy higher educational attainment, are more likely to have CCP membership, and are less mobile. For example, the proportion of local householders with urban hukou in the Northeastern region is more than four-fifths, far exceeding the levels that range from 54.9% in the Eastern region to 63% in the Central region. The mean year of schooling in the Northeastern region is 10.5 years, followed by the Central region at 9.4 years and the Eastern region at 8.7 years. Northeastern householders also stand out with a high ratio of CCP membership at 21.1%.

The employment characteristics also vary greatly across the regions. Relatively few householders in urban areas of Northeastern China are involved in agricultural production, but more than one-tenth of householders in the Central region still live with farming as their main source of income. In terms of self-employment, a relatively high proportion of householders are self-employed in the Eastern and Central regions, which is largely due to the rapid development of the private sector in related regions. A substantial proportion of 45% of Northeastern householders are retired or disabled, compared to 36–40% in the other regions. This results from several factors, including a low fertility rate, an alarming ageing population, and a large labour outflow in Liaoning, Jilin, and Heilongjiang provinces.

Job-related characteristics are composed of employer ownership and some variables related to seniority. The three regional groups are quite similar in terms of these variables: working in governments or working in public service. It is also expected to find

that urban householders who reside in the Northeastern region of China stand out with a relatively high proportion of householders working in SoEs, which is far beyond the levels for other regions, varying from 6.8% in the Eastern region to 8.3% in the Central region. In terms of the private sector, householders in the Eastern region follow a different pattern: 16.6% are employed by PoEs; the Central and Northeastern regions lag behind by about four to five percentage points. However, the householders who reside in the Central region are more likely to have jobs in individual enterprises than the other regions.

Turning to seniority, 10% of Northeastern householders report holding administrative positions, whether or not there is any subordinate under their charge, followed by the Central region at 9.7%, and the Eastern region at 8.6%. However, from a different perspective, the pattern is changed. The mean number of subordinates in the Northeastern region is almost 8. This figure is considerably lower in the other regions, ranging from two persons in the Eastern region to three persons in the Central region. The second proxy for seniority is the length of the current job, measured in years. Apparently, Eastern region householders are less likely to stay with the same company as long as those in the Central or Eastern regions.

Household characteristics also vary considerably by regional groups. While Central households have more members, Eastern region households have more children, a high rate of second-home ownership, and more real estate assets in terms of market value.⁹ For example, the average number of children for the Eastern region is 1.305; this is in contrast to 0.948 in the Northeastern region. In the Eastern region, one in four households own extra dwellings other than their primary homes, compared to one in seven households in the Northeastern region. The mean value of extra dwellings in the Eastern region is 123,540 RMB, which is almost twice the dwelling value in the Cen-

⁹All children are counted, and I did not limit the sphere to children who still depend on their parents financially. This decision allows us to capture the homeownership outcomes that are influenced by life-cycle choices such as the formation of a new family.

tral region at 64,560 RMB, and much larger than the dwelling value of 56,510 RMB for the Northeastern region. The only departure from this pattern is the variation in household income per capita; here, members of Northeastern households enjoy higher income than the others, which is largely due to the relatively small household size in this region.

3.5 Methodology

3.5.1 Sample

To order to better evaluate homeownership and represent actual value of owner-occupied housing, I confine this research to the urban areas of China by following a careful approach to better represent actual housing markets (Myers et al., 2005). According to the classification set by the NBSC, 47.5% of the sampled households reside in urban area. Since the following surveys have been taken every other year, this chapter examines the determinants of regional gaps in homeownership using a short panel that contains 18,904 person-wave observations from 9,371 urban households interviews by the CFPS from 2010 to 2014.

Table 3.5: Variation in Homeownership for Panel Data

	Overall		Between		Within
	Freq	Percent	Freq	Percent	Percent
Being an Homeowner					
No	3796	20.08	2837	30.27	80.17
Yes	15108	79.92	7580	80.89	93.62
Total	18904	100.00	10417	111.16	89.96
Sample Size	9371				

Sources: *The Sample of Urban Households from the 2010-2014 CFPS.*

Notes: *The Panel tabulation provides the details on the within and between variation of being an homeowner.*

Table 3.5 provides the details on how rate of homeownership varies between and within the survey year. The overall summary shows that nearly four-fifths of urban observations held ownership of their residences from 2010 to 2014. Of 9,371 urban households, 81% had been homeowners at least once during the surveyed period. The within summary of homeownership point out that 80.2% of households that did not own their homes and remained in that status during the years covered by the panel. That is to say, only one-fifth of urban households had obtained ownership of their main residences. Meanwhile, 93.6% of the homeowners continued to own their residences. Therefore, to some extent, homeownership is close to time-invariant. This feature leads to a substantial loss in the number of observations when the logistic regressions are carried out with fixed-effect estimations.

3.5.2 Modelling

Logistic Model of Homeownership

From both individual and household characteristics outlined in the previous section, we can see that the Northeastern and Central regions differ from the Eastern region in distinctive ways that may influence that group's prospects in homeownership and value of owner-occupied housing. The demographic attributes reveal some additional, potentially important factors for the analysis: the Northeastern region has high levels for divorced, widowed, and female householders; those factors are associated with low homeownership rates. For the Eastern and Central regional groups, migrant status as well as registered urban hukou are distinguishing factors. The socio-economic characteristics portray a more complex picture. Northeastern householders have a clear advantage over the others in terms of educational attainment and household income. Both factors are related to a higher value of self-owned housing and high homeownership.

To better examine the effect of regressors on homeownership across the regions, logistic regression with fixed-effect is carried out for each regional group, and the following model is written as:

$$Pr(O_{it} = 1|X'_{it}, \beta, \alpha_i) = \Lambda(\alpha_i + X'_{it}\beta) \quad (\text{Eq. 3.1})$$

The results are reported as odd ratios that give a straightforward interpretation on how homeownership varies as household characteristic changes:

$$\frac{Pr(O_{it} = 1|X_{it} + 1)}{Pr(O_{it} = 0|X_{it} + 1)} / \frac{Pr(O_{it} = 1|X_{it})}{Pr(O_{it} = 0|X_{it})} = \exp(\beta) \quad (\text{Eq. 3.2})$$

$Pr(O_{it}=1)$ represents the probabilities that a household i owns a dwelling, while $Pr(O_{it}=0)$ refers to residential status without ownership. β is a vector of coefficients, and X_i is a set of explanatory variables. The conditional probability is estimated by:

$$Pr\left(O_i|x_i, \sum_{t=1}^{T_i} O_{it}\right) = \frac{\exp\left(\sum_{t=1}^{T_i} O_{it}X'_{it}\beta\right)}{\sum_{d_i \in \beta_i} \exp\left(\sum_{t=1}^{T_i} d_{it}X'_{it}\beta\right)} \quad (\text{Eq. 3.3})$$

Selecting variables is based on previous literature and the data used in this chapter. In the demographic set of variables, marital status is defined by using three dummy variables for never-married, divorced, and widowed. Based on the theory of age generation (Helbrecht and Geilenkeuser, 2010) and taking into account what happened in contemporary China, age is estimated by two variables: age of the HRP, and its squared form. There is no age limit for the HRP. The decision not to limit the sample to working age allows us to examine housing outcomes of households with a complete life-cycle such as retirement and intergenerational transfers on individual savings. The probability of ownership should increase with age as individuals become more settled in their careers and personal lives.

Although fading out in the emerging housing market, institutional factors still play

crucial role in explaining home ownership in China. First, a dummy variable for CCP membership is included in the model. In a study conducted in Guangzhou, Li, Wang, and Law (2005) point out that party membership contributes significantly to personal access to homeownership, and its advantage is evident even in a city like Guangzhou where market mechanisms have been deeply ingrained. Second, a set of the migrant/hukou variables is added, and consist of two attributes: the origin of the HRP, and whether or not the HRP registers as a holder of urban hukou.

Since the ability of a household to purchase a dwelling depends on its expected lifetime income, the employment status of the householder is important. Holdsworth and Solda (2002) believe that being employed offers a substantial chance to be a first-time home buyer or is the basic requirement for leaving parental home. Occupational status is often included to capture the longer-term aspects of a household's economic prospects. Empirical studies have consistently found that these variables are positively associated with the likelihood of owning a home (Krivo, 1995; Painter, Gabriel, and Myers, 2001).

It has been widely agreed that work units show consistent influence on their employees in the provision of housing. Firm ownership is added to the logistic model to find out the influence of work units on their employees in urban China. Given the householders' employment status, two proxy variables are added to estimate the impact of seniority on homeownership: the number of subordinates, and length of time working in the same job. Also, five interaction terms are included to capture how the effect of seniority differs in terms of an employer's ownership. To assess how job-related factors deter homeownership across the three regions, I estimate baseline models (the results are presented in **Table 3.6**) that contain only the demographic, institutional, and employment characteristics, and then to which I add job-related factors, employer's ownership, and seniority variables (presented in **Table 3.7**). The reason for using separate models is that the addition of seniority variables reduces the sample size. Having

a job is the prerequisite condition to measuring the impact of seniority, and a relatively large number of householders do not report the details on their working experiences.

Household characteristics include demographic variables and household income. Family stability and structure significantly impact children and may be associated with ownership. Household size may reflect additional resources available to support homeownership or additional demands on limited resources; hence, the expected signs of the estimates for these variables are uncertain. The ability of a household to purchase a house depends on household income. A categorical variable provides a quartile classification of household income per capita to reduce the computational cost and to account for the non-linear relationship between income and the likelihood of homeownership.

Fixed-Effect Model of Housing Value

By profiling the impact of explanatory variables on value of owner-occupied housing in the previous section, we can also see that regional differences in household characteristics may lead to various outcomes in terms of housing quality. The demographic variables contribute some important ingredients for the analyses of the qualitative inequality of housing; the combination of being female and married reveals a substantially positive impact on housing quality. Socio-economic and job-related attributes are expected, but the variables in migration tells another story. The contribution of urban-rural division to quality of housing is worth examining. Using the market value of owner-occupied housing as a dependent variable, the fixed-effect models can explain how housing values vary across regions in urban China.

To better assess the effect of each explanatory variable on housing quality, a fixed-effect regression is carried out by using the market value of owner-occupied housing

units as dependent variable. The following model is applied for the three regional groups:

$$\ln Y_{it} = \alpha_i + X'_{it}\beta + \varepsilon_{it} \quad (\text{Eq. 3.4})$$

Where ε_{it} are $i.i.d.N(0, \sigma_\varepsilon^2)$ independently of α_i , i denotes a household, β is a vector of coefficients, and X' is a set of explanatory variables. $\ln Y$ represents the log of the market value of a housing unit in RMB that indicates the quality of the dwelling owned by the household i . Since it is unable to separate unpaid mortgage on main residence from one on extra dwellings, this chapter uses current market value instead of housing equity.

The variables are selected on the basis of previous literature, and thus they are almost identical to the set of regressors used in the logistic model. However, the fixed-effect model also includes the interaction terms of gender, and marital status, and value of investment in real estate that shows a potential influence on the market value of owner-occupied housing (see **Table B.5** and **Table 3.2**). The interaction terms are three dummy variables with female householder coded for never-married, divorced, and widowed. This addition makes the model able to estimate the gender differences in housing outcomes in consideration with marital history. The log of real estate investment is able to capture the crowding-out effect of second-home ownership more effectively than a dummy variable on whether or not the household owns extra dwellings other than a main residence. A baseline model (Model A) still only contains the household characteristics of demographic, socio-economic, and migration variables; the job-related variables are added sequentially (Model B). **Table 3.8** presents the results.

Table 3.6: Estimation from the logistic models for Three Regions (Model A)

	Model A: Baseline					
	Eastern Region		Central Region		Northeastern Region	
	Coef.	Odds Ratio ^a	Coef.	Odds Ratio ^a	Coef.	Odds Ratio ^a
HRP Characteristic						
Age	0.293*	1.341*	0.304 ^(*)	1.355 ^(*)	-0.228	0.796
Age squared/100	-0.203	0.816	-0.275	0.759	0.15	1.162
Marital Status						
Never Married	0.278	1.321	-1.172	0.31	0.407	1.502
Having a Spouse	ref.	.	ref.	.	ref.	.
Divorced	-0.879	0.415	-0.639	0.528	0.218	1.243
Widowed	0.462	1.587	0.225	1.253	-2.092 ^(*)	0.123 ^(*)
Hukou-Migration Status						
Rural Local	0.704 ^(*)	2.022 ^(*)	-1.452*	0.234*	-0.067	0.935
Rural Migrant	-0.601	0.548	-1.612*	0.199*	-0.92	0.399
Urban Local	ref.	.	ref.	.	ref.	.
Urban Migrant	-0.329	0.72	0.259	1.296	-0.387	0.679
Employment						
Employed	ref.	.	ref.	.	ref.	.
Self-Employed	0.823*	2.277*	-0.279	0.756	0.265	1.304
Farming	0.688 ^(*)	1.989 ^(*)	-0.006	0.994	0.576	1.779
Other Type	-0.594**	0.552**	-0.251	0.778	-0.128	0.88

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Table 3.6: – continued from previous page

	Model A: Baseline					
	Eastern Region		Central Region		Northeastern Region	
	Coef.	Odds Ratio	Coef.	Odds Ratio	Coef.	Odds Ratio
Out of Labour Market	-0.369	0.691	-0.077	0.926	-0.235	0.791
Household Characteristic						
No. of Household Members	0.082	1.085	0.008	1.008	0.419*	1.521*
No. of Children	0.371**	1.450**	-0.066	0.936	0.358*	1.430*
Household Income per Capita						
Bottom 25%	-0.953**	0.385**	-0.675*	0.509*	-0.081	0.922
Lower 25%	-0.095	0.91	-0.543 ^(*)	0.581 ^(*)	0.003	1.003
Upper 25%	ref.	.	ref.	.	ref.	.
Top 25%	0.118	1.125	-0.184	0.832	0.137	1.146
Observations	977		660		621	
Pseudo R^2	0.103		0.046		0.088	

^(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^a Odd ratios is calculated on the basis of Eq. 2.2

Source: the Sample of Urban Households from the 2010–2014 CFPS. Use Household as measurement unit.

Note: (d)-dummy variable; ref-reference category.

3.6 Empirical Analysis

3.6.1 Analysis of Homeownership

Table 3.6 sets forth the estimated results from the baseline models for three subsamples of urban households in the Eastern, Central, and Northeastern regions. The coefficients and odd ratios are estimated for two sets of explanatory variables: the HRP and household characteristics. **Table 3.6** also reports the number of observations and Pseudo R^2 . Here, the observations that report all negative or positive outcome in three surveys are dropped. That is to say, the households that stay as either homeowners or renters during the period between 2010 and 2014 are excluded from the sample automatically. Therefore, the sample size reduces to less than 1,000. Pseudo R^2 is fine for a short-panel study of homeownership, which is relatively static over a span of five years.

The estimates of the baseline models conform to the consensus in the literature regarding demographic, socio-economic, and institutional factors. For urban households in the Eastern and Central regions, homeownership prospects increase as the householder ages. In fact, the effect of age is slightly higher for urban householders in Central China. Turning to the influence of marital status on homeownership, the only significant variable is the dummy variable for widowhood in the Northeastern region (the default is having a spouse). Compared to being married or cohabited, the odds of acquiring ownership decrease by about 88% if the householder becomes widowed.

Of the institutional characteristics, being a rural local increases the chance of owning a home in the Eastern region, but reduces the chance in the Central region (see **Table 3.1**). When the reference group is an urban local, the odds of being a homeowner increase by about 102% if one urban local holds rural hukou. Rural identifica-

tion may mean easier access to homeownership because rural dwellers became urban dwellers without actually leaving their hometown during China's urbanisation, which often transformed villages into cities. Thus, they built their homes on the land allocated to the household. However, the Central region groups follow a different pattern. The odds of obtaining homeownership decline dramatically by more than 75% if one becomes a rural hukou holder regardless of the holder's origin.

Turning to employment status, in the Eastern region, the odds of homeownership increase as householders become self-employed or farm on their own land, with the default being employed. Here, the other type refers to full-time students or the retired. The farmers' advantage is similar to that of being a rural local in the Eastern region, while there is a link between housing assets and entrepreneurial activities for urban adults (Li and Wu, 2014). However, Li and Wu (2014) confine their work to homeowners, and do not extend their interest to access to ownership. For the householders in the Central and Northeastern regions, as we expect, change in employment status does not deter tenure of the main residence occupied.

With respect to household characteristics, additional household members result in an increase in the probability of homeownership, except those in the Central region. More specifically, the odds of owning main residence increases by 52% as a new member joins a Northeastern household. The positive effect of children is slightly smaller but still increases by 45% for the Eastern region and 43% for the Northeastern region.

The effect of household income on homeownership is not as strong as expected. As household income per capita drops, the probability of obtaining homeownership decreases for urban households, except those in the Northeastern region. However, the differences are statistically insignificant among most income groups. To estimate the effect of household income, I also run the logistic models with a single regressor, log of household income per capita. The Likelihood Ratio test suggests that the logit

Table 3.7: Estimation from the logistic models for Three Regions (Model B)

	Model B					
	Eastern Region		Central Region		Northeastern Region	
	Coef.	Odds Ratio ^a	Coef.	Odds Ratio ^a	Coef.	Odds Ratio ^a
HRP Characteristic						
Age	0.448	1.566	-2.565*	0.077*	-0.461	0.63
Age squared/100	-0.444	0.641	3.182*	24.098*	0.519	1.68
Migrant Status by Hukou						
Rural Local	0.136	1.145	-5.148*	0.006*	-18.362	0
Rural Migrant	-1.556	0.211	-1.313	0.269	-1.967	0.14
Urban Local	ref.	.	ref.	.	ref.	.
Urban Migrant	-0.322	0.724	-2.330(*)	0.097(*)	-1.543	0.214
CCP Membership(d)	-1.347	0.26	1.934	6.914	0.766	2.151
Employment Status						
Employed	ref.	.	ref.	.	ref.	.
Self-Employed	1.120(*)	3.065(*)	-3.227*	0.040*	-3.495(*)	0.030(*)
Farming	0.976	2.653	-1.537	0.215	-16.239	0
Other Type	-0.580(*)	0.560(*)	-1	0.368	-0.265	0.767
Out of Labour Market	-0.637	0.529	-13.511	0	-2.037	0.13
Ownership of Employer						
Governments	-0.504	0.604	-28.689(*)	0.000(*)	-17.517	0

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Table 3.7: – continued from previous page

	Model B					
	Eastern Region		Central Region		Northeastern Region	
	Coef.	Odds Ratio	Coef.	Odds Ratio	Coef.	Odds Ratio
Public Service	-0.869	0.419	1.618	5.041	16.175	1.06E+07
State-owned Enterprise	ref.	.	ref.	.	ref.	.
Private-owned Enterprise	-0.871	0.419	-5.138 ^(*)	0.006 ^(*)	-1.712	0.181
Individual Enterprise	-1.026	0.359	-2.013	0.134	-1.239	0.29
Others	-0.2	0.819	1.508	4.519	-1.058	0.347
<i>Seniority</i>						
Length of Current Post	-0.023	0.977	-0.133	0.875	-0.021	0.979
Year of Working for						
Governments	-0.079	0.924	1.861 ^(*)	6.431 ^(*)	-0.123	0.884
Public Service	0.154	1.166	0.054	1.055	-0.023	0.978
State-owned Enterprise	ref.	.	ref.	.	ref.	.
Private-owned Enterprise	0.092	1.097	1.175*	3.237*	0.148	1.159
Individual Enterprise	0.045	1.046	0.259	1.296	0.07	1.073
Others	0.042	1.043	0.017	1.018	-0.019	0.981
Household Characteristic						
No. of Household Members	-0.089	0.915	-0.014	0.986	0.667	1.948
No. of Children	0.617	1.853	2.446	11.538	-1.46	0.232

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Table 3.7: – continued from previous page

	Model B					
	Eastern Region		Central Region		Northeastern Region	
	Coef.	Odds Ratio	Coef.	Odds Ratio	Coef.	Odds Ratio
Household Income per Capita						
Bottom 25%	-1.670 ^(*)	0.188 ^(*)	-3.276 [*]	0.038 [*]	-0.18	0.835
Lower 25%	0.01	1.01	-2.292 [*]	0.101 [*]	0.601	1.823
Upper 25%	ref.	.	ref.	.	ref.	.
Top 25%	-0.261	0.771	-1.001	0.368	-1.011	0.364
Observations	317		176		168	
Pseudo R^2	0.163		0.445		0.328	

^(*) $p < 0.10$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$

^a Odd ratios is calculated on the basis of Eq. 2.2

Source: the Sample of Urban Households from the 2010–2014 CFPS. Use Household as measurement unit.

Note: (d)-dummy variable; ref-reference category.

models are not significantly different from the null or intercept-only model except for the Eastern region subsample. Therefore, change in income does not determine the outcome of homeownership in the Central and Northeastern regions of China. The models in **Table 3.7** add to the baseline models a set of control variables that capture household attributes related to job variation. The number of observations is reduced to one-third of the baseline model. Controlling ownership and seniority variables increases the possibility of homeownership for the self-employed in the Eastern regions but reduces this possibility considerably in the other regions. The models also show that job-related variables mitigate the association between demographic factors and homeownership. All demographic effects diminish when those variations are added.

Apparently, compared to SoEs, working for other employers reduces substantially the chance of being a homeowner. In general, loyalty alone does not show significant influence on housing outcomes for urban households. However, it tells a different story when combined with employer ownership in the Central region of China. In fact, the odds of being a homeowner increase by more than five times as one works more years for the government and by three times as one works for PoEs (the default being year of working for SoEs). Unfortunately, there is no further information on governments such as their administrative level and departments.

3.6.2 Analysis by Values of Owner-Occupied Housing

Table 3.8 reports the results from the fixed-effect regression for three regional subsamples. The baseline model estimates (see Model A) conform partly to the literature findings regarding demographic, institutional, and socio-economic factors. Since the explanatory variables are composed of both normal and log transformed variables, the interpretation of the coefficient for a log variable will be given a 1% change in x , where y is expected to change by β per cent; a normal variable will be given a one unit

Table 3.8: Estimation from fixed-effect model for Three Regions

	Model A			Model B		
	Eastern	Central	Northeast	Eastern	Central	Northeast
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
HRP Characteristics						
Log of Age	6.782***	6.427***	0.615	8.392**	4.042 ^(*)	3.573
Marital Status						
Never Married	-0.173	-1.424*	0.804	1.381	-1.506 ^(*)	2.272
Having a spouse	ref.	ref.	ref.	ref.	ref.	ref.
Divorced	0.346	-1.840*	0.67	2.195	0.101	0.167
Widowed	0.146	0.439	-1.711 ^(*)	0.864	3.341 ^(*)	-2.353
[For a Female]						
Never Married	-0.0543	-0.907	0.727	-1.006	1.639	11.46**
Having a spouse	ref.	ref.	ref.	ref.	ref.	ref.
Divorced	-1.589	2.205 ^(*)	-1.506	-2.225	-1.877	-1.963
Widowed	0.64	-0.125	-0.864	2.157	-4.686 ^(*)	-2.39
Hukou-Migration Status						
Rural Local	0.499	-0.866**	0.0732	0.0511	-1.419 ^(*)	-1.554
Rural Migrant	-0.606	-1.174**	-0.77	-1.169	-1.382	0.334
Urban Local	ref.	ref.	ref.	ref.	ref.	ref.
Urban Migrant	-0.505	0.227	-0.485	-0.194	-1.341*	-0.635
Employment status						
Self-employed	0.457 ^(*)	-0.159	0.255	0.902 ^(*)	-0.909*	-1.145

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Table 3.8: – continued from previous page

	Model A			Model B		
	Eastern	Central	Northeast	Eastern	Central	Northeast
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Employed	ref.	ref.	ref.	ref.	ref.	ref.
Working at own Farm	0.382	-0.0136	0.427	0.466	-0.345	-0.0666
Other Types	-0.546**	-0.0763	0.07	-0.746**	0.0503	-0.0109
Out of Labour Market	-0.306	-0.108	-0.185	-0.972	-0.933	-1.523
Ownership of Employer						
Governments				-0.336	-0.381	-1.997 ^(*)
Public Service				0.0346	0.579	-1.164
State-owned Enterprise				ref.	ref.	ref.
Private-owned Enterprise				-0.327	-0.927	-1.193
Individual Enterprise				-0.581	-1.078	-0.785
Others				0.0955	-0.16	-1.096
Seniority						
Log of No. of Subordinates				-0.117	-0.0117	-0.041
Length of Current Post				0.00126	-0.0499	-0.0495
Year of Working for						
Governments				-0.0365	0.0387	0.0851
Public Service				0.0157	-0.0409	0.0786
State-owned Enterprise				ref.	ref.	ref.
Private-owned Enterprise				0.0517	0.103*	0.0634

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Table 3.8: – continued from previous page

	Model A			Model B		
	Eastern	Central	Northeast	Eastern	Central	Northeast
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Individual Enterprise				-0.0113	0.0856 ^(*)	0.0192
Others				-0.000226	0.0425	0.0556
Household Characteristics						
Log of No. of Household Members	0.544 ^(*)	0.289	1.346***	0.833	-0.186	0.956
Household Finance						
Log of Household Income pc	0.268***	0.0327	0.169 ^(*)	0.279	0.0305	-0.0159
Log of Investment on Real Estate	-0.0501***	-0.0652***	-0.0841***	-0.0446 ^(*)	-0.0336	-0.0835*
Observations	6988	6288	3549	3334	2921	1533
R^2 Within	0.025	0.026	0.029	0.033	0.049	0.073
R^2 Between	0.138	0.053	0.022	0.201	0.04	0.002
R^2 Overall	0.084	0.031	0.025	0.164	0.038	0.001

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: the Sample of Urban Households from the 2010–2014 CFPS. Use Household as measurement unit.

Note: (d)-dummy variable; ref-reference category.

change in x , where y is expected to change by $100(e^{\beta} - 1)$ per cent (Wooldridge, 2013). First, housing values increase with age. More specifically, a householder aged 40 years in 2010 is expected to gain nearly 34% added-value on his or her occupied dwelling in the Eastern region by the end of 2012; a householder aged 40 years in the Central region is expected to gain slightly over 32% added-value on his or her occupied dwelling (There is a 5% increase in age between two survey year).

Regarding marital status (the default having a spouse), for a householder who resides in the Central region, the condition of being never-married or divorced reduces the value of self-owned residences by around 76% and 84%, respectively. Meanwhile, widowhood is associated with an 82% decline in value of owner-occupied housing in Northeastern cities. Recalling the relatively high proportion of the widowed in **Table 3.4**, I believe such a high rate of widowhood, to some extent, contributes to the low value of owner-occupied housing in three Northeastern provinces. However, a female householder follows a different pattern. In fact, for a female living in the Central region of China, getting a divorce brings a higher added-value to occupied dwellings of about 221%, compared to a female with a spouse. Although the coefficients are not statistically significant, being divorced shows a contrasting effect on housing outcomes for female householders in the Eastern and Northeastern regions.

Turning to the effect of institutional factors, the statistically significant variables are the dummy variables for being a rural local and a rural migrant, which reduce the value of owner-occupied dwellings by nearly 58% and 69%, respectively, in comparison with an urban local who resides in the Central region. This finding is consistent with Huang and Jiang (2009) who point out that migrants with rural hukou status live in the smallest and worst housing in Beijing. The local residents with urban hukou status, by contrast, enjoy the largest and best housing. Furthermore, the results from the fixed-effect regression also show there is no statistically significant difference between urban locals and migrants.

Moving to employment status, the only statistically significant results are found in the Eastern region. With being employed as the reference, becoming self-employed enjoys an almost 58% increase in the value of self-owned housing. This finding is inconsistent with the previous work by Wang, Wang, and Wu (2010), in part because they only address the housing issue of migrants. However, it partially confirms the hypothesis on the fading-out effect of work units.

Back to household characteristics, household size has a positive effect on housing, but it is only significant in cities in the Eastern and Northeastern regions. For example, one additional member to a two-person household (an increase of 50%) contributes to a 27.4% increase in the value of self-owned housing in the Eastern region but more than two-thirds added-value in the Northeastern region. However, considering the low fertility rate, it is difficult to determine the impact of demographic factors on housing values in the Northeastern region. By contrast, its contribution is clearly seen in the Eastern region.

Turning to the economic variables, higher household income is linked to added value to owner-occupied housing. In fact, the effect of income is much larger in the Eastern region than in the Northeastern region. For instance, a one percentage point increase in household income per capita results in around a 0.27% increase in market value of self-owned housing in the Eastern region and slightly less of an increase in the Northeastern region. The findings also confirm the crowding-out effect of investment in real estate on the value of main residences. This effect appears to be relatively stronger in the Northeastern region, which reflects a bitter prospect for the housing market there.

Model B adds to the baseline model a set of control variables that capture householder attributes related to details of employment factors. Controlling ownership and seniority proxies strengthens the effect of age on housing values in the Eastern region but

weakens the effect in the Central region. This model shows that job-related variables mitigate the association between housing values and demographic factors as well as economic characteristics of households in terms of statistical significance. Household size does not show any influence on housing outcomes. Neither does household income. Although household investment in second homes still shows a crowding-out effect, it weakens and disappears in the Central region. Given employment, having a spouse is no longer crucial, except for the never-married in the Central region and the widowed in the Northeastern region. For urban households in the Central region, all hukou and migrant effects are amplified when those variables are added. There, urban locals have a clear advantage over the other three groups.

It is of utmost importance to note that the additional variables intensify the effect of employment status on housing outcomes. With being employed as the reference, self-employment affects the Eastern and Central regions in opposite ways. For example, becoming self-employed, as opposed to being employed, leads to 146% more added-housing value in the Eastern region but nearly 60% less value in the Central region. This finding reveals that work units still play a crucial role in the Central region where the market economy is less developed than in the coastal area of China. Turning to employer ownership, there is no group that has a clear advantage over the others. However, working in government is associated with about an 86% decrease in the value of owner-occupied housing, compared to a householder who works for an SoE. Marked by a relatively high proportion of people working in the public sector, the households in the Northeastern region still benefit from the dominant role of SoEs in terms of housing supply.

To measure how seniority alters housing values, two proxy variables and interaction terms of length in same job by ownership are added. Neither the number of subordinates nor job duration impacts the housing value alone. For a householder living in the Central region, working one more year receives a nearly 11% increase in housing

value in return for seniority (seen as loyalty) to a private-owner enterprise, and a 9% in housing value in return for seniority to individual enterprises (the default length of working for SoEs).

3.7 Conclusion

Homeownership is widely perceived as a path to improved economic well-being, accumulation of wealth, and social stability. However, housing prices in China have continued to float at an unachievable level, and the high rate of homeownership does not mean a decent or suitable home for everyone. The less-developed regions lag behind other regions, and regional disparities in homeownership and housing quality is worrying. This study looks beyond differences in socio-economic and demographic characteristics to address differences in employment and residential migration patterns as critical determinants of regional patterns in urban housing. The addition of these variables helps to formulate a clearer picture of the sources of disparities in homeownership across the regions in China.

The role of demographics is particularly interesting. While the Northeastern provinces are characterised by a low fertility rate, an ageing population, and a small proportion of migrants, demographic factors contribute greatly to a stagnant housing market in the Northeastern region of China. The Central region has a younger and emerging population and is experiencing rapid a growth rate of homeownership; however, this region still lags behind others in term of housing value. Household decisions in housing outcomes are also shaped by employment status that links strongly to regional economic development. As an influential player in the housing market, the work unit has faded out as a housing supplier but still contributes to regional inequality in housing outcomes. However, the private sector has grown as the state sector has shrunk. The self-employed sector enjoys higher housing values in the Eastern region, while

self-employment has lost its advantage in the Northeastern region, which is dominated by the oversized SoEs. The private-state variation across regions produce substantial housing disparities along regional borders in China.

The impact of migration in regional inequality is complex, but fascinating. Institutional exclusion makes it difficult for migrants to access homeownership in Chinese cities, and the rural-urban division worsens the situation. The migrant-hukou composition in the population varies dramatically across the regions, which is partly responsible for the different housing outcomes. Policy makers should pay more attention to enhancing the homeownership prospects of migrants and should develop mechanisms to improve those existing housing programs that fail to lessen hukou discrimination in the housing system.

However, some part of regional gap in homeownership and housing value still requires further explanation. First, is there a way to approximate the quality of living for Chinese households instead of using the estimated market value of main residences? Second, how can we measure the importance of spatial context for regional differences in housing outcomes using provincial data that are available over a long term? An examination of whether the origins of regional disparities in housing outcomes have changed in the new environment is an interesting topic for future research.

Chapter 4

The Determinants of Household Investment Choice

4.1 Introduction

Over the past decade much research has attempted to build and examine models in the field of household finance in China. However, those works have focused on limited topics like the famous saving puzzle (Feng, He, and Sato, 2011; Wang and Wen, 2012; Chamon, Liu, and Prasad, 2013; Curtis, Lugauer, and Mark, 2015, 2017), asset allocation - dividing household portfolio among cash, bonds, and stocks (Li, 2006b,a; Wu, Yi, and Zheng, 2010; Yin, Song, and Wu, 2014; Chu et al., 2016), and entrepreneurship (Wei and Zhang, 2011; Li and Wu, 2014, 2017). Household investment in China has recently attracted much academic interest but still lacks definition and empirical analysis to capture favourable factors or constraints that affect household investment decisions regarding participation and diversification. Besides, most studies of household investment presume that the decision makers only deal with financial assets actively traded as stocks, funds, and bonds (Li, 2006a; Yin, Song, and Wu, 2014; Chu

et al., 2016).

Still, there are some important components of household wealth held in the forms of residential properties and privately owned businesses that cannot be bought or sold in financial markets. Those assets, although different from tradable financial products, take a dominant role in household wealth, especially in the case of Chinese families. Hence, there are many questions that remain unanswered. What make Chinese households to invest? Or more specifically: How do households allocate their wealth across broad categories such as financial products (stocks, funds, and bonds), private businesses, and real estate? How do household investment choices vary with age, gender, hukou status, income, and other household characteristics?

Focusing on investment decisions of Chinese households, this chapter investigates the determinants of household investment choices in China using 2010–2014 longitudinal survey data from the CFPS. The goal of this study is to examine the pattern of household investment decisions and explore how household investment choices differ according to personal and household characteristics such as demographic composition, institutional factors, and intra-household bargaining. In addition, this study empirically explore how parenthood alters household investment decisions by building a binomial logistic model for a subsample of households with children.

This chapter extends both theoretical and empirical literature on household investment choices within the context of developing countries, having adopted a nested logit approach to examine the dynamics of investment decisions among different types of household. This nested logit model include a binomial decision on invest or not at the top level and a multinomial investment category choice at the bottom level. This research is among the first to systematically study household investment in China. Considering its coverage of second-home ownership and entrepreneurship, such research can have important policy implications on housing reform and private sector develop-

ment. For instance, household characteristics that influence investment choices could also impact the distribution of wealth. Understanding the reasons for these choices could help policy makers better navigate the complexities of forming appropriate policies to address inequality.

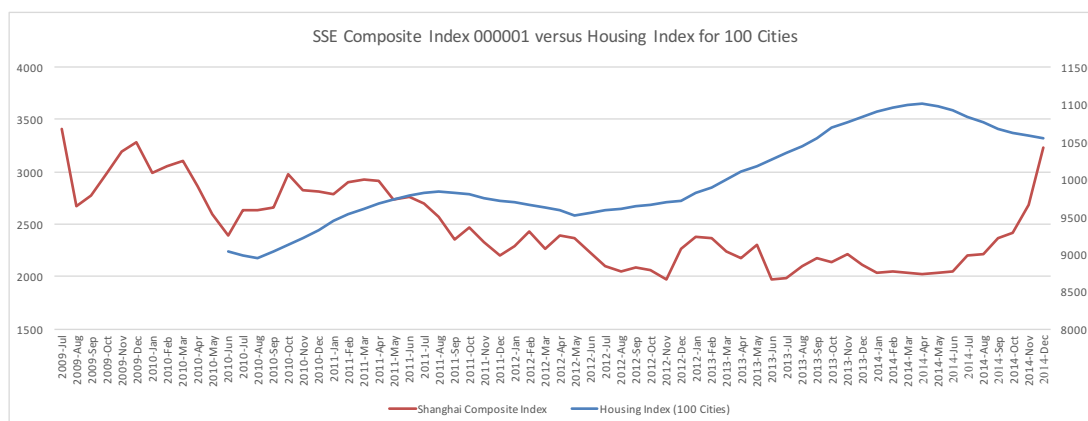
The rest of the chapter is structured as follows. Section 2 gives a background of household investment in China. Section 3 discusses the relevant literature in the field of household investment by drawing together three investment categories. Section 4 lists and explains the hypotheses, and Section 5 presents the samples, model selection and how the key variables are measured. Section 6 discusses the empirical results of both the binomial logistic and the nested logit models, and of various robustness checks. Section 6 concludes with the highlights of the study.

4.2 Background

Financial assets are composed of stocks, funds, bonds, and other actively traded financial products that expose their owners to the risks in financial markets. In 2010, approximately 7.5% of Chinese households held financial assets that included stocks, funds, and bonds, and over two-thirds of them are stockholders.¹ Although investments in financial assets are widely regarded as a way to wealth accumulation, China's financial market is characterised by its turbulence. Since the bull market crashed in 2007, the financial market has shown continued under-performance with the exception of a partial recovery in the aftermath of the 2008 global crisis. The Shanghai Composite Index has not broken 3,000 points for three consecutive years since 2011 (See Figure 4.1 Sun, 2009, p.24). The stock market began growing rapidly at the end of 2014, but collapsed soon after hitting new all-time highs in less than a year. Most people assumed that stocks, which were only a small fraction of total wealth, would

¹The author uses the weighted sample from the 2010 CPFS to calculate the rate of participations in the financial market and the proportion of stockholders.

Figure 4.1: Composite Index of Stock Market and China Real Estate Index (2010-2014)



not greatly affect Chinese households. However, this brief booming proved otherwise, considering 13 million new accounts opened in the first half of 2015.

China's stock market is dominated by small and individual investors. According to the data collected by Thomson Reuters (cited in S.R., 2014), individuals account for about four-fifths of investor trading in China, far outweighing professional investors, whereas institutions dominate more developed markets. Although the number of stock accounts reached 168 million, and fund investment account exceeded 40 million, less than 20% of these accounts held more than 100,000 RMB (equivalent to US \$16,000) by the end of 2012 (Walter and Howie, 2012). Since 90% of the CFPS's latest data was collected prior to the short boom in the fourth quarter of 2014. According to the CFPS, the proportion of shares of financial assets to total assets declined substantially from 29.76% in 2010 to 18.68% in 2014. Also during this period, the proportion of households that participated in the financial market dropped from 11.7% to 9.6%. This decline in the rate of participation in the financial market reflects depreciation of financial assets among Chinese households as does the shrinking share of financial assets.

Compared to financial assets, investing in real estate (excluding primary residence) tends to be less risky and residential assets usually account for a larger share of house-

hold wealth. A booming housing market leads to a considerable return on real estate investments, which is why second-home ownership has been emerging in Chinese cities. In 2002, about 7% of urban households owned two or more homes nationally (Mo, 2002). Five years later this figure had doubled and accounted for 15% of Chinese urban households (Huang and Yi, 2011). The rate of second-home ownership increased to approximately 18% in 2014, and Beijing, Tianjing, Shanghai, and Hunan stand out for even higher rates among provincial regions covered by the CFPS. Huang and Yi (2011) believe that the huge demand for second homes as investments has partially contributed to the rapidly rising housing costs in Chinese cities. However, among 23.7% of observed households in Beijing owned residential properties other than their main homes, only 7% claimed that they purchased second homes on purely investment purposes, in a survey conducted by Feng and Zhou (2004).

In addition to residential properties, non-financial assets also refer to land and small business, over which ownership can be enforced and that provide economic benefits to their owners (based on System of National Accounts (SNA) guidelines Piketty, Yang, and Zucman, 2017, p.9). Investing in private business is growing and has a crowding-out effect on other investment assets. Along with a rapid growth of China's economy, a massive expansion of the private sector has become an important source of economic development and labour market improvement (Mohapatra, Rozelle, and Goodhue, 2007; Liu and Huang, 2016). Privately held businesses include the self-employed, small businesses, and businesses owned jointly by household members. Business assets can be broadly divided by the number of employees in private enterprises and individual enterprises.² In the non-agricultural sector, the private sector has overtaken the state sector in the importance of the labour market. Employment in private enterprises has increased, accounting for around 25% of the total urban employment in 2014, up from 5.5% in 2000.

²The CFPS questionnaire is designed by the registration of legal status of the business organisation at the Bureau of State Administration for Industry and Commerce: *SiYing Qiye* and *Geti Hu*.

Private business is characterised by its high return and reliance on internal financing. Compared with SoEs, privately-owned enterprises have given an impressive performance of nearly 10% return on assets since 2010. In an empirical analysis of return on assets, Xu and Zhou (2014) point out that the profitability of private firms is better than foreign invested enterprises and nearly 9% higher than SoEs on average. The rise of entrepreneurship and self-employment is an emerging force for sustained economic growth, but the entrepreneurs and self-employed have to face a number of obstacles such as limited access to credit. This is partially due to the fact that Chinese banks favour large firms like SoEs over private firms. As a consequence of credit constraints on obtaining external financing, new entrepreneurs rely heavily on internal funds, such as family assets and borrowings from friends on their social networks, to ease the shortage of external financing at the startup (Talavera, Xiong, and Xiong, 2012).

4.3 Review of the Related Literature

This chapter emphasises on the determinants of household decision to invest and how demographic characteristics affect the choice to invest in three broad categories: financial products, real estate assets other than primary residences, and privately held businesses. Heaton and Lucas (2000b) and Campbell (2006) classify investment assets based on risk type. The risk from non-financial assets such as residential properties and business assets is background income risk or simple background risk that distinguish from the financial risks that investors are exposed to in trading stocks or funds in financial markets. Most studies analysing household investment assume that the decision makers only deal with financial assets such as stocks, funds, and bonds, which are actively traded in markets (Wu, Yi, and Zheng, 2010; Bogan, 2013; Yin, Song, and Wu, 2014; Chu et al., 2016). However, there are some important components of household wealth that are not brought or sold in financial markets. These components include primary residences, holiday homes, and privately held businesses. Such as-

sets, although quite different from tradable financial products, comprise the majority of total household wealth, especially for Chinese families.

Many empirical analyses have focused on the potential determinants of portfolio choice (Guiso, Jappelli, and Terlizzese, 1996; Heaton and Lucas, 2000a,b; Poterba and Samwick, 2001; Flavin and Yamashita, 2002; Pelizzon and Weber, 2009), and in China (Yin, Song, and Wu, 2014; Chu et al., 2016; Zhang, 2017). Even though few studies have directly addressed the determinants of choosing non-financial assets, a glimpse can be caught on how households make investment decisions. For example, my work is related to Campbell (2006), who is broadly concerned with household finance with a focus on investment mistakes including non-participation in risky asset markets, and under-diversification of risky portfolios. According to his research, households with limited investment skills that tend to invest poorly are less likely to participate in risky market assets. Other households that leave financial decisions to professionals may put a large share of their wealth into mutual funds. Traditionally, analyses of household investment choices have focused on the factors that affect decisions to hold stock or other financial assets at different risk levels (Bogan, 2013), and investment patterns of rural households with productive assets and land for farming purposes (De Brauw and Rozelle, 2008). Therefore, I follow three strands of the existing literature in three investment categories: financial assets, second-home ownership (extra residential properties), and entrepreneurship (privately held business).

4.3.1 Financial Assets

Most previous studies on household investment decisions, specifically stock-holding decisions, have focused on **financial assets**. More rigorously, researchers have observed that ownership of financial assets can be affected by many factors, including financial literacy and information accessibility. van Rooij, Lusardi, and Alessie (2011)

examine the respondents' financial literacy by asking a series of questions to determine their understanding of the difference between bonds and stocks, the relationship between bond prices and interest rates, and the basics of risk diversification. They find that financial literacy affects financial decision making and low literacy is less likely to reduce the probability of participation in the stock market. Using household-level data from China, Chu et al. (2016) and Zhu, Dai, and Zhang (2016) find results consistent with the positive effect of financial literacy on stockholding. However, others have demonstrated that improving financial literacy may not lead to a higher probability of stockholding and that the effect of financial training has a limited effect on young and middle-aged investors without higher education (Wu and Shen, 2015).

Brown et al. (2008) find a causal relation between an individual's decisions about stockholding and the average participation of residential communities in the stock market. However, using transaction locations, Feng and Seasholes (2004) shows that, among Chinese investors, access to release of public information is more likely to be the main determinant of stock trading than word-of-mouth information. Hsu (2012) finds that households with a higher probability of extremely low income are less likely to participate in the stock market, and for those who are participating, the probability of low wages reduces the portion invested in stocks (Curcuro et al., 2010, p.357). Although Heaton and Lucas (2000b) explain how investors fractionate their wealth between stocks and safe securities by background risk, their model is not able to describe the overall low participation level in the stock market of households with modest financial wealth but significant human capital.

Mankiw and Zeldes (1991) provide an empirical analysis on how the consumption of stockholders differs from the consumption of non-stockholders; the results indicate that the former's spending is more volatile and more highly correlated with excess return on the stock market. However, their work covers only a relatively short period; it also fails to avoid substantial errors in measurement due to the limited availability of

consumption data. Chiteji and Stafford (1999) find that a young family's likelihood of owning stocks is affected by whether parents held these financial assets, and they give empirical evidence that the economic environment of the home in which a child grows up affects the child's adult outcomes.

Turning to demographic factors, there is little evidence of specific financial assets being favoured by either male or female householders. However, gender has been treated as a key factor within the field of investment behaviour, and a number of previous empirical studies have examined the effect of gender on choosing financial assets from the perspective of gender difference in risk-taking (Jianakoplos and Bernasek, 1998; Sundén and Surette, 1998; Blau and Kahn, 2000; Dwyer, Gilkeson, and List, 2002; Fehr-Duda, de Gennaro, and Schubert, 2006; Croson and Gneezy, 2009; Stark and Zawojka, 2015). Dwyer, Gilkeson, and List (2002) investigate approximately 2,000 fund investors and find that women take less risk than men in their mutual fund investments (see also Carhart, 1997). Barber and Odean (2001) examine the relationship between overconfidence and stock ownership. They adopt the dummy variable, male, as a natural proxy for overconfidence and concludes that as common stock investors, men traded more, invested in stocks with higher market risk, and performed worse than women.

Although age and gender have a definite impact on household finance, there are few empirical studies that examine how household age-gender composition affects Household financial assets, especially in developing countries. Bogan (2013) specifically documents that having only daughters can considerably lead to an increase in the probability of stockholding in household portfolio allocation. In his recent study, Bogan (2015) shows further evidence of how household composition affects the holding of financial assets, where households with children and elderly dependents significantly reduce stockholding. He points out that having elderly dependents decreases the probability of stockholding by twice as much as having poor personal health.

4.3.2 Second-Home Ownership

Second homes, defined as **real estate other than a primary residence**, are important for many purposes (Müller, 2004; Paris, 2008; Di, 2009; Huang and Yi, 2011; Bricker et al., 2014), but its investment function has not received a great deal of scholarly attention. Housing has played a crucial role in explaining the patterns of household wealth composition and the determinants of household investment holdings. Many previous works have investigated household investment behaviour in the presence of housing (Flavin and Yamashita, 2002; Cocco, 2004; Sarama Jr., 2010) and housing assets (Cho, 2010; Beaubrun-Diant and Maury, 2011).

Prior works have indicated that real estate is typically concentrated, highly leveraged, costly to adjust, but not highly correlated with stock returns. Kullmann and Siegel (2005) examine empirically the relationship between real estate ownership and a household's financial asset allocation. Based upon an analysis of the Panel Study of Income Dynamics data, they find that the extent of homeownership strongly affects household investment in risky financial assets. Thus, they conclude that asset allocation models and prescriptions can be improved by the exposure to risk associated with homeownership (homeowners are more likely to participate in the stock market than renters). Iwaisako (2009) observes a similar relationship between two assets in Japanese households and finds that the existence of homeownership contributes to a large share of stock in household wealth. Heaton and Lucas (2000b) and Shum and Faig (2006) conclude that the effect of real estate investments on stock holdings is not significant, whereas Cocco (2004); Kullmann and Siegel (2005); Curcuro et al. (2010) find significant negative relationships.

Many European researchers portray a picture that differs from the perception of second-home ownership for the rich. Even in the more egalitarian Nordic societies, second homes are available for broader groups with socio-economic disparities (Müller,

2010). Second homes are accessible to urbanites from different backgrounds in some southern European countries like Spain (Módenes and López-Colás, 2007; Barke, 2008). Duval (2004), Hoogendoorn (2012), and Visser and Hoogendoorn (2015) address similar arguments for developing countries such as the Caribbean and South Africa. In those cases, a massive number of second homes results from international and domestic migration, which lead to a high rate of second-home ownership for relatively poor households in their homeland. In other words, the spatial factor greatly contributes to acquisition of second homes. Empirical studies on migration provide a possible explanation for the abnormally high rate of second-home ownership for Chinese migrant households. Huang and Yi (2011) confirm that both urban and rural migrants are more likely to own second homes than local residents. This is because the Hukou system prevents migrants from accessing subsidised housing in Chinese cities. Instead, it allows migrants to maintain housing in their home towns, thus encouraging migrants to own second homes.

Additionally, previous literature has examined the impact of demographic factors on ownership of second homes. Carliner (2002) believes that second-home ownership is strongly associated with homeowner age. Di, McArdle, and Masnick (2001) find that the majority of second-home owners are middle-aged whites with high incomes, although less-valuable mobile homes account for two-fifths of the total number of second homes (cited in Di, 2009, p.323). Belsky, Di, and McCue (2007) establish the propensity models and conclude that certain household characteristics are consistently associated with second-home ownership. These characteristics include high household income (both short-term and long-term), market value of non-fixed assets, and being non-minority.

4.3.3 Entrepreneurship

Much research has focused on the effect of business ownership on portfolio choice. According to Campbell (2006)'s study on wealthy households, the existence of **private business assets** can explain greatly household behaviours to avoid public equity markets. Many studies have found consistent evidence for the crowding-out role of private business in household investment holding. Heaton and Lucas (2000a) find that households with high and unstable business incomes hold less wealth in stocks than other similarly wealthy households, perhaps due to the higher background income risk they face. Moskowitz and Vissing-Jorgensen (2002, p.745) examine the households that invest in private businesses and finds that households invested more than 70% of the total holdings in one company in which they hold an active management interest. Using a household survey of the migrant population in Dublin, Batista and Umblijs (2014) find that entrepreneurs appear to be less risk-averse than average. Huberman (2001) finds that familiarity increases investment and implies that investors are more likely to invest in companies they know. In terms of business assets, it is plausible that the owners invest most of their assets into their privately owned businesses rather than in financial markets to diversify their portfolios.

Several previous studies have found that socio-economic factors make a person more likely to be an entrepreneur. Lazear (2004) states that being experienced or taking a more general course curriculum lead to an increase in the probability of entrepreneurship. Dunn and Holtz-Eakin (2000) examine the intergenerational transmission of entrepreneurship, but Fairlie and Robb (2007) point out that general and specific business human capital acquired through experience working in a family business is strongly correlated to becoming an entrepreneur rather than inheriting a business passed by on a family member. This is consistent with the findings in Lazear (2004). However, Blanchflower and Oswald (1998) imply that receiving an inheritance or gift increases the probability of self-employment. Meanwhile, having analysed the relationship be-

tween market size and young entrepreneurs in Italy, Di Addario and Vuri (2010) conclude that doubling the density of the provincial labour population lowers the probability of being an entrepreneur. The findings in these studies indicate that credit constraints are less problematic in developed countries, which differs from the situation in developing countries.

More recently, a good deal of empirical studies have examined the determinants of entrepreneurship in China. Wei and Zhang (2011) find that son-preference is related to a higher probability of being an entrepreneur as well as being either male, married, or educated. Considering the link between credit constraints and entrepreneurship, Li and Wu (2014) examine the impact of housing prices on self-employment. They find that high housing prices discourage entrepreneurial activities for urban adults. Except for the homeowners without a mortgage, house value appreciation has a positive wealth impact on the likelihood of entrepreneurship. However, for renters, a higher ratio of housing price over income corresponds to a lower probability of entrepreneurship. Their study provides further evidence of the importance of credit constraints on entrepreneurship in developing countries. To relax such a constraint, Li and Wu (2017) examine the impact of siblings on self-employment or entrepreneurship when siblings are able to substitute for formal financial institutions in providing funds. They concluded that having more siblings significantly increases the probability of starting a business. In terms of gender, brothers tend to contribute more to the determination of entrepreneurship than sisters.

In general, studies have either examined household choices over financial assets or documented determinants of non-financial assets in developed countries. There is little literature that investigates household investments by simultaneously considering a household's financial market participation, business involvement, and real estate investments. Although there has been some research that analyses portfolio choice in the presence of housing tenure, few works have considered Chinese households. This

research fills the gap in both theoretical and empirical literature on household investment choice in broad categories within the context of a developing country, by adopting a nested logit approach to examine the dynamics of investment decisions among different types of households.

4.4 Hypotheses

The hypotheses that I tested are:

Hypothesis 1 Female householders have a positive impact on the probability of investing.

Hypothesis 2 Migrant status has a positive effect on household investment decisions.

Hypothesis 3 Increasing the relative bargaining power of women affects household investment decisions.

Hypothesis 4 Existence of young household members contributes to a higher probability of investing.

Hypothesis 5 High household income is associated with certain investment decisions

Hypothesis 6 The choice of financial assets is more sensitive to household composition than other investment categories.

The first five hypotheses concern the determinants investment decisions. **Hypothesis 1 and 3** is related to this issue of gender. Lawson and Gilman (2009, p.14) find that there was significant unmet demand among women for savings and investment assets held outside the household and thus more directly and safely under women's control, with simple financial products being the most attractive to them. **Hypothesis 3** focuses on

the link between women's bargaining power and household investment behaviour; that is, households that own financial or non-financial assets are linked to a high bargaining power for women.

Hypothesis 2 comes from the relatively high rate of second-home ownership for migrant households. Huang and Yi (2011) point out that migrants remain in a marginalised position in cities where they often rent private housing while building houses back in their home villages. To test **Hypothesis 4**, the analysis is confined to a sample of households with children since the primary aim is to examine the effects of children's gender and parental consumption on household investment decisions. I examine the effect of demographic factors on household decisions by converting the numbers of males and females in each household that fall into nine distinct age ranges (from the youngest infants to the oldest) on a set of ratios to total number of household members.

For **Hypothesis 5**, I explore the relationship between household income and investment decisions in cross-section data. It is well known that consumption, investment, and savings make up household disposable income, but high-income households have been linked to a very high savings rate. Huggett and Ventura (2000) believe that savings rates increase monotonically with income but also point out that savings rate heterogeneity within an age group for example, a group receiving social security or one experiencing earnings shocks is also an important consideration. Therefore, the kind of role that income plays in household investment should be investigated. Once we disentangle the relation between consumption, savings, and investment, the effect of income on investment decisions can be determined.

With respect to **Hypothesis 6**, there is both theoretical and empirical evidence to support the conclusion that offspring gender can influence parental preferences on investment. Bogan (2013) states that having only female offspring can significantly increase the probability of stockholding. Barber and Odean (2001) document the strong rela-

tionship between gender and stock investment.

4.5 Methodology

4.5.1 Sample

In this study nested models are used to estimate the empirical determinants of household decision and specific choice over three investment assets. I estimate one model for each of the survey years, showing an increase in investment participation in three consecutive surveyed years: 26.7% in 2010, 27.5% in 2012, and 29.2% in 2014 (**Table 4.1** shows weighted summary statistics). Logit regression employs the data from the 2012 CFPS, which is the second wave from this longitudinal project and contains 6,827 parental households. This binary logistic model is used to investigate how parenthood alter household investment decision by limiting the sample to the households with children. This empirical analysis is carried out with a cross-section data that gives a snapshot of household investment in 2012, instead of using three waves of panel data. This is mainly due to the limited availability of data on household expenditures on certain goods such as beauty products and cigarette and alcohol.

4.5.2 Modelling

An econometric approach assumes that a prospective household chooses an investment asset in a two-stage process. First, a household decides whether or not to invest. If the household decides to invest, the choice is among three categories of investment assets. **Figure 4.2** presents a nesting feature of the model. The tree structure shown is not intended to represent a sequential behavioural model of investment. Rather, I assume the household makes a simultaneous decision regarding investment choice and type

Table 4.1: Change of HRP and Household Characteristics by Survey Year

	2010		2012		2014		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
HRP Characteristic								
Age	49.542	13.743	50.637	14.193	49.576	15.880	49.899	14.636
<i>Gender</i>								
Male	0.707	0.455	0.714	0.452	0.733	0.442	0.718	0.450
Female	0.293	0.455	0.286	0.452	0.267	0.442	0.282	0.450
<i>Marital Status</i>								
Never Married	0.043	0.203	0.040	0.196	0.085	0.279	0.056	0.230
Married	0.857	0.350	0.853	0.354	0.806	0.395	0.839	0.368
Cohabited	0.003	0.054	0.005	0.070	0.005	0.069	0.004	0.065
Divorced	0.022	0.146	0.022	0.145	0.023	0.149	0.022	0.147
Widowed	0.074	0.262	0.080	0.271	0.081	0.273	0.078	0.268
<i>Hukou-Migration Status</i>								
Rural Local in Countryside	0.478	0.500	0.469	0.499	0.425	0.494	0.458	0.498
Rural Local in Cities	0.173	0.379	0.176	0.381	0.202	0.402	0.184	0.387
Rural Migrant from another County	0.009	0.096	0.028	0.165	0.043	0.202	0.027	0.161
Rural Migrant in Cities	0.028	0.164	0.020	0.141	0.033	0.178	0.027	0.162
Urban Local in Countryside	0.031	0.173	0.037	0.189	0.035	0.184	0.034	0.182
Urban Local in Cities	0.249	0.433	0.252	0.434	0.232	0.422	0.244	0.430
Urban Migrant in Countryside	0.003	0.059	0.003	0.056	0.005	0.070	0.004	0.062
Urban Migrant from another City	0.027	0.163	0.014	0.117	0.026	0.158	0.023	0.148

Continued on next page

Table 4.1: – continued from previous page

	2010		2012		2014		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<i>Health Status</i>								
Underweighted	0.079	0.270	0.084	0.277	0.074	0.261	0.079	0.269
Healthy	0.498	0.500	0.471	0.499	0.461	0.498	0.477	0.499
Overweighted	0.346	0.476	0.356	0.479	0.368	0.482	0.357	0.479
Obesity	0.077	0.267	0.089	0.285	0.097	0.297	0.088	0.283
Body Mass Index	22.634	3.295	22.794	3.429	22.982	3.450	22.798	3.391
Year of Schooling	7.210	4.602	7.382	4.566	7.409	4.691	7.331	4.622
Employed(d)	0.531	0.499	0.719	0.450	0.701	0.458	0.647	0.478
Household Characteristic								
No. of Household Members	3.822	1.722	3.829	1.782	3.663	1.850	3.771	1.786
Having Unmarried Adult Children(d)	0.337	0.473	0.301	0.459	0.267	0.442	0.302	0.459
Women's Bargaining Power ^a	4.095	3.136	4.130	3.152	4.430	3.473	4.217	3.260
<i>Age-Gender Demographic Composition (0-100)</i>								
Proportion of Male aged 0-6	3.230	8.262	3.305	8.428	3.470	8.962	3.334	8.554
Proportion of Male aged 7-12	2.978	8.344	2.955	8.320	2.845	8.167	2.926	8.278
Proportion of Male aged 13-18	3.714	9.709	3.410	9.392	3.018	9.092	3.386	9.411
Proportion of Male aged 19-25	5.995	12.716	5.550	12.903	5.483	14.482	5.684	13.390
Proportion of Male aged 26-35	6.327	12.488	6.367	12.738	7.435	15.845	6.709	13.782

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Table 4.1: – continued from previous page

	2010		2012		2014		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Proportion of Male aged 36-45	8.461	13.737	7.758	13.380	6.987	13.917	7.747	13.700
Proportion of Male aged 46-55	7.713	14.534	7.744	14.483	7.704	14.917	7.720	14.647
Proportion of Male aged 56-65	7.008	15.567	7.183	15.439	7.383	16.146	7.189	15.723
Proportion of Male aged 66+	5.920	15.809	6.620	16.565	6.870	17.136	6.458	16.504
Proportion of Female aged 0-6	2.728	7.767	2.964	8.045	3.074	8.593	2.918	8.139
Proportion of Female aged 7-12	2.502	7.665	2.513	7.634	2.379	7.481	2.464	7.594
Proportion of Female aged 13-18	3.311	9.040	3.101	8.895	2.714	8.581	3.045	8.847
Proportion of Female aged 19-25	5.193	11.364	5.176	12.381	5.325	14.123	5.232	12.658
Proportion of Female aged 26-35	5.807	11.421	5.594	11.560	6.286	13.382	5.899	12.155
Proportion of Female aged 36-45	8.262	13.054	7.601	12.743	6.693	12.857	7.530	12.907
Proportion of Female aged 46-55	7.730	14.481	7.725	14.410	7.614	14.621	7.690	14.505
Proportion of Female aged 56-65	6.976	15.391	7.544	15.897	7.430	15.799	7.306	15.690
Proportion of Female aged 66+	6.145	16.329	6.890	17.142	7.293	17.904	6.763	17.130
Tenure Status								
Owned	0.855	0.352	0.870	0.336	0.828	0.378	0.851	0.356
Occupied	0.070	0.255	0.060	0.237	0.075	0.263	0.068	0.252
Rented	0.064	0.245	0.035	0.183	0.078	0.269	0.060	0.237
Household Finance								
(in 10,000s RMB)								

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Table 4.1: – continued from previous page

	2010		2012		2014		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Household Income	3.267	5.169	3.827	5.885	4.626	5.985	3.889	5.699
Household Income per Capita	0.997	1.804	1.129	2.215	1.447	2.050	1.187	2.027
Lagged Household Income PC	.	.	0.922	1.724	1.097	2.204	1.005	1.968
Log of Lagged Household Income PC	.	.	8.496	1.200	8.559	1.435	8.526	1.317
Total Household Wealth	65.823	497.760	81.044	512.792	98.205	436.500	81.518	483.466
Share of Consumption on Beauty Products	.	.	0.396	1.334	0.954	1.679	0.683	1.546
Share of Consumption on Cigarette & Alcohol	.	.	8.377	11.129	.	.	8.377	11.129
Share of Consumption on Education	9.605	16.280	7.316	13.298	7.341	13.361	8.129	14.476
Investment Combination								
Only Financial Products	0.044	0.204	0.040	0.196	0.029	0.167	0.037	0.190
Only 2nd Home	0.115	0.319	0.100	0.300	0.115	0.319	0.110	0.313
Only Business	0.056	0.229	0.066	0.248	0.065	0.246	0.062	0.241
Financial Products + 2nd Home	0.015	0.121	0.018	0.132	0.015	0.123	0.016	0.125
Financial Products + Business	0.003	0.056	0.005	0.067	0.004	0.059	0.004	0.061
2nd Home + Business	0.020	0.141	0.020	0.139	0.024	0.152	0.021	0.144
All of Three	0.002	0.049	0.004	0.061	0.002	0.047	0.003	0.052
Market Value of Investment								
MV of Real Estate Assets	5.151	43.642	5.365	35.949	8.011	39.377	6.169	39.941
MV of Financial Assets	0.378	3.555	0.479	4.920	0.571	6.527	0.474	5.125
MV of Business	0.892	20.302	2.322	30.795	1.363	12.295	1.513	22.303

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Table 4.1: – continued from previous page

	2010		2012		2014		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Region								
Eastern	0.346	0.476	0.334	0.471	0.343	0.475	0.341	0.474
Middle	0.234	0.423	0.241	0.428	0.238	0.426	0.237	0.425
Western	0.263	0.441	0.268	0.443	0.269	0.443	0.267	0.442
Eastern North	0.157	0.364	0.158	0.364	0.151	0.358	0.155	0.362
Observations	14941		13424		14210		42575	

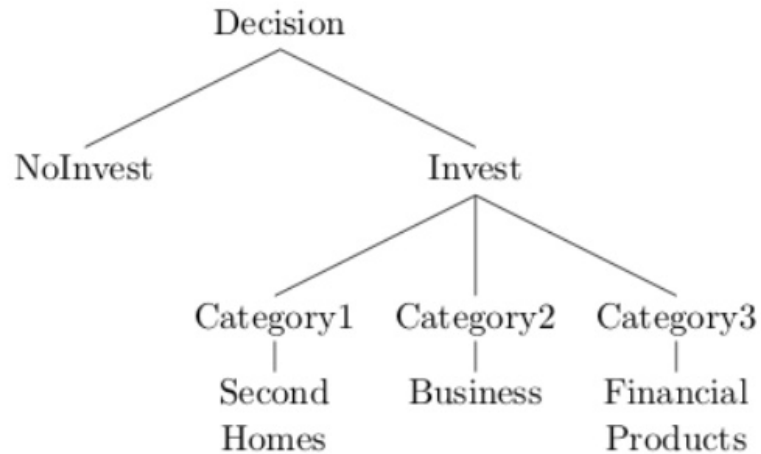
Note: (d)-dummy variable.

^a Wife's years of education over years of education of husband and wife combined.

^b Adjusted version refers to conversion of self-consumption in rural households into family income (CFPS, 2015).

Source: Calculated from the 2010-2014 CFPS.

Figure 4.2: Household Decision Tree on Investment Holdings



of asset. The sequential model structure is not proposed because the decision-making process is not known a priori.

In a nested logit framework, the investment-choice model forms one nest while the decision model forms the other. Though estimated simultaneously, the nest structures are quite different and are therefore discussed separately. The work by Hensher and Greene (2002) has led to algorithm corrections for estimating the nested logit model so that it is consistent with expected utility maximisation. As developed by Hunt (2000), the procedure for estimating my model, which contains a degenerate branch, requires normalisation upon the upper-level scale parameter.

Many economists state there is an advantage in using nested logit models to analyse household behaviour in travel, migration, mobility, and investment (Falaris, 1987; Zax, 1994; Bhat, 1997; Knapp, White, and Clark, 2001; Lee and Waddell, 2010; Steele et al., 2016). Zax (1994) recognises behavioural distinctions between move types and concludes the appropriateness of the nested logit model in the study of transportation. Comparing the estimated results from the Multinomial Logit (MNL), the standard nested logit, and the covariance heterogeneity nested logit after examining the impact of improved rail service on weekday business travel in the Toronto-Montreal area,

Bhat (1997) points out the potential shortcomings of using the MNL lead to the necessity of covariance heterogeneity in nested model formation for evaluating the policy that aims to ease intercity travel congestion. Knapp, White, and Clark (2001) provide both theoretical and empirical grounds for applying a nested logit model in examining the determinants of household relocation. Steele et al. (2016) develop a random effects nested logit model for the analysis of households' choice of neighbourhoods in England using data from the BHPS linked to neighbourhood-level census data. With the apparent advantages of nested logit models applied to the study of foreign direct investment, this technique is quite useful for this study (Head and Mayer, 2004; Rasciute and Pentecost, 2010), with special attention given to flowing direction.

More recently, researchers have introduced the nested logit models to investigate household decision making (Bhat, Sen, and Eluru, 2009; Adams and Cuecuecha, 2010; Gudishala and Wilmot, 2012). Bhat, Sen, and Eluru (2009) formulate and estimate a nested model structure that includes a multiple discrete-continuous extreme value component to analyse the choice of vehicle type/vintage and usage in the upper level and an MNL component to analyse the choice of vehicle make/model in the lower level. The empirical results provide important insights into the determinants of vehicle holdings and usage decisions of households. More recently, Gudishala and Wilmot (2012) investigate the evacuate/stay and departure timing decisions at the household level and notes that the nested approach is computationally expensive even with only a few intervals. To examine the impact of specification bias caused by the MNL procedure that assumes the Independence of irrelevant alternatives (IIA) hypothesis, Adams and Cuecuecha (2010) use a nested logit model to test and reject the validity of the IIA hypothesis in their research on how the receipt of internal remittances and international remittances affects the marginal spending behaviour of Guatemalan households.³

³Nested logit models are typically used to overcome the IIA limitation in MNL models.

Investment choice is a special case of discrete choice in which non-exclusivity between investment assets can lead to overlapping problems. The selection of the nested logit model helps to eliminate this potential estimation bias. On the one hand, it is well known that the major drawback in applying the standard logit model is its inability to account for overlapping (or correlation) among choices. The MNL model has the property that the relative probabilities of each pair of alternatives are independent of the presence or characteristics of all other alternatives, which is known as the IIA hypothesis (Koppleman and Wen, 1998). On the other hand, the nested logit approach is a widely recognised solution for such a problem because it allows interdependence and is able to capture correction between the alternatives (Ben-Akiva and Lerman, 1985; Barsch-Supan, 1990).

The Choice Model

Investment choice is estimated by a variant of the nested logit model (take a look at Greene, 2012, section 18.2.5). It is a normalised nested logit model consistent with random utility maximisation analogous to the conditional logit technique introduced by McFadden (1973).⁴ Although the random utility model is preferable in most situations, the normalised nested logit is equivalent to the random utility maximisation nested logit since there is no generic variable (called an alternative-specific variable) included in my models (Heiss, 2002) and the scale parameter is normalised (Hensher and Greene, 2002). Formally, the model assumes that if household i decides to invest, then it chooses among J alternative investment categories. Including all these variables, the deterministic part of the utility V_j can be written as follows (for convenience, I have suppressed the subscript referring to households):

$$V_j^{Invest} = \alpha_j + \beta_j^{Invest} x'_j + \varepsilon_j^{Invest}, \quad j = 1, \dots, J \quad (\text{Eq. 4.1})$$

⁴The differences between the two variants substantially affect estimation results and behavioural interpretations, and Koppleman and Wen (1998, p.297) conclude that the McFadden model has reasonable elasticities and provides better interpretable parameters across alternatives.

where m refers to household decision (not invest or invest) and j refers to investment choice (business, real estate, or financial asset), and X is a vector of characteristics of the household. If household i chooses investment category k , I infer that: $V_k^{Invest} > V_j^{Invest} \forall j \neq k$. The household-specific error term, ε_j^{Invest} , is assumed to be a random, independently distributed variable. Therefore, the probability that household i chooses investment category j is given by:

$$Prob_{j|m} = \frac{\exp(\beta_{j|m} X'_{j|m})}{\sum_{j=1}^J \exp(\beta_{j|m} X'_{j|m})} \quad (\text{Eq. 4.2})$$

The Decision Model

The other part in the nested logit model is the model of the decision whether or not to invest. In this case, I assume that the utility levels associated with investing are:

$$V^{Invest} = \Upsilon^{Invest} X_i + \mu_i^{Invest} \quad (\text{Eq. 4.3})$$

I set the null choice in the model as ‘not invest’. In the decision model the vector X contains characteristics of the household and the HRP. With not-investing as the null choice, the probability of investing is:

$$Prob_{Invest} = \frac{\exp(\Upsilon_{Invest} X_i)}{\sum_{m=1}^M \exp(\Upsilon_{Invest} X_i)} \quad (\text{Eq. 4.4})$$

This is the typical binomial logistic equation. Besides the nesting structure, I use a standard logistic model for a subsample of households with children to examine empirically how parenthood alters household investment decisions. The results are shown in the first part of Section 6: Empirical Results. The binomial logistic model is carried out with the household decisions as a dependent variable. This variable is recorded into a dummy variable with those households that reported as holding at least one of the following categories of investment assets: financial assets, real estate assets

(extra dwellings known as second homes), and private businesses as 1 and the others as 0. Two sets of explanatory variables are included. The first group of variables present HRP characteristics (gender, age, education, health status, employment, hukou status, and migrant) and household characteristics (family size, women's bargaining power, composition, income, consumption, and location).

The Combination of the Decision and Choice over Investment Categories

To jointly estimate the investment categories of choice and decision, the nested logit model combines *Equation 4.2* and *Equation 4.4* in the following way. The unconditional probability that a household will choose to invest in category j under the decision of investing is:

$$Prob_{(m,j)} = Prob_m(Investing) \times Prob_{(j|m)}(choose \ j|investing) \quad (Eq. 4.5)$$

Or,

$$Prob_{(m,j)} = \left[\frac{e^{\beta^{Invest} Z_j}}{\sum_{j=1}^J e^{\beta^{Invest} Z_j}} \right] \left[\frac{e^{(\gamma^{Invest} X_j + \sigma^{Invest} IV^{Invest})}}{1 + e^{(\gamma^{Invest} X_j + \sigma^{Invest} IV^{Invest})}} \right] \quad (Eq. 4.6)$$

This is just the multiple of *Equation 4.2* and *Equation 4.4*, except for the appearance of the parameter σ^{Invest} and the variable IV^{Invest} (see Heiss, 2002, p.234).]. This new variable is called the inclusive value and is defined as:

$$IV_{invest} = \ln \left(\sum_{j=1}^J e^{\beta^{Invest} X_{ij}} \right) \quad (Eq. 4.7)$$

In fact IV_{Invest} is the denominator of *Equation 4.2*. The inclusive value represents the utility associated with having available all of the investment categories in investment decisions. If the coefficient of the inclusive value, σ^{Invest} is zero, then *Equation 4.5*

reduces to the unconditional probability of choosing category j times the probability of investing. In other words, if σ^{Invest} equals zero, there will be no nesting of the decisions. In this case, the choice of whether or not to invest is independent of the utility value of the selections in the investment category set, and estimating the choice category jointly with the decisions category will be meaningless. Thus, the coefficient σ^{Invest} provides a convenient statistical test of whether the decision should be nested.

Having specified the probabilities of the observed choices from *Equation 4.5*, I can construct a likelihood function in the usual way. Parameters β_{Invest} , Υ_{Invest} , and σ_{Invest} are then estimated by full information maximum likelihood.

4.5.3 Measurement

To estimate the nested logit model, four observations are created for each household. One alternative is actually chosen, but it is crucial to include measures of the attributes of alternative investment categories that were not chosen. Unlike many previous studies with a nested logit approach, the alternatives are investment categories that represent a household's investment strategy to concentrate their wealth in a specific category, instead of purchasing second home for leisure purposes. Thus, an investment decision is more likely to be made on the basis of a set of personal and household characteristics and less likely to be formed by considering distinctive features of stocks, funds, or residential locations. Therefore, the investment choice models include a set of variables that indicate household composition by sex and age instead of the characteristics of three investment categories. To reduce the computational cost mentioned by Gudishala and Wilmot (2012), I use dummy variables for the existence of household members belonging in the below age and gender groups instead of the ratios for each group. Eighteen demographic types are distinguished: the number of males and females in each of nine age groups, 0–6 years, 7–12 years, 13–18 years, 19–25 years,

26–35 years, 36–45 years, 46–55 years, 56–65 years, and over 65.

At the upper level, the total number of household members is added to capture the additional effect of composition (Deaton, 1989). A set of dummy variables for residential type is also included, and present the HRP's hukou and migrant status. The formation of eight residential identification variables are based on the combination of two hukou types (urban and rural) and four origin-destination types (registered countryside, registered cities, moving to another county, and moving to another city). Instead of using household income in the transformation of logarithms, its cube root is added in the nested logit model to minimise the computational cost. Cox (2011) believes that the cube root does an excellent job with a distinctly non-normal distribution since such transformation has often been applied to precipitation data, which are characteristically right-skewed and sometimes include zeros. The selection of the cube root of household income per capita greatly reduces the computational cost but also makes the regression succeed.⁵

The binomial logistic model also includes the variable of household income. To avoid the endogeneity issue, I use lagged income as the instrumental variable for household income. A common practice in applied econometrics consists of replacing a suspected simultaneously determined explanatory variable with its lagged value, but this practice does not enable one to escape simultaneity bias. Reed (2015) suggests an alternative to the practice of substituting lagged values for contemporaneous variables by using the lagged values as instruments in the 2SLS estimation. Bellemare, Masaki, and Pepinsky (2017) also point out that neither a theoretical nor a statistical argument is provided when researchers lag their independent variables in applied research. Their study stresses the relationship between lag identification and incorrect inferences and concludes that without careful arguments on substantive grounds, lagged explanatory

⁵I run the regression with the log of household income per capita alone, and the result shows a strongly positive effect on the decision to invest. However, no matter which regressor I add next, the estimation ends with 'flat region encountered'.

variables should not be used for identification purposes (take a look at a related study in the field of political science by Blackwell and Glynn, 2018). Although Bellemare, Masaki, and Pepinsky (2017) believe that Reed (2015)'s recommendations are unlikely to represent a valid solution to the identification problem, it is an effective estimation strategy since the lagged values do not themselves belong in the respective estimating equation, and they are sufficiently correlated with the simultaneously determined explanatory variable according to the further explanation in (Reed, 2015, p.204).

4.6 Empirical Results

4.6.1 Determinants of Being Investors

In this section I use a binomial logistic model to estimate the empirical determinants of whether or not a household holds investment. **Table 4.2** presents the results of the binomial logistic model using the sample of 6,827 urban and rural households. The model's Pseudo R^2 is approximately 0.139 and the log likelihood function is -3545.3 . The odds ratio for a household having investment is shown in the 1st column, while the marginal effects of regressors on predicted probabilities of investment are reported in the 2nd column. Of the HRP characteristics, there is no clear effect of being male and receiving a higher education on household investment decisions, and this result does not support **Hypothesis 1** on female householder. However, getting older significantly decreases the probability of making a decision to invest. In regards to employment, I expect a thirty-six percentage point increase in the probability of households having investments for householders who are self-employed and a fourteen and two-tenths percentage point decrease for householders who work for others.

Table 4.2: Estimated Results from Binary Logistic Regression on Household Investment Decision

Dependent Variable:	Holding Investment=1	
	Odds Ratio	Marginal Effect
HRP Characteristics		
Male(d)	-0.026	-0.0044
Log of Age	-0.945***	-0.1625
Year of Schooling	0.015	0.0026
Health Status		
Underweighted	0.028	0.0049
Healthy	ref.	.
Over-weighted	0.223***	0.0383
Obesity	0.289**	0.0497
Self-employed(d)	2.095***	0.3601
Employed(d)	-0.827***	-0.1422
Hukou-Migration Status		
Rural Locals in Countryside	0.125	0.0216
Rural Local in Cities	0.454***	0.0781
Rural Migrant from another County	-0.295	-0.0508
Rural Migrant in Cities	0.551**	0.0947
Urban Local in Countryside	-0.016	-0.0027
Urban Local in Cities	ref.	.
Urban Migrant in Countryside	0.375	0.0644
Urban Migrant from another City	-0.489(*)	-0.084
Household Characteristics		
No. of Household Member	0.211***	0.0363
Women's Bargaining Power (1-10) ^a	0.030*	0.0052
<i>Age-Gender Composition of Household</i>		
Proportion of Male aged 0-6	0.029***	0.0049
Proportion of Male aged 7-12	0.032***	0.0055
Proportion of Male aged 13-18	0.020***	0.0034
Proportion of Male aged 19-25	0.001	0.0002
Proportion of Male aged 26-35	ref.	.
Proportion of Male aged 36-45	0.018***	0.0031
Proportion of Male aged 46-55	0.019***	0.0033
Proportion of Male aged 56-65	0.026***	0.0044
Proportion of Male aged 66+	0.025***	0.0043
Proportion of Female aged 0-6	0.022***	0.0037
Proportion of Female aged 7-12	0.028***	0.0048
Proportion of Female aged 13-18	0.007	0.0012
Proportion of Female aged 19-25	0.004	0.0007

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Table 4.2: – continued from previous page

Dependent Variable:	Holding Investment=1	
	Odds Ratio	Marginal Effect
Proportion of Female aged 26-35	0.009 ^(*)	0.0016
Proportion of Female aged 36-45	0.020 ^{***}	0.0034
Proportion of Female aged 46-55	0.020 ^{***}	0.0035
Proportion of Female aged 56-65	0.021 ^{***}	0.0037
Proportion of Female aged 66+	0.015 ^{**}	0.0026
Household Consumption & Income		
Share of Consumption on Education	0.003	0.0005
Share of Consumption on Beauty Products	0.047 ^(*)	0.0081
Share of Consumption on Cigarette & Alcohol	-0.010 ^{**}	-0.0017
Reduced Household Income per Capita	1.542 ^{***}	0.2651
Region		
Eastern	0.047	0.008
Middle	ref.	.
Western	-0.181 [*]	-0.0311
Northeastern	-0.437 ^{***}	-0.0752
Observations	6,827	
LR χ^2	1140	
Log likelihood	-3545.3	
Pseudo R^2	0.139	

(^{*}) $p < 0.10$, (^{*}) $p < 0.05$, (^{**}) $p < 0.01$, (^{***}) $p < 0.001$

Sources: Calculated from the 2012 CFPS.

Note: Use household as unit measurement. (d)-dummy variable. (ref.)-reference group.

^a Women's relatively bargaining power is calculated using educational attainment.

Turning to the impact of personal health, overweight and obesity are linked to a three and four-fifths percentage point and a nearly five percentage point increase in the chance of investing, respectively, with the healthy as the omitted group. To examine whether or not this effect is consistent, two logit models are estimated: first, the categorical variable on health status is replaced with a continuous variable of Body Mass Index (BMI); and second, the squared form of BMI is added. The results suggest that there is a positive relationship between BMI and the decision to invest, and such an uptrend is expected to be sustained. This result can be explained by the prevalence of obesity in Chinese cities where the rate of obesity is three to four times that in

rural areas, which reflects higher incomes in urban areas with higher levels of nutrition and food consumption, on the one hand, and less physical activity, on the other.

The mixed impact of hukou status and mobility is examined with the default group with urban locals. Clearly, the single most statistically significant variable is the dummy variable of being a rural migrant in cities, which considerably increases the probability of investing. Such a strongly positive effect can be explained by the fact that most rural migrants have second homes in their home towns and their inclination to self-employment (Cao et al., 2015; Ning and Qi, 2017). More importantly, the average value of those residences that rural migrants leave behind is approximately 83,400 RMB, which is much higher compared to the value of their current dwellings (CFPS, 2012). The locals mainly living in urban fringe, but registered as agricultural hukou also have a greater chance to invest, which may be due to the reason explained by Huang and Yi (2011). Since these urban dwellers still own residential land, it is highly possible to build more homes as land owners.

The estimated results on rural migrants do confirm **Hypothesis 2** on the positive effect of migrant status. However, we also note a negative effect of migration on those who come from other cities; more specifically, the probability of investing for them declines by nearly forty-nine percentage points in comparison with urban locals, but those migrants do own the most expensive dwellings. Nevertheless, the extremely high standard deviation indicates an uneven distribution of their wealth (CFPS, 2012).

Of the household characteristics, the demographic factors that make households more likely to hold investments are having more household members, the increasing bargaining power of women, and a higher proportion of younger members (especially young boys), and the findings confirm with **Hypothesis 2** and **Hypothesis 4**. For example, one additional member increases the probability of investing with about three and six-tenths percentage points, and we can expect a five and two-tenths percent-

age point increase in the proportion of households that invest if we compare households with single-male householders (0 score at bargaining power) to ones with single-female householders (10 score at bargaining power).

Turning to household composition, household members are categorised by gender and age into 18 cohorts, and then added in the logit model as 17 variables on a ratio of demographic segment to total number of household members, with a reference group of males aged 26–35 years. Although some age-gender groups show statistically significant effects on household investment decisions, their contributions are less significant (compared with their effect on selecting investment categories or shares of certain investment categories). For instance, a household of a preschool boy living with his grandparents aged 56 and 57 is expected to have a sixteen percentage point rise in the chance to invest, compared to a household composed of an adult son and his parents at their late 50s.

Turning to household consumption and income, the contribution of household income is considerable. To solve the endogeneity problem in the model, I use a log of its lagged value as the instrument variable for per capita household income to capture the effect of income on investment decisions (recommended in Reed, 2015). There is clear evidence that high per capita income is strongly associated with the probability of holding investment assets. This finding confirms **Hypothesis 5**, which means that household income contributes greatly to investment decisions.

For household expenditures, the impact of beauty products consumption is in contrast to the impact of cigarette and alcohol consumption, widely seen as male consumption products. For instance, one percentage point increase in beauty product expenditures is linked to an increase of four-fifths percentage point in the probability of investing, while an increase in cigarette and alcohol expenditures, regardless of its minimal scale, leads to the likelihood of a decrease in investing. This finding also indicates

regional differences in household investment decisions. Using the middle region as the reference group, it appears that households in the eastern region are more likely to invest, but this is statistically insignificant. Meanwhile, the chances of investing are much smaller for households in the western and north-eastern areas, with the predicted probability for investment falling with three and seven and half percentage points, respectively.

4.6.2 Determinants of Investment Choice

What characteristics determine the particular asset in which households choose to invest? I use nested logit models to estimate the empirical determinants of these characteristics. Since my primary focus is on the effect of children's gender on household investment, the sample is confined to parental households. I estimate one model for each of the survey years, noting that three investment choices differ in their tendencies: the plummet and slight recovery in real estate investment in the data from 58.75% in 2010, to 52.6% in 2012, and 57.2% in 2014; the overall rise in business investment from 20.9% in 2010, to 28.8% in 2012, and 26.4% in 2014; and the consistent fall in financial assets from 20.35% in 2010, to 18.6% in 2012, and 16.4% in 2014 (**Table 4.1** presents weighted summary statistics). **Table 4.3** and **Table 4.4-4.6** report the results of the nested logit models at two levels. Recommended by Cheng and Long (2007); Greene (2010), a likelihood-ratio test for the IIA test is carried out, and suggests that nesting is more appropriate for this model than a standard logit model.

Noting that the models have a degenerate nest, I constrain the log sum for the nest of not investing to be 1 in the specification suggested by Hunt (2000). The model is fitted with the restriction that the inclusive value parameter for the decision of not investing is equal to unity. The coefficient on the inclusive value is the so-called dissimilarity parameter. A two-tailed Wald test at the 99% confidence level suggests that

Table 4.3: The Results from Nested Logistic Model for Household Investment Decision

Level One ¹	The Decision to Invest(m=1)					
	2010		2012		2014	
	Coef.	t	Coef.	t	Coef.	t
HRP Characteristic						
Male(d)	-0.082	(-0.082)	-0.149*	(-2.19)	-0.220***	(-3.44)
Educational Level						
Illiterate/Semi-literate	-0.433***	(-6.17)	-0.412***	(-4.87)	-0.435***	(-5.75)
Primary school	-0.205**	(-3.16)	-0.143*	(-2.07)	-0.193**	(-2.76)
Junior High school	ref.	.	ref.	.	ref.	.
High school	0.209**	(3.00)	0.203**	(2.81)	0.214**	(2.84)
3-year College	0.581***	(5.35)	0.310**	(2.67)	0.333**	(2.77)
Bachelor or Higher Degree	0.535***	(3.80)	0.546***	(3.62)	0.548***	(3.78)
Hukou-Migration Status						
Rural Local in Countryside	-0.145*	(-2.09)	-0.658***	(-9.15)	-0.457***	(-6.28)
Rural Local in Cities	0.202**	(2.70)	-0.164*	(-2.07)	-0.018	(-0.22)
Rural Migrant from another County	0.730**	(3.22)	-0.912***	(-6.40)	-0.821***	(-5.34)
Rural Migrant in Cities	0.961***	(7.05)	0.037	(0.24)	0.367**	(2.61)
Urban Local in Countryside	-0.096	(-0.71)	-0.129	(-0.93)	-0.122	(-0.87)
Urban Local in Cities	ref.	.	ref.	.	ref.	.
Urban Migrant in Countryside	0.672(*)	(1.91)	-0.014	(-0.04)	-0.028	(-0.07)
Urban Migrant from another City	0.325*	(2.22)	0.17	(0.89)	0.025	(0.15)

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Table 4.3: – continued from previous page

Level One ¹	The Decision to Invest(m=1)					
	2010		2012		2014	
	Coef.	t	Coef.	t	Coef.	t
Household Characteristic						
No. of Household Members	0.228***	(6.10)	0.113**	(2.98)	0.115**	(3.12)
Cubed Root of Household Income per Capita	0.086***	(20.10)	0.082***	(19.56)	0.078***	(19.62)
Inclusive Value						
m_0 = decision of not investing	1.000	.	1.000	.	1.000	.
m_1 = decision of investing	-3.583***	(-23.05)	-3.089***	(-19.55)	-3.589***	(-20.60)
Observations	45,440		37,704		37,500	
Wald chi ²	1173.5		1033.1		1033.1	
Pseudo R ²	0.252		0.139		0.194	
Adjusted Pseudo R ²	0.246		0.131		0.186	

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

¹ The Decision of not Investing (m=0) is the omitted group

Source: Calculated from three CFPS surveys in 2010, 2012, and 2014. Use Household as measurement unit.

Note:(d)-dummy variable. (ref.)-reference group.

Table 4.4: The Results from Nested Logistic Model for Household Investment Choice (2010)

Level One	The Decision to Invest(m=1)					
Level Two ^a	j=2nd Home		j=Financial Assets		j=Business	
	Coef.	t	Coef.	t	Coef.	t
Age-Gender Dummy						
Male aged 0-6	-0.435**	(-2.73)	2.514***	(4.77)	-0.406	(-1.30)
Male aged 7-12	-0.343*	(-2.03)	1.982***	(3.96)	-0.127	(-0.38)
Male aged 13-18	-0.499**	(-2.89)	1.624**	(3.24)	0.238	(0.70)
Male aged 19-25	-0.599***	(-4.03)	3.209***	(6.68)	-0.08	(-0.26)
Male aged 26-35	ref.	.	ref.	.	ref.	.
Male aged 36-45	-0.434*	(-2.28)	0.675	(1.34)	0.966*	(2.39)
Male aged 46-55	-0.763***	(-3.77)	1.047*	(2.30)	0.994*	(2.39)
Male aged 56-65	-1.056***	(-4.96)	2.313***	(4.78)	1.446**	(2.76)
Male aged 66+	-0.720***	(-3.91)	0.481	(1.10)	1.244**	(2.58)
Female aged 0-6	-0.612***	(-3.73)	1.676**	(3.27)	0.35	(0.96)
Female aged 7-12	-0.247	(-1.31)	1.647**	(3.03)	-0.797*	(-2.28)
Female aged 13-18	-0.567**	(-3.12)	2.306***	(4.01)	-0.442	(-1.27)
Female aged 19-25	-0.299*	(-2.01)	2.191***	(4.88)	-0.653*	(-2.34)
Female aged 26-35	-0.268 ^(*)	(-1.72)	-0.118	(-0.32)	0.630 ^(*)	(1.91)
Female aged 36-45	0.035	(0.18)	-0.082	(-0.16)	-0.073	(-0.18)
Female aged 46-55	-0.25	(-1.27)	-0.917*	(-2.11)	0.887*	(2.07)
Female aged 56-65	-0.534**	(-2.65)	-0.752 ^(*)	(-1.80)	1.524**	(3.00)

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Table 4.4: – continued from previous page

Level One	The Decision to Invest(m=1)					
Level Two ^a	j=2nd Home		j=Financial Assets		j=Business	
	Coef.	t	Coef.	t	Coef.	t
Female aged 66+	-0.591***	(-3.30)	-0.271	(-0.62)	0.634	(1.44)
Observations	45,440					
Wald chi ²	1173.5					
Pseudo R ²	0.252					
Adjusted Pseudo R ²	0.246					

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^a Choosing No Investment ($j=0$) is the omitted group in level two.

Source: Calculated from three CFPS surveys in 2010, 2012, and 2014. Use Household as measurement unit.

Note:(d)-dummy variable. (ref.)-reference group.

Table 4.5: The Results from Nested Logistic Model for Household Investment Choice (2012)

Level One	The Decision to Invest(m=1)					
Level Two ^a	j=2nd Home		j=Financial Assets		j=Business	
	Coef.	t	Coef.	t	Coef.	t
Age-Gender Dummy						
Male aged 0-6	-0.181	(-1.02)	2.014***	(4.24)	-0.143	(-0.53)
Male aged 7-12	-0.281	(-1.57)	3.328***	(5.72)	-0.173	(-0.65)
Male aged 13-18	-0.269	(-1.42)	2.379***	(4.55)	-0.343	(-1.22)
Male aged 19-25	-0.635***	(-3.76)	1.977***	(4.41)	0.043	(0.16)
Male aged 26-35	ref.	.	ref.	.	ref.	.
Male aged 36-45	-0.086	(-0.43)	0.968*	(2.03)	0.427	(1.38)
Male aged 46-55	-0.174	(-0.73)	0.972(*)	(1.88)	0.157	(0.42)
Male aged 56-65	-0.319	(-1.43)	1.010(*)	(1.89)	0.311	(0.84)
Male aged 66+	-0.415*	(-2.08)	0.476	(0.97)	0.599	(1.64)
Female aged 0-6	-0.179	(-1.03)	1.391**	(2.98)	-0.145	(-0.55)
Female aged 7-12	-0.017	(-0.09)	1.449**	(3.02)	-0.291	(-1.06)
Female aged 13-18	0.06	(0.28)	1.564**	(2.98)	-1.207***	(-4.41)
Female aged 19-25	0.008	(0.05)	0.946*	(2.27)	-0.657**	(-2.58)
Female aged 26-35	0.073	(0.4)	0.14	(0.34)	0.183	0.63
Female aged 36-45	-0.111	(-0.52)	-0.367	(-0.76)	0.647*	(1.97)
Female aged 46-55	-0.453*	(-1.99)	0.168	(0.35)	1.128**	(3.1)
Female aged 56-65	-0.539*	(-2.56)	0.214	(0.43)	1.280***	(3.53)

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Table 4.5: – continued from previous page

Level One	The Decision to Invest(m=1)					
Level Two ^a	j=2nd Home		j=Financial Assets		j=Business	
	Coef.	t	Coef.	t	Coef.	t
Female aged 66+	-0.485*	(-2.45)	-0.518	(-1.12)	0.44	(1.26)
Observations	37,704					
Wald chi ²	1033.1					
Pseudo R ²	0.139					
Adjusted Pseudo R ²	0.131					

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^a Choosing No Investment ($j=0$) is the omitted group in level two.

Source: Calculated from three CFPS surveys in 2010, 2012, and 2014. Use Household as measurement unit.

Note:(d)-dummy variable. (ref.)-reference group.

Table 4.6: The Results from Nested Logistic Model for Household Investment Choice (2014)

Level One	The Decision to Invest(m=1)					
Level Two ^a	j=2nd Home		j=Financial Assets		j=Business	
	Coef.	t	Coef.	t	Coef.	t
Age-Gender Dummy						
Male aged 0-6	0.397*	(2.34)	2.598***	(3.83)	-0.932***	(-3.49)
Male aged 7-12	-0.195	(-1.11)	1.791**	(2.89)	0.059	(0.18)
Male aged 13-18	-0.348(*)	(-1.80)	4.379***	(4.98)	-0.368	(-1.05)
Male aged 19-25	-0.326*	(-1.99)	1.966***	(3.42)	0.293	(0.94)
Male aged 26-35	ref.	.	ref.	.	ref.	.
Male aged 36-45	0.256	(1.25)	0.756	(1.12)	0.057	(0.15)
Male aged 46-55	-0.286	(-1.30)	0.925	(1.47)	0.809(*)	(1.92)
Male aged 56-65	-0.709**	(-3.09)	0.441	(0.70)	1.624***	(3.47)
Male aged 66+	-0.446*	(-2.27)	0.548	(0.91)	0.642	(1.61)
Female aged 0-6	-0.107	(-0.63)	3.121***	(3.95)	-0.408	(-1.38)
Female aged 7-12	-0.161	(-0.83)	2.743**	(2.84)	-0.664*	(-2.05)
Female aged 13-18	-0.221	(-1.11)	2.737***	(3.70)	-0.598(*)	(-1.76)
Female aged 19-25	-0.405*	(-2.51)	1.997**	(3.23)	0.013	(0.04)
Female aged 26-35	-0.291(*)	(-1.80)	1.681***	(3.31)	0.906**	(3.12)
Female aged 36-45	-0.313	(-1.47)	0.51	(0.79)	1.221**	(3.07)
Female aged 46-55	-0.264	(-1.22)	1.521*	(2.50)	0.894*	(2.22)
Female aged 56-65	-0.621**	(-2.81)	2.592***	(3.82)	0.839*	(1.97)

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Table 4.6: – continued from previous page

Level One	The Decision to Invest(m=1)					
Level Two ^a	j=2nd Home		j=Financial Assets		j=Business	
	Coef.	t	Coef.	t	Coef.	t
Female aged 66+	-0.387*	(-2.16)	0.469	(0.82)	0.920*	(2.50)
Observations	37,500					
Wald chi ²	1033.1					
Pseudo R ²	0.194					
Adjusted Pseudo R ²	0.186					

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^a Choosing No Investment ($j=0$) is the omitted group in level two.

Source: Calculated from three CFPS surveys in 2010, 2012, and 2014. Use Household as measurement unit.

Note:(d)-dummy variable. (ref.)-reference group.

the IV parameter for the decision to invest is significantly different from both zero and one (suggested by Hensher, Rose, and Greene, 2015, p.574). Therefore, I can conclude that the nested structure is indeed a statistically significant improvement over the MNL model. In other words, there are unobserved similarities between three broad investment categories. By these measures, this nested logit model is an appropriate characterisation of household investment for these data. McFadden's pseudo R^2 for three nested logit models are 0.252, 0.139, and 0.194, respectively, and values from 0.2–0.4 indicate an excellent model fit according to McFadden (1979).

Table 4.7 gives the predicted probability for the decision on whether or not to invest. Of the personal characteristics, being female, an urban resident, and educated increased the probability of holding investment assets in each of the consecutive surveys. The gender gap in the probability widened in the first interval and narrowed in the second. The probability of a female householder was above 30% in 2012 and 2014, while for male householders, the corresponding decrease but still under 26%. This finding confirms **Hypothesis 1** that there is a positive relationship between female householders and decisions to invest.

There is also a considerably significant increase in the importance of education. An example is given by comparing two householders: one with a three-year college education and the other with higher education. In the beginning of the CPFS survey in 2010, a college graduate had a 49.3% probability of owning investment assets, and this probability declined to 46.5% in 2014.

By contrast, the prospects for a householder receiving a bachelor's or higher degree increases nearly four percentage points from 54.2% in 2010 to 58% in 2014. Meanwhile, there is a significant decline in the average probability of investing for rural migrant households. In 2010, a rural migrant residing in another country without the registered in hukou system had a 35.7% chance of holding investments, but by 2014 this chance

Table 4.7: Estimated Probability of Making the Decision m

HRP Characteristics	<i>Probability (decision = m)</i>					
	2010		2012		2014	
	Not Invest	Invest	Not Invest	Invest	Not Invest	Invest
Gender						
Female	0.733	0.267	0.687	0.313	0.695	0.305
Male	0.753	0.247	0.745	0.255	0.742	0.258
Educational Level						
Illiterate/Semi-literate	0.848	0.152	0.844	0.156	0.836	0.164
Primary school	0.792	0.208	0.788	0.212	0.783	0.217
Junior High school	0.730	0.270	0.735	0.265	0.714	0.286
High school	0.661	0.339	0.647	0.353	0.626	0.374
3-year College	0.507	0.493	0.523	0.477	0.535	0.465
BA or Higher degrees	0.458	0.542	0.418	0.582	0.420	0.580
Hukou-Migration Status						
Rural Local in Countryside	0.819	0.181	0.821	0.179	0.814	0.186
Rural Local in Cities	0.731	0.269	0.710	0.290	0.722	0.278
Rural Migrant from another County	0.643	0.357	0.826	0.174	0.831	0.169
Rural Migrant in Cities	0.505	0.495	0.617	0.383	0.607	0.393
Urban Local in Countryside	0.753	0.247	0.655	0.345	0.687	0.313
Urban Local in Cities	0.674	0.326	0.598	0.402	0.607	0.393
Urban Migrant in Countryside	0.683	0.317	0.618	0.382	0.655	0.345

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Table 4.7: – continued from previous page

HRP Characteristics	<i>Probability (decision = m)</i>					
	2010		2012		2014	
	Not Invest	Invest	Not Invest	Invest	Not Invest	Invest
Urban Migrant from another City	0.560	0.440	0.463	0.537	0.535	0.465

Source: The CFPS Urban Household Survey in China from 2010 to 2014. Use Household as measurement unit.

Note: The probability that household i makes decision m is calculated by Equation 4.2

had fallen to 16.9%. In addition, the likelihoods that urban-hukou holders would invest, unlike rural-hukou holders, increased no matter where they actually lived. In fact, the prospect that urban households would invest remained at a high probability of over 30% in the 2010–2014 interval, in despite of fluctuation. For example, the chance of investing for urban locals in Chinese cities rose from 32.6% in 2010 to 39.3% in 2014, in contrast to the levels for rural migrants from other counties that drop from 35.7% to 16.9%.

Turning to age-gender composition variables, **Table 4.8** presents the conditional probability of choosing one of the investment alternatives in the bottom level of the nest of investing. Having dependent younger members of both genders are determinants that make the selection of financial assets more likely. Specifically, the existence of young dependents under the age of 26 years increases the probability of choosing financial products in each of the surveys (the default is having household members aged 26–35 years). This tendency demonstrates an intrinsic impact that children have on investment decisions of Chinese parents. Among the young dependents, boys in pre-elementary school show a strong and continually increasing influence on household decisions to hold financial assets while the influence of their counterparts also grows over the same interval. Although their average rate of participation in financial markets drops considerably from over 16% in 2010 to less than 10% in 2014, as the markets continuously underperform, households with young adults aged 26–36 years show a relatively high level of holding financial assets over the same period.

The households with males between the ages of 18 and 25 also show an interest in participating in the financial market, and the probabilities of investing remain basically unchanged: slightly decreasing from 9.6% in 2010 to 9.4% in 2014. By contrast, the prospects for households with teenage boys attending middle or high schools decreased from 13.4% to 5.4% in the final survey in 2014. The empirical analysis on demographic factors confirm Hypothesis 6 that the choice of investing in finan-

Table 4.8: Estimated Probability of Investment Category j for all Households with Investment

	<i>Probability($j m = invest$)</i>								
	2010			2012			2014		
	<i>2nd</i> Home	Business	Financial Assets	<i>2nd</i> Home	Business	Financial Assets	<i>2nd</i> Home	Business	Financial Assets
Household Composition by Age & Gender									
Male aged 0-6	0.639	0.259	0.102	0.566	0.331	0.103	0.581	0.359	0.06
Male aged 7-12	0.616	0.257	0.127	0.576	0.344	0.081	0.624	0.293	0.083
Male aged 13-18	0.615	0.251	0.134	0.554	0.339	0.107	0.626	0.319	0.054
Male aged 19-25	0.647	0.257	0.096	0.597	0.292	0.111	0.635	0.271	0.094
Male aged 26-35	0.604	0.232	0.164	0.54	0.308	0.152	0.602	0.301	0.097
Male aged 36-45	0.591	0.269	0.14	0.54	0.331	0.129	0.579	0.327	0.095
Male aged 46-55	0.601	0.24	0.159	0.548	0.306	0.146	0.613	0.275	0.111
Male aged 56-65	0.67	0.172	0.157	0.588	0.269	0.143	0.676	0.223	0.101
Male aged 66+	0.6	0.183	0.218	0.597	0.253	0.149	0.625	0.26	0.114
Female aged 0-6	0.661	0.218	0.121	0.56	0.322	0.118	0.629	0.32	0.051
Female aged 7-12	0.588	0.286	0.125	0.535	0.343	0.122	0.6	0.341	0.058
Female aged 13-18	0.615	0.284	0.102	0.491	0.401	0.107	0.597	0.333	0.07
Female aged 19-25	0.623	0.279	0.098	0.535	0.346	0.12	0.628	0.298	0.074
Female aged 26-35	0.623	0.219	0.158	0.549	0.313	0.138	0.625	0.3	0.075
Female aged 36-45	0.574	0.293	0.133	0.526	0.337	0.137	0.593	0.305	0.102

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Table 4.8: – continued from previous page

	<i>Probability($j m = invest$)</i>								
	2010			2012			2014		
	<i>2nd</i> Home	Business	Financial Assets	<i>2nd</i> Home	Business	Financial Assets	<i>2nd</i> Home	Business	Financial Assets
Female aged 46-55	0.605	0.221	0.173	0.563	0.286	0.151	0.614	0.276	0.11
Female aged 56-65	0.647	0.162	0.191	0.601	0.253	0.146	0.673	0.246	0.081
Female aged 66+	0.647	0.162	0.191	0.601	0.253	0.146	0.673	0.246	0.081

Source: The Sample of Urban Household from the 2010 – 2014 CFPS. Use Household as measurement unit.

Note: The probability that household i choose investment category j is calculated by Equation 3.2

cial markets is strongly associated with household composition. I can conclude that households with younger children show a preference for investing in financial assets.

The findings on the effects of household composition on holding extra residential properties portray a different picture. First, over time, ageing households show a decreased probability of second-home ownership. The threshold of this negative effect in older households becomes visible at the age of 46. Compared to the default of males aged 26–35 years, the single most statistically significant factor is the dummy variable for male members aged 56–65 years because this greatly reduces the probability of second-home ownership. Overall, the probability of owning extra properties other than a main residence fall dramatically in the first interval between 2010 and 2012, and recover in 2014 to a level slightly higher than one in 2010.

The results also indicate the continuing influence of male children on household decisions to invest. For example, compare two households: one with teenage sons aged 13–18 years and the other with daughters the same age. Under difficult circumstances that led to a downward trend in second-home ownership from 2010 to 2012, households with teenage sons aged 13–18 years faced a decline of six and one-tenth percentage points in the probability of owning extra dwellings in the interval of two years. However, households with teenage daughters of the same age experienced a dramatic decline from 61.5% in 2010 to 49.1% in 2012. In other words, parents with a son, especially under 26 years old, are less sensitive to unfavourable conditions when making investment decisions, which is consistent with the findings on savings and house purchase behaviour by Wei and Zhang (2011); Li and Wu (2015).

Turning to entrepreneurship or shareholders in private businesses, the probability of holding business investment assets increases in three conservative surveys. The gap between young and older households widens over time. Having preschool boys increases the likelihood of business investment assets by 10%, from 35.9% in 2014 to

25.9% in 2014. I also note the comparably strong effect of female members, except those who are at marriageable age (19 to 25), middle age (36 to 45) and retired (over 66). In evaluating the effect of household composition on business investment decisions, gender preference is hardly noticeable, unlike in the case of house purchase behaviour (Li and Wu, 2015). Besides, the results from the nested logit models verify my earlier assumption that younger household members have a greater impact on decisions regarding investment strategy than on whether to invest or not.

4.7 Conclusion

This chapter used household-level data from the CFPS survey undertaken between 2010 and 2014 to characterise the household investment behaviour of Chinese households. The results can be summarised in four main findings. First, mobility is strongly associated with the decision to invest. Although the existing hukou system prevents migrants from accessing subsidised housing in destination cities, it allows them to maintain land rights in their hometowns, which thus leads to second-home ownership of migrants whose main residence is in destination cities.

Second, there are significant differences in the impact of demographic composition between investment categories over the sample of households with children. Households with younger children show a preference for investments in financial assets. Determinants that make the selection of financial assets more likely are having dependent children of both genders. The existence of younger members under 26 years old increases the probability of investing in financial products in each of the surveys. The findings on how household composition affects ownership of residential dwellings portray a different result. Over time, ageing households consistently lessen the probability of owning second homes. The results reflect the influence of boy-preference on household decisions to invest in private businesses. The gap between young and older

households in the likelihood to invest widens over time, particularly in real estate and business assets.

Third, there is a positive relationship between being overweight and an increased probability of investing. Using BMI as the proxy for personal health, this finding is not consistent with previous studies on the relationship between investment and health (Rosen and Wu, 2004) but is still robust in sensitivity tests, including the use of alternative measures of health and the related variables on eating habits and physical activity level to capture the additional effect of health. This result can be explained by the high correlation between the better-off and overweight that researchers have found in many developing countries (Martorell et al., 2000; Ziraba, Fotso, and Ochako, 2009). The prevalence of obesity in Chinese cities, where the rate of obesity is three to four times that in rural areas, reflects higher incomes in urban areas with, on the one hand, higher levels of nutrition and food consumption, and on the other, less physical activity.

Fourth, there is clear evidence that high per capita income is strongly associated with the probability of holding investment assets, and the results from the logit model show that the contribution of household income to ownership of investment assets is statistically significant. However, my analysis suffers from the fact that the data on adult consumption of exclusive goods cover only cigarette and alcohol spending, only one survey period, and contain some measurement errors that cause some missing data. Meanwhile, the results suggest a statistically significant but minimum impact on parental investment decisions from adult consumption patterns. While no better household-level consumption data exists, the potential drawbacks of CFPS data present an important caveat to the analysis, and this issue could bias the estimated effects of consumption on household investment.

A number of questions remain unanswered. First, is there a way to approximate

parental consumption patterns in households with different investment strategies using data that are available in long-term panel? Second, how do we overcome the choice-overlapping problem and examine the determinants of an investment portfolio across a broad set of investment categories? The second question will be answered in the next chapter.

Chapter 5

The Intra-Household Bargaining in Investment Holdings

5.1 Introduction

A growing share of empirical literature on intra-household resource allocations is set in China (Li and Wu, 2011) and other developing countries such as South Africa Duflo (2003), Mexico (Bobonis, 2009), and low- and moderate-income countries (Duflo, 2012) where women's economic opportunities have historically been weak. These studies typically link a change in women's economic power in the household with a change in an outcome variable, and they demonstrate a causal relationship between a change in women's bargaining power in the household with a change in household resource allocation. Here, the implied mechanism is that women with larger relative resources (such as income, higher educational attainment, and assets) are more likely to have greater bargaining power and thus are better able to steer allocations of resources towards their preferred direction. However, prior studies focus on outcomes like household expenditures on goods for children or children's health outcomes such

as height and weight, and fail to extend their focus to other fields such as household investments and children's outcomes by gender.

Many researchers have studied household investment in China (Li, 2006b,a; Wu, Yi, and Zheng, 2010; Yin, Song, and Wu, 2014; Chu et al., 2016), but those studies concentrate on portfolios in the field of financial assets as a portion of household wealth. Nevertheless, according to the CFPS survey, financial products account for approximately one-fourth of total urban household investment assets in comparison with nearly half of household investment assets existing in the form of second homes in 2012. It is well known that housing assets account for more than 70% of household wealth and 80% in large cities like Beijing and Shanghai (Xie and Jin, 2015). Meanwhile, there are few studies that investigate how Chinese households fractionalise their wealth across broad investment categories from financial assets (stocks, funds, and government bonds) to non-financial assets (residential properties and private businesses).

Additionally, some studies have acknowledged the importance of children on household decisions regarding resource allocation such as household consumption Deaton (1989), and the impact of sons on the saving motives of parents Wei and Zhang (2011), and family wealth used for housing purchases Li and Wu (2015) in China. However, previous empirical works do not provide a sufficient explanation for the role of demographic factors in household investment decisions. Plenty of questions are rising. What alter household investment holdings? Or more specifically: How does intra-household bargaining change the way in which urban households allocate their wealth across broad investment categories? How does household investment allocation vary with the gender of children? Does the empowerment of women reduce the preference for boys in terms of investment holding?

Using longitudinal survey data available from the CFPS, this chapter will investigate

the allocation pattern of investment at the household level in urban China and explore how household investment holdings are affected by changes in demographic composition and intra-household bargaining power in urban China. To some extent, this study gives a further examination of household investment trends in terms of resource allocation and answers the question presented in the previous chapter (how do we solve the choice-overlapping problem and examine the determinants of household portfolio across a broad set of investment categories?) with a focus on gender of children and intra-household bargaining. This work provides implications for future policy making since household characteristics that influence investment allocations may lead to distributional welfare issues, and also fills a gap in the existing literature on the field of household finance and intra-household bargaining.

In the remaining part of this chapter, the background and literature review are presented in Sections 2 and 3. Sections 4 and 5 discuss the hypotheses and methodologies, respectively. Section 6 explains the empirical results, and Section 7 provides a conclusion.

5.2 Background

5.2.1 Empowerment of Urban Women

Initiated in the late 1970s, China's one-child policy ended in 2015. This policy not only left a country under pressure from an ageing population where today one in seven people are over 60 years old. It also led to an era of urban families with only one daughter in a society characterised by patrilineal kinship. Before the one-child policy, in a society with a cultural preference for sons over daughters, many Chinese parents kept having children until they got a boy, and they had little incentive to invest in their daughters. After three decades of the one-child policy, dramatic demographic changes

took place in China. There is much evidence indicating that urban daughters have benefited from such changes. As the one-child policy was enforced in cities, a change in attitudes towards female offspring also occurred.

Brotherless daughters enjoy exclusive support from their parents due to the absence of male siblings who compete for parental investment. Indeed, there is an evident trend towards more women receiving higher education than men. In terms of tertiary enrolment, females overtook males in 2008 (World Bank, 2017b). In terms of higher education, women outnumbered men in 2010: female students accounted for approximately 51% of all university students in China (United Nations Children's Emergency Fund, 2014). That is to say, the share of female students has surpassed that of their male counterparts, doubling from 23.4% in 1980. It took three decades for women to achieve such a balance (Liu, Li, and Yang, 2015).

As a result of these changes, urban daughters now provide more physical and emotional support to parents, whereas sons and daughters do not differ in rural areas. China has experienced a consistent decrease in the fertility rate. The number of births per woman dropped from over 6 during the 1960s to 1.4 by the late 1990s and has remained at around 1.5 since then (World Bank, 2017a). This extremely declining rate of fertility has increased women's empowerment. A strong correlation between women's employment and a low fertility rate has been well documented in prior studies (Abadian, 1996; Duflo, 2012). Low fertility rates free urban women from the responsibilities of motherhood and enable them to engage in education and employment. In Chinese cities, nearly three-fourths of mothers aged 25–34 years who have children younger than six years old were employed in 2010, despite the fact that China's economic reform has reduced childcare options in the public sector and created a barrier for working women.

Earning an independent income also increases daughters' ability to provide financial

support to parents (All-China Women's Federation and National Bureau of Statistics of China, 2011). Xie and Zhu (2009) point out that married daughters provide more financial resources to their parents than their brothers, which suggests that traditional norms are no longer valid in Chinese cities. Furthermore, gender-based exchange contracts between parents and adult children have disappeared in urban China.¹ The findings from Lei (2013) show that unmarried daughters are more likely to provide financial support to their parents compared to their male counterparts. With more education, increased financial abilities, and access to property rights, urban women have enhanced their impact on household decisions, and there is clear evidence showing that children benefit most from such changes.

5.2.2 Emerging Demand for Investment from the Middle Class

The explosive growth of an emerging middle class has brought sweeping economic change and social transformation in China in recent decade. A study by the consultancy McKinsey & Company pointed out that about 14% of China's urban households were considered upper middle class in 2012, which means that they earned annual household disposable incomes from US \$16,000 to US \$34,000. While less than 5% of urban households were within that range, this proportion is expected to quadruple in the decade ahead (Barton, Chen, and Jin, 2013). A larger middle-class population and market has significant environmental and social implications. On the one hand, in contrast to China's ageing population, the middle class is getting younger and larger. On the other hand, the members of this emerging middle class have access to more opportunities than their predecessors had a decade ago. They are willing to spend their income on luxury goods and build wealth through investment instead of putting all

¹In a patriarchal society, sons receive more investment from their parents than daughters, and only male offspring are entitled to inherit family assets like land and property. As the beneficiaries, sons are expected to be the main caretakers for older parents. Since female offspring are married out and thus counted as members of their spouses' households, they no longer have obligations to support their parents. Previous studies have found such a gender pattern in inter-generational support in rural areas of mainland China (Yang, 1996) and Taiwan (Lee, Parish, and Willis, 1994; Lin et al., 2003).

their money in saving accounts.

Investments in financial assets like stocks, funds, and bonds are widely regarded as a way to accumulate wealth. However, since the economic collapse from the 2008 global crisis, stock markets in China have shown continued under-performance. Except for a partial recovery in the aftermath of the ‘financial Tsunami’, the stock market index has not broken 3,000 points in three consecutive years since 2011 (Sun, 2009, p.24). This long-term underperforming market has resulted in a substantial decline in the portion of household total investment assets held as financial assets. According to the CFPS, the ratio of financial products to total assets has declined from 29.76% in 2010 to 18.68% in 2014, and the rate of financial market participation has dropped from 11.7% to 9.6%. These figures reflect that stock depreciation leads to a shrinkage in the value of financial assets held by Chinese households.

Furthermore, Piketty, Yang, and Zucman (2017, p.9) indicate that ownership over non-financial assets, including residential property, land, and small businesses, can provide economic benefits to their owners. With rising incomes and a considerable return on real estate investments in the recent housing boom, second-home ownership is emerging in Chinese cities. Nationally, only about 7% of urban households owned two or more homes in 2002 (Mo, 2002); and the percentage increased to approximately 20% in 2014². Feng and Zhou (2004) find out that less than one-fourth of second-home owners claim that buying additional properties is purely for investment purposes in their research on residential mobility in Beijing. However, the value of those second-home dwellings is greater than other investment assets held by Chinese households, due to the dramatic rise in housing prices. Real estate assets are characterised by long-time holdings and illiquidity. Like long-term bonds, residential properties can be used to hedge changes in the relative prices of housing and non-housing consumption behaviour (Sinai and Souleles, 2005). However, real estate illiquidity makes own-

²The rate of second-home ownership is calculated using a nationally representative sample from the 2014 CFPS.

ers unable to make timely adjustments in response to economic shocks, which may discourage household investment holdings in real estate assets.

As the Chinese economy grows rapidly, the substantial expansion of the private sector becomes an important source of economic growth and labour market improvement (Mohapatra, Rozelle, and Goodhue, 2007). Zhang et al. (2006) believe that private businesses have been growing fast in terms of their rate of capital accumulation and have performed better than SoEs, and township and village enterprises in several ways. In the non-agriculture sector, the private sector has overtaken the state sector in the importance of the labour market. Employment in private enterprises has increased from 5.5% of total urban employment in 2000 to around 25% in 2014. Compared with SoEs, PoEs have shown an impressive performance of a nearly 10% return on assets since 2010 .

5.3 Review of the Related Literature

I approach the impact of child gender on household investment holdings from two strands of literature: (1) the effect of child gender on household decisions, and (2) the determinants of household investments in three broad categories of assets.

5.3.1 Child Gender and Household Decisions

There is an extensive literature showing the prevalence of child-gender bias and its implications for family behaviour in developing countries. Many scholars have given attention to social issues such as the skewed sex ratio in China (Zeng et al., 1993) and India (Arnold, Kishor, and Roy, 2002), marriage patterns (Gupta et al., 2003), and the well-being of children (Meadows, Land, and Lamb, 2005), that derive from child-

gender bias. In general, previous studies have examined the effect of child gender on many decisions made by parents: divorce and marriage (Morgan, Lye, and Condran, 1988; Heaton and Albrecht, 1991; Katzev, Warner, and Acock, 1994); fertility (Dahl and Moretti, 2008; Tian and Morgan, 2015); parental labour supply (Lundberg and Rose, 2002); investment in child education (Parish, Willis, and Willis, 1993; Lei et al., 2017), and time allocation (Raley and Bianchi, 2006; García-Mainar, Molina, and Montuenga, 2011). The positive impact of the increasing bargaining power of women in household investments in human capital and decisions about household consumption regarding child-related issues has also been found in China, and Li and Wu (2011) observe a greater influence in household decision making for women with first-born sons than women with first-born daughters.

With respect to the impact of child gender on household economic behaviour, Knight, Shi, and Quheng (2010), using the data from rural Chinese households, find that having a son rather than a daughter leads to higher family income. Wei and Zhang (2011) argue that, in both urban and rural settings, Chinese parents of a boy are more likely to save for a dwelling to be used in their child's marriage. Additionally, Smith and Ward (1980) find that attachment of young offspring depresses savings of young households but increases savings of married households where parents have been married longer than five years. Li and Wu (2015), in their work on accumulation of urban household wealth, point out that the presence of a son is more likely associated with earlier access to ownership of a larger dwelling and has a positive effect on family wealth through homeownership. Regarding the impact of children on household consumption, existing studies point out that girls have been placed at an unfavourable position compared with boys. Deaton (1989) gives evidence of boy-girl discrimination in household consumption in Cote d'Ivoire and Thailand, and Song (2008) finds that the presence of young girls in rural households is correlated with a smaller rise in the share of health care expenditures than the presence of young boys.

Referring to investments and wealth allocation, there is little evidence of household decisions in favour of either sons or daughters. In general, gender has been treated as a key issue within the area of investment behaviour, and thus there is an extensive literature that documents how child-gender preference affects investment decisions (Fehr-Duda, de Gennaro, and Schubert, 2006; Croson and Gneezy, 2009). Sundén and Surette (1998) find that gender is significantly related to asset allocations. Dwyer, Gilkeson, and List (2002) investigate approximately 2,000 mutual fund investors and find that women take less risk than men in their mutual fund investments (see also Carhart, 1997). Barber and Odean (2001) examine the relationship between overconfidence and stockholding behaviour. He adopts male as a natural proxy for overconfidence to test the model and concludes that men trade more, invest in stocks with higher market risk, and perform worse than women as common stock investors. Indeed, child gender has not been empirically examined regarding its influence on household investment decisions, especially in the developing countries. Nevertheless, its influence on household financial decisions is clear. Bogan (2013) specifically documents that having only girls can considerably lead to an increase in the probability of household's holding stock. Additionally, with regard to investment in businesses, Wei and Zhang (2011) find that son-preference is related to a higher probability of being an entrepreneur.

5.3.2 Investment Categories

Here, the classification of investment assets is the same as that used in the previous chapter that examined the determinants of investment decisions and selection of assets. This chapter particularly emphasises household decisions that allocate assets across three broad categories: financial products, real estate assets other than a primary residence, and privately held businesses. Or more plainly: With its focus on the share of each asset category in total household investment, this research shows more

interest in investment composition and what type of factors might affect it over time.

Traditionally, analyses of household investment choices have focused on the shares or amounts of financial assets at different risk levels (Bogan, 2013) or investment portfolios of rural households with productive assets and farm land (De Brauw and Rozelle, 2008). The results from the life-cycle model of Poterba and Samwick (2001) indicate that a ‘hump-shaped’ pattern of asset accumulation as households age is not applicable to all types of investments. For instance, as a part of total assets, financial assets show an opposite pattern. They decline as households age, then gradually rise at the advanced threshold ages. Investments in real estate and equity in privately held businesses do demonstrate a hump-shaped pattern, but owner-occupied housing is an exception since Poterba and Samwick do not find an apparent decline in ownership of household residence at older ages.

A massive number of studies have examined the determinants that alter household decisions on holding **financial assets**, particularly concerned in stocks. In fact, scholars have documented many factors that influence on households’ participation in the financial markets, for example, the impact of financial literacy on holding stocks and bonds (van Rooij, Lusardi, and Alessie, 2011); the different pattern of stockholders’ consumption from the others (Mankiw and Zeldes, 1991); and the relationship between low-income and share of financial assets (Hsu, 2012; Heaton and Lucas, 2000b). More recently, some works have provided empirically analyses of household investment in China, which is largely attributed to an increase in reliable data that collects financial information from Chinese households. A consistently positive effect of financial literacy on stockholding has been found by Wu and Shen (2015), Zhu, Dai, and Zhang (2016), and Chu et al. (2016).

Additionally, there are many previous works that focus on the effect of demographic characteristics on investment behaviours. For example, many researchers have exam-

ined the relationship between gender and holding financial assets (Barber and Odean, 2001; Dwyer, Gilkeson, and List, 2002; Croson and Gneezy, 2009; Stark and Zawojka, 2015). However, few studies have found empirical evidence that links gender of householders with their preferences in financial assets. Turning to household composition, Bogan (2013, 2015) has pointed out the impact of demographic structure on household behaviour in holding financial assets. His studies, to some extent, inspire the research of this chapter.

Real estate other than a primary residence, or a so-called ‘second home’, fulfils various functions for their owners, which has been documented by many researches (Müller, 2004; Paris, 2008; Di, 2009; Huang and Yi, 2011). Real estate is typically concentrated, highly leveraged, but costly to adjust. However, as an investment vehicle, the importance of second homes has received very little scholarly attention, compared to owner-occupied housing. A good deals of works have investigated household portfolio in the presence of homeownership (Cocco, 2004; Kullmann and Siegel, 2005; Cho, 2010). Kullmann and Siegel (2005) empirically investigate the relationship between real estate ownership and a household’s financial asset allocation, and concludes that homeowners are more likely to participate in the stock market than renters by testing asset allocation models. However, prior studies have not reached full agreement on an effect of housing investment on holding financial assets. Heaton and Lucas (2000b); Shum and Faig (2006) state that real estate investments show an insignificant effect on stock holdings, in contrast to a significant negative relationships found by Cocco (2004), Curcuro et al. (2010), and Kullmann and Siegel (2005).

Previous literature has concluded the impact of demographic factors on second homeownership, such as the strong effect of age (Carliner, 2002), and the white-minority disparities (Di, 2009). Additionally, Belsky, Di, and McCue (2007) use propensity models to how household characteristics affect second-home ownership, and find the positive relationship between the presence of second homes and high income, as well

as value of non-fixed assets.

Many researches have focused on **private business assets** in the field of portfolio choice. According to his study on wealthy households, Campbell (2006) explains that the rich avoids public equity markets due to their ownership of business. Many studies have found consistent evidence about the crowding-out role of private businesses in household investment holdings (Heaton and Lucas, 2000a; Huberman, 2001; Moskowitz and Vissing-Jorgensen, 2002; Batista and Umblijs, 2014). The owners invest most of their assets in their private small businesses rather than in financial markets to diversify their portfolio. Some studies have found that the positive influence of socio-economic factors on being an entrepreneur (Lazear, 2004; Fairlie and Robb, 2007; Di Addario and Vuri, 2010; Blanchflower and Oswald, 1998; Dunn and Holtz-Eakin, 2000). Both Lazear (2004) and Fairlie and Robb (2007) agree on gaining human capital through working in a family business makes an individual more possible to raise own business, than inheriting fortune from intergenerational transfer. However, Blanchflower and Oswald (1998) imply that receiving an inheritance increases the probability of self-employment.

More recently, empirical studies have examined the determinants of entrepreneurship in China (Wei and Zhang, 2011; Li and Wu, 2014, 2017). In their examination on the impact of siblings on self-employment or entrepreneurship through financial support, Li and Wu (2017) conclude that the number of siblings significantly affect the probability of being an entrepreneur, as well as gender. In fact, they believe that sisters tend to contribute less to the chance of entrepreneurship than brothers. The findings in these studies indicate that credit constraints are less problematic in developed countries, which differs from the situation in developing countries.

In summary, there has been widespread recognition of the impact of gender and children on household economic behaviour in the past decades. However, few previous

works have examined the combined effect of these two demographic factors, and rarely have such studies focused on household investment as a whole. Although existing literature reflects a complex relationship among investment assets, many studies on portfolio choice still exclude non-risk assets such as real estate and privately held businesses. In order to fill the gap, this research aims to find out the allocation pattern of household investment among a broad set of asset categories and examine how offspring gender affects household investment holdings.

5.4 Hypotheses

Listed below are this chapter's four main hypotheses:

Hypothesis 1 The existence of more young male members at marriageable age alters household investment holdings in real estate assets.

Hypothesis 2 The existence of more young female members contributes to a greater share of financial assets owned by households.

Hypothesis 3 Households with more boys increase their business asset holdings.

Hypothesis 4 Increasing the relative bargaining power of women affects household investment decisions.

The first three hypotheses concern whether urban households change their investment holdings with increasing male or female members at certain ages. The demographic factors that I examine are the number of members in each household that fall into eight distinct age ranges, from the youngest to the oldest, by gender. **Hypothesis 1** is based on son-preference in Chinese society. Wei and Zhang (2011) believe that Chinese parents of a boy show a strong motive to save to purchase a dwelling used in

their son's marriage, and Li and Wu (2015) argue that the existence of a son is highly related to earlier acquisition of a larger dwelling. Therefore, I assume that the addition of young male members at marriageable ages increases the share of investment in real estate assets.

Hypothesis 2 reflects an assumption that the probability of stockholding increases in the presence of a daughter. Bogan (2013) tests the factors affecting household behaviours in stockholding, and he finds that having only female children increases the probability of holding stocks, funds, and US saving bonds. **Hypothesis 3** relies on a relatively high proportion of young male members in households with business investments. **Table 5.2** shows that business investments for households with male members under the age of 16 are at nearly 10%; the same households invest 5.8% in financial assets and 7.5% in real estate. Wei and Zhang (2011) find that son-preference is related to a higher probability of being an entrepreneur. The study of mainland China and Hong Kong by Siu-lun (2009) finds that successful entrepreneurs try to make sure that they have enough male offspring to carry on their ventures.

Hypothesis 4 focuses on the link between women's bargaining power and household investment behaviour, that is, whether or not households change their share of financial and non-financial assets as women's bargaining power increases. The households with financial assets have relatively higher bargaining power of women (see also **Table 5.2**). Lawson and Gilman (2009, p.14) find that there is significant unmet demand among women for savings and investment assets that are held outside the household and thus are more directly and safely under their control, with simple financial products being the most attractive to them.

Table 5.1: Change of Financial Assets over three waves

	Interview Year											
	2010			2012			2014			Total		
	No.	Col%	Row%	No.	Col%	Row%	No.	Col%	Row%	No.	Col%	Row%
Holding Financial Products												
No	6494	88.3	35.9	5555	88.0	30.7	6037	90.4	33.4	18086	88.9	100.0
Yes	861	11.7	38.1	755	12.0	33.5	641	9.6	28.4	2257	11.1	100.0
Owning other properties												
No	6032	82.0	36.1	5232	82.9	31.3	5429	81.2	32.5	16693	82.0	100.0
Yes	1323	18.0	36.2	1078	17.1	29.5	1253	18.8	34.3	3654	18.0	100.0
Having Business												
No	6653	90.5	36.7	5572	88.3	30.7	5904	88.3	32.6	18129	89.1	100.0
Yes	700	9.5	31.5	740	11.7	33.3	779	11.7	35.1	2219	10.9	100.0
Being Investor												
No	4953	67.3	36.3	4217	66.8	30.9	4485	67.1	32.8	13655	67.1	100.0
Yes	2402	32.7	35.9	2095	33.2	31.3	2198	32.9	32.8	6695	32.9	100.0
Total	7355	100.0	36.1	6312	100.0	31.0	6683	100.0	32.8	20350	100.0	100.0
Sample size	7,355			6,312			6,683			20,350		

Sources: *Calculated from the 2010-2014 CFPS.*

Being Investor: *At least holding one of financial assets above.*

Table 5.2: Change of HRP and Household Characteristics for Investment Categories

HRP Characteristic	Investment Categories					
	Financial Assets		Real Estate		Private Business	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	48.693	13.379	48.183	13.785	44.476	12.497
<i>Gender</i>						
Male	0.623	0.485	0.667	0.471	0.692	0.462
Female	0.377	0.485	0.333	0.471	0.308	0.462
<i>Marital Status</i>						
Single	0.048	0.214	0.042	0.202	0.046	0.210
Married	0.879	0.326	0.886	0.317	0.904	0.295
Cohabited	0.002	0.042	0.004	0.066	0.003	0.056
Divorce	0.029	0.169	0.022	0.146	0.018	0.135
Widowed	0.040	0.197	0.045	0.206	0.028	0.166
<i>Resident Type</i>						
Urban Hukou(d)	0.867	0.340	0.574	0.495	0.438	0.496
Migrant(d)	0.205	0.404	0.252	0.434	0.205	0.403
Year of Schooling	12.064	3.662	9.568	4.525	9.067	4.230
Employed(d)	0.630	0.483	0.671	0.470	0.782	0.413
Household Characteristic						
No. of Household Member	3.236	1.222	3.755	1.625	3.901	1.577
Having Unmarried Adult Children(d)	0.322	0.467	0.315	0.465	0.303	0.460

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Table 5.2: – continued from previous page

	Financial Assets		Real Estate		Private Business	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Women's Bargaining Power (1-10) ^a	4.864	2.133	4.520	2.569	4.421	2.548
<i>Age-Gender Composition of Household</i>						
Proportion of Male aged 0-6	2.569	8.170	3.230	8.460	4.001	9.487
Proportion of Male aged 7-12	2.354	7.988	2.746	8.167	3.822	9.515
Proportion of Male aged 13-15	1.099	5.653	1.503	6.278	2.124	7.324
Proportion of Male aged 16-18	1.320	6.401	1.525	6.477	2.093	7.834
Proportion of Male aged 19-22	2.242	8.458	2.741	9.136	2.800	8.809
Proportion of Male aged 23-35	9.581	17.512	11.440	17.513	11.389	17.395
Proportion of Male aged 36+	30.183	17.578	28.238	17.883	25.491	16.292
Proportion of Female aged 0-6	2.152	7.235	2.849	7.903	3.316	8.763
Proportion of Female aged 7-12	1.903	7.394	2.037	6.953	2.818	8.258
Proportion of Female aged 13-15	1.272	6.162	1.348	6.077	1.615	6.422
Proportion of Female aged 16-18	1.235	6.372	1.367	5.977	1.684	7.007
Proportion of Female aged 19-22	2.162	8.734	2.379	8.393	2.655	8.720
Proportion of Female aged 23-35	10.187	16.419	10.270	15.359	11.502	15.960
Proportion of Female aged 36+	31.740	18.696	28.328	17.622	24.691	16.528
Dwelling						
Owned	0.836	0.371	0.748	0.434	0.785	0.411
Occupied	0.060	0.238	0.085	0.279	0.045	0.207
Rented	0.093	0.291	0.148	0.355	0.143	0.350

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Table 5.2: – continued from previous page

	Financial Assets		Real Estate		Private Business	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Household Finance						
Household Income	91.790	120.772	74.568	106.317	54.287	105.092
Household Income per Capita	30.991	41.667	22.816	30.480	15.896	37.107
Lagged Household Income per Capita	25.938	24.318	19.085	25.057	14.229	36.471
Log of Lagged Household Income per Capita	9.824	0.899	9.294	1.228	8.812	1.404
Log of Lagged Household Income per Capita ^b	9.838	0.883	9.351	1.149	8.910	1.339
Total Market value of Holding Assets(10k yuan)	42.853	115.832	63.280	126.321	35.921	122.498
Investment Combination						
Only Financial Products	0.627	0.484	0.000	0.000	0.000	0.000
Only 2nd Home	0.000	0.000	0.669	0.471	0.000	0.000
Only Business	0.000	0.000	0.000	0.000	0.673	0.469
Financial Products + 2nd Home	0.273	0.446	0.169	0.375	0.000	0.000
Financial Products + Business	0.058	0.234	0.000	0.000	0.059	0.236
2nd Home + Business	0.000	0.000	0.137	0.344	0.226	0.418
All of Three	0.042	0.200	0.026	0.158	0.042	0.202
Observations	2257		3654		2219	

Note: (d)-dummy variable.

^a Wife's years of education over years of education of husband and wife combined.

^b Adjusted version refers to conversion of self-consumption in rural households into family income (CFPS, 2015).

5.5 Methodology

5.5.1 Sample

This chapter relies on a short-panel from the 2010-2014 CFPS to explore the effect of household composition on decisions to hold investment assets. Since the key variable is a set of 16 continuous variables that present age-gender composition of the household, the 2016 CFPS survey is excluded due to lack of demographic information on all household members. Moreover, this analysis is confined to urban areas, because they better represent actual financial and housing markets. The sample contains 20,338 person-year observations from 9,371 urban households. For the working-lesser model, the sample is limited to the households that invest at least once during the surveyed period. **Table 5.1** shows how three types of investment assets changed in the surveyed years. Real estate is a relatively popular asset among three investment holdings. More or less 18% of urban households are observed to own second homes for each survey year. Although there is not much difference between investments in financial products and businesses in terms of year of observation, almost 11% of the sampled households purchase either of them. Household holding in financial assets showed a downward trend as its proportion decreases from 11.7% to 9.6% within four years. Meanwhile, the proportion of the households that invest in businesses increased at the same interval. **Table 5.2** presents summary statistics.

5.5.2 Modelling

This section explains the models we choose to examine the effect of children's gender on household investment holdings and how household investment assets and household characteristics are measured to test the hypotheses. To solve the overlapping problem

and test how household investment behaviour varies with demographic changes, the fixed-effect regression is carried out for each investment category and used its proportion to total investment as the dependent variable. Due to the crowding-out effect, there are many extremely small values in the variable of share of financial assets in the sample. This study also adopts a Tobit model to investigate the effect of children's gender on household investment holdings, using the actual value of investment assets as the dependent variable.

Two-Limit Tobit Model

The dependent variables are values of household assets in three investment categories. To estimate how household investment responds to changes in demographic composition and intra-household bargaining power, I run the Tobit regression for investment in financial assets, real estate, and businesses, respectively. According to Tobin (1958), a standard Tobit model is specified as a latent response variable, y_i^* ,

$$y_i^* = x_i' \beta + \varepsilon_i, \quad i = 1, \dots, N \quad (\text{Eq. 5.1})$$

where $\varepsilon_i|x \sim \text{Normal}(0, \sigma^2)$, and $\mathbf{x}_i$ denotes the vector of observed regressors. If y^* were observed, I would assume (β, σ^2) by OLS in the usual way. The observed variable y_i is related to the latent variable

$$y_i = \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* = 0 \end{cases} \quad (\text{Eq. 5.2})$$

It is well known that the Tobit model relies crucially on normality, and the data on household investment is right-skewed; thus, I adopt two alternative approaches to achieve normality. The first option is to use the log transformation of value of investment assets. Thus, $\ln I_{it}$ denotes the log of market value of investment assets in

category j for household i at time t . Now, the distribution is near normal. The Tobit specification is modified for log normality for each of three dependent variables (Cragg, 1971; Wooldridge, 2010) in

$$I_{it}^* = \exp(x_{it}'\beta + \alpha_i + \varepsilon_{it}) \quad (\text{Eq. 5.3})$$

where the random effects are, $\alpha_i \sim i.i.d.N(0, \sigma_\alpha^2)$ and $\varepsilon_{it} \sim i.i.d.N(0, \sigma_\varepsilon^2)$ with α independent of ε . The observation rule is also adjusted with a non-zero threshold γ . However, in the computational application for the Tobit model with lognormal data, extra attention is needed for choosing the threshold and interpreting the effect of regressors. I placed the related discussion and the empirical results in **Appendix B.2**.

Instead, I emphasise the second solution for the skewed data on the value of investment holdings since the urban households sample demonstrates overly crowded households that either do not invest or hold significantly large investment assets. The Tobit model that allows both left and right censoring is well fitted. Therefore, the underlying model is

$$I_{it,j}^* = x_{it}'\beta + \alpha_i + \varepsilon_{it} \quad (\text{Eq. 5.4})$$

where x_{it} denotes the characteristics of urban households and their HRPs. This latent function characterises household investment decisions, which are defined as the observation of positive holding value; and it also characterises behaviour, which is defined as the household investment share given the status of investment holding. The observation rule is

$$I_{it} = \begin{cases} 0 & \text{if } I_{it}^* = 0 \\ I_{it}^* & \text{if } 0 < I_{it}^* < L \\ L & \text{if } I_{it}^* \geq L \end{cases} \quad (\text{Eq. 5.5})$$

$$L_{it,j} = \Phi\left(\frac{0 - x_{it}'\beta}{\sigma}\right)^{d_0} \left[\frac{1}{\sigma}\phi\left(\frac{I_{it}^* - x_{it}'\beta}{\sigma}\right)\right]^{d_1} \left[1 - \Phi\left(\frac{L - x_{it}'\beta}{\sigma}\right)\right]^{d_2} \quad (\text{Eq. 5.6})$$

where $I \sim N(\mu, \sigma^2)$ and $\phi(\cdot)$ is the standard normal density. For household i , the exponent d_n ($n = 0, 1, 2$) will take a value that depends upon whether the value of the observed I_{itj} is equal to zero, is in the interval between limits, or is equal to the upper limit, respectively. All other exponents will take a value of zero. The lower limit of the censored distribution is zero to confine the data to the households with investments; the upper limit, L_j , has been set equal to the value of investment assets at category j at the 90th percentile. The probability of a household being censored is presented in the following equation:

$$\begin{aligned} P(I_{it} = 0|x) &= \Phi \frac{0 - x'\beta}{\sigma} \\ P(I_{it} = L_j|x) &= \Phi \left(-\frac{L_j - x'\beta}{\sigma} \right) \end{aligned} \quad (\text{Eq. 5.7})$$

As the data have been scaled to a continuous distribution between the two endpoints, the expected value of I_{itj} in the interval between 0 and L_j is given to estimate the change in the expected value of investment assets, assuming a change in a conditioning variable:

$$E(I_{it}|x, 0 < I_{it}^* < L_j) = \int_0^{L_j} I \frac{1}{\sigma} \left[\frac{\phi(I - x'\beta)}{\sigma(\Phi_2 - \Phi_1)} \right] dI \quad (\text{Eq. 5.8})$$

where Φ_1 and Φ_2 represent the cumulative distribution function of the standard normal, evaluated at $(0 - X'\beta)/\sigma$ and $(L_j - X'\beta)/\sigma$, respectively. An alternative expression for the conditional expectation, which does not require integration over the dependent variable, has been defined by Maddala (1983, p.161) as

$$E(I_{it}|x, 0 < I_{it}^* < L_j) = x'\beta + \sigma \frac{\phi_2 - \phi_1}{\Phi_2 - \Phi_1} \quad (\text{Eq. 5.9})$$

where ϕ_1 and ϕ_2 represent the probability density function of the standard normal, evaluated at $(0 - x'\beta)/\sigma$ and $(L_j - x'\beta)/\sigma$. The term after $x'\beta$ is the extension of the inverse Mills ratio. The unconditional expectation can be estimated by Wooldridge

(2010, p.704) from

$$E(I_{it}|x) = P(0 < I_{it} < L_j|x)E(I_{it}|x, 0 < I_{it} < L_j) + L_j\Phi\left(-\frac{L_j - x'\beta}{\sigma}\right) \quad (\text{Eq. 5.10})$$

Fixed-Effect Model

The dependent variables for the fixed-effect model are the proportion of household investment for three categories: real estate, privately held businesses, and financial assets. Further details on investment categories are presented in the following subsection: **Dependent Variable**. To test the hypotheses on the impacts of children on household investment holdings, a model was built with a Working-lesser function Working (1943), where the share W_j of total household investment on assets of category j is given by

$$W_{itj} = \alpha_i + \beta_1 \ln Y_{it-1} + \beta_2 \ln N_{it} + \beta_3 R_{it} + \beta_4 \ln \left(\frac{A_{it}}{N_{it}} \right) + \sum_{k=1}^{K-1} \eta_{tk} \left(\frac{N_{itk}}{N_{it}} \right) + \tau_{tj}Z + \varepsilon_{it} \quad (\text{Eq. 5.11})$$

Where ε_{it} are *i.i.d.* $N(0, \sigma_\varepsilon^2)$ independently of α_i .

In this equation, Y_{t-1} is annual net household income per capita at time $t-1$. For the purposes of this study, N is added to describe household size in the form of total number of household members, while N_k is the number of people in the household in the k^{th} demographic category. R represents the ratio of the wife's years of schooling to the sum of both husband and wife, and is used as an indicator of intra-household bargaining power. A is the market value for all investment assets held by household i at time t (all assets are valued at the prevailing market prices). ΘZ is a vector of other control variables such as age, educational attainment, employment status, and tenure at the main residence.

The starting point for this equation is the Engel's curve, which originally refers to the share of expenditure on each good to the logarithms of total expenditure per capita (Working, 1943). The log-linear budget share specification provides a better solution for the overlapping problem in household investment choice. Adding to its original design, in order to examine the relationship between income and consumption, a modified Working-Leser model provides a more sensitive instrument to estimate how household investment behaviour responds to changes in demographic characteristics (Deaton, 1989). The lagged household income per capita is added to test whether or not income alters household investment behaviour. Using this model, I can examine the expectation of household assets conditional on the structure of the household. In the formulation of Working (1943), the coefficient of total expenditure represents the sign of which goods are necessities or luxuries. In this case, β_4 determines whether investment in a specific category is preferred. When β_4 is greater than 0, the total investment elasticity is greater than unity, and vice versa with β_4 smaller than 0.

Assuming that demographic composition matters, the effect of household composition is modelled by the inclusion of the ratios N/N_k , together with the logarithm of household size to capture the additional effects of composition. The η coefficients reveal the impacts of changing demographic structure while holding household size constant. The K age-gender groups derive from a disaggregation of the household by two demographic factors; in the example, there are 16 groups, males and females aged 0–6 years, 7–12 years, 13–15 years, 16–18 years, 19–22 years, 23–35 years, 36–65 years, and older than 65. Such categorisation is based on school age and life cycles such as preschool, primary school, and preparation to marry. I set the turning point at 35 years old, considering the tendency for the rate of marriage to drop for females after their mid 30s. The surplus number of the single also reduce around 35 years old for both men and women. Only $K-1$ of the ratios can be added into the regression since the sum of all K is equal to unity. In the empirical analysis, the omitted group is males aged 23–35 years. Some inferences are possible based on the effect of household demographic

composition on the allocation of household wealth to investments. For example, if a higher proportion of boys in a household is associated with a higher fraction of investments in extra dwellings than an equivalent higher proportion of girls, then this suggests that no property is bought for girls. Li and Wu (2015) give the details on why it is important to obtain ownership of residence before marriage.

To investigate how the relative bargaining power of women alters household investment holdings, I include the ratio of a wife's education in years to the sum of the years both husband and wife received as the main indicator of bargaining power. If a male householder is never married or lost his spouse by death or divorce, the bargaining power should be set to 0. For a female householder without a spouse, her relative bargaining power is set to 10, the highest in this case. If the fallback position is marital dissolution, then education is a likely determinant. Higher-educated individuals may be better able to obtain paid employment or a new spouse.

Women's entry into wage labour could thus be one way of increasing their intra-family bargaining power both directly and indirectly by increasing the perceived legitimacy of their claims (see also Sen, 1990). A valid measure for bargaining power should not only reflect a woman's relative bargaining position, but also be exogenous to outcomes under investigation. A wide range of measures can be used to proxy for women's bargaining power, from income and employment, ownership of land, housing and other fixed assets (of current household and from dowry) to education. For example, Quisumbing and Maluccio (2003); Brown (2009) focus on assets controlled by individuals at the time of household formation in their studies on household consumption. Since the researches on intra-household allocation suggest that female empowerment has a positive impact on children's outcomes, some children's physical outcome are also used as the indicators for bargaining power, for example, height and weight at the micro level, and school enrolment rate (low-income countries) and life expectancy at the macro level (see Duflo, 2012). Additionally, some scholars use whether the

woman has given birth to a son (Li and Wu, 2011), the time on household chores and personal consumption on tea, cigarette and alcohol (Wang, 2014), and the wife's autonomy to travel and make independent decisions (Qian, 2008) as the indicators to identify bargaining power.

Personal income is one of the most widely used measures for bargaining power (Rosenzweig and Schultz, 1982; Haddad and Hoddinott, 1994; Chau et al., 2007). However, using income as a measure for bargaining power and estimating its impact could be problematic in empirical analysis. Firstly, wage income is associated with the decision of entering the labour market so that it is likely to be endogenous to household outcomes. Non-wage income or assets controlled by women are also affected by investment assets in the previous period. Moreover, income and assets could also directly affect household investment patterns. It is hard to differentiate the bargaining effect from the income effect (Behrman, 1997). Secondly, for empirical analysis in many developing countries such as China, limited data on female income lead to a considerable loss of information. In this sample, over 24% of observed households would be thus lost if personal income is used as the indicator. Therefore, I use educational attainment to calculate bargaining power for the sampled households, especially those rural households living in cities but mainly engaging in agricultural production.

Dependent Variable

The dependent variable is the market value of investment in the j asset as a share of total household investment. This research uses the following categories for the assets of urban households: Financial assets include investments in stocks, funds, bonds, and financial derivatives. Real estate assets refer to investments in additional dwellings (so called 'second homes') rather than a main residence. Business assets are individually operated businesses, family-owned businesses and held shares of private businesses.

Unlike most research that used financial assets at different risk levels to analyse household investment portfolios, this research did not use such a method to classify investment assets owned by Chinese urban households. In the 2010–2014 period, 11.1% of urban households in China owned financial assets such as stock, funds, and bonds; 18% owned investment real estate other than a primary residence; and 10.9% owned private business assets (CFPS, 2010–2014). Wolff (1998, p.138) points out that there are marked differences in household portfolios by level of wealth.

Stocks are treated as risky investments as well as funds and financial derivatives that are associated with high levels of risk via indirect links to the stock market. Although some works place bonds in the risky investment category with high risk and return levels, long-term corporate bonds, with a much lower inflation-adjusted return than company stocks and government bonds, are widely regarded as risk free. In a study of the Chinese bond market, only government bonds have discount rate risks and highly predictable returns (Fan, Jiang, and Zhou, 2014, pp.122; 124). Compared to the U.S. bond market, bond trading is not as active and dropped considerably from mid-2013 to the end of 2014 (Fan, Jiang, and Zhou, 2014, p.114). Individual investors usually buy government savings bonds through banks, and only in the rare case do they sell these bonds before maturity (the time when a financial agreement such as a bond or an insurance policy is ready to be paid). *The Economist* (S.R. & C.C.W, 2015) described China's stock market as crowded with 'small-time punters.' Nine-tenths of daily turnovers are made by retail investors in China while more developed markets are usually dominated by institutions. Additionally, more than 80% of Chinese stock market investor accounts held less than 100,000RMB.

A primary home refers to the current dwelling (either owned or rented) that households live in most of the time. A second home is defined as an additional residence owned by households that currently do not live there, whether it is for holiday accommodation, investment, or other purposes. This definition relates to the following question in the

2012 CFPS questionnaire: ‘Does your family own any other house than the one where you currently live?’ Due to design limitations, the panel data does not provide information on the true functions of second-home dwellings. Thus, it cannot be determined from the survey interview whether these dwellings are used for holiday occupancy of family members, investments (with continuously rising housing prices), or to rent out for extra income.³ Therefore, in this research, second homes simply refer to owned dwellings not occupied by households as the main residence, regardless of whether it is for holiday accommodations or other investment purposes. If a household owns additional residential properties, I regard that household as an investor in real estate and extract the market value of those dwellings to calculate the share of investment in real estate of total household investment.

5.6 Results

5.6.1 Summary Statistics

Table 5.3 illustrates how the pattern of investment holdings changed during the period covered by the panel. There are seven types of investment combinations for the households that hold investments. Nearly one-third of the sampled households invested at least in one category. Instead of adopting a diversified approach to reduce the investment risk and to achieve a more consistent return, the majority of the urban households concentrated their wealth in one type of investment. In the sample holding at least one investment asset, half of the households preferred to invest in either the financial market or businesses rather than to purchase a residential property.

Table 5.4 displays how asset holdings grew considerably as the survey proceeded. The

³Only 13.67% of urban households with second homes chose to rent out the additional dwellings for rental income in 2012 (CFPS).

Table 5.3: Combination of Investment Assets over the three waves

Investment Combination	Interview Year											
	2010			2012			2014			Total		
	No.	Col%	Row%	No.	Col%	Row%	No.	Col%	Row%	No.	Col%	Row%
None of Three	4951	67.3	36.3	4215	66.8	30.9	4481	67.1	32.8	13647	67.1	100.0
Only Financial Products	587	8.0	41.5	457	7.2	32.3	372	5.6	26.3	1416	7.0	100.0
Only 2nd Home	913	12.4	37.4	686	10.9	28.1	843	12.6	34.5	2442	12.0	100.0
Only Business	450	6.1	30.2	510	8.1	34.2	532	8.0	35.7	1492	7.3	100.0
Financial Products + 2nd Home	202	2.7	32.8	212	3.4	34.4	202	3.0	32.8	616	3.0	100.0
Financial Products + Business	42	0.6	32.1	48	0.8	36.6	41	0.6	31.3	131	0.6	100.0
2nd Home + Business	178	2.4	35.6	142	2.3	28.4	180	2.7	36.0	500	2.5	100.0
All of Three	30	0.4	31.9	38	0.6	40.4	26	0.4	27.7	94	0.5	100.0
Total	7353	100.0	36.2	6308	100.0	31.0	6677	100.0	32.8	20338	100.0	100.0
Sample size	7,353			6,308			6,677			20,338		

Sources: *Calculated from the 2010–2014 CFPS.*

Table 5.4: Change in Shares of Investment Holdings

Year	N	Mean	SD	Percentile					Skewness
				p25	p50	p75	p90	p95	
2010									
% as Financial Products	1935	29.76	44.60	0.0	0.0	100.0	100.0	100.0	0.91
% as Real Estate	1935	61.08	47.23	0.0	100.0	100.0	100.0	100.0	-0.48
% as Business	1935	10.19	29.09	0.0	0.0	0.0	50.0	100.0	2.64
2012									
% as Financial Products	2075	24.39	41.47	0.0	0.0	25.1	100.0	100.0	1.23
% as Real Estate	2075	47.21	47.79	0.0	28.6	100.0	100.0	100.0	0.08
% as Business	2075	28.66	43.41	0.0	0.0	95.0	100.0	100.0	0.96
2014									
% as Financial Products	2155	18.68	37.46	0.0	0.0	4.8	100.0	100.0	1.65
% as Real Estate	2155	54.72	47.67	0.0	87.5	100.0	100.0	100.0	-0.23
% as Business	2155	26.89	42.59	0.0	0.0	66.7	100.0	100.0	1.06

Sources: Calculated from the 2010-2014 CFPS.

sampled households distributed their wealth unevenly among the three types of assets. Of these asset types, investments in financial products stand out with the lowest average value steadily increasing from 65,700 RMB in 2010 to 126,100 RMB in 2014 and have the smallest standard deviation. The average value of real estate investments was 449,400 RMB in 2010, gradually increasing to 697,000 RMB in 2014. For business assets, the market value mean decreased substantially from 432,200 RMB in 2010 to 167,700 RMB in 2014, which makes a remarkable contrast with the investment holdings of investments in financial products. Inequalities in household wealth are shown by including a series of percentiles for each investment holding. While such figures do not represent the overall level of inequality in the sample, they provide measures of the shape of asset distributions. The sample contains the only households that hold specific investment assets; hence, this sample accounts for one-third of the urban sample. In the period 2010–2012, the ratio of market values between median and the 75th, 90th, and 95th percentile did change slightly for the households that invested in real estate and financial products, while the ratio between the 75th, 90th, and 95th percentile increased in terms of both investment in real estate and businesses. There is also a big gap between the average values of businesses in 2010 and 2012 as well as the 90th and 95th percentiles in 2010, which is possibly due to the missing value in the first wave of the panel study (527 households whose details were not collected). As a result, the value distributions of real estate assets are skewed to the right with a very long tail in 2010 and 2012.

Using the Tobit model that relies crucially on normality and having calculated the ratios of actual value between the percentiles, I find their skewness to indeed be a serious issue when examining how the gender of children affects household investment decisions. In order to make the dependent variables more suitable for model application, I adopt two solutions and transformed the dependent variable into lognormal form. Prior research shows that expenditure data have often been modelled as lognormal (Deaton, 1997; Chern, Ishibashi, and Taniguchi, 2003).

Table 5.5: Tobit Regression Estimates for Investment Assets for Urban Households

	Actual Market Value of								
	(1) Financial Product			(2) Real Estate			(3) Business		
	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b
HRP Characteristic									
Log of Age	3.784**	0.436**	0.275**	24.212**	2.967**	3.775**	-7.484***	-1.055***	-0.562***
Year of Schooling	1.000***	0.115***	0.073***	2.535***	0.311***	0.395***	0.352*	0.050*	0.026*
Employed(d)	-0.238	-0.027	-0.017	10.085**	1.242**	1.614**	-3.440**	-0.480**	-0.248**
Self-employed(d)	-1.602	-0.182	-0.106	19.407***	2.427***	3.396***	24.509***	4.135***	3.845***
<i>Hukou-Migration Status</i>									
Urban Local	-0.321	-0.037	-0.023	-25.759***	-3.173***	-4.150***	-0.11	-0.015	-0.008
Urban Migrant	ref.	.	.	ref.	.	.	ref.	.	.
Rural Local	-7.658***	-0.857***	-0.487***	-37.782***	-4.559***	-5.440***	2.762	0.392	0.214
Rural Migrant	-4.161*	-0.457*	-0.232*	-12.27	-1.482	-1.763	7.957*	1.197*	0.782*
Household Characteristic									
No. of Household Member	0.392(*)	0.045(*)	0.028(*)	13.129***	1.609***	2.047***	2.177***	0.307***	0.163***
Women's Bargaining Power ^c	0.241*	0.028*	0.018*	1.336*	0.164*	0.208*	-0.397*	-0.056*	-0.030*
Unmarried Adult Children(d)	2.601***	0.304***	0.205***	-2.871	-0.351	-0.444	1.399	0.198	0.107
Demographic Composition (0-100)									
Male aged 0-6	0.063	0.007	0.005	-0.802**	-0.098**	-0.125**	0.061	0.009	0.005
Male aged 7-12	0.024	0.003	0.002	-0.479*	-0.059*	-0.075*	0.187**	0.026**	0.014**

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	(1) Financial Product			(2) Real Estate			(3) Business		
	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b
Male aged 13-15	0.054	0.006	0.004	-0.608*	-0.075*	-0.095*	0.187*	0.026*	0.014*
Male aged 16-18	0.074 ^(*)	0.009 ^(*)	0.005 ^(*)	-0.34	-0.042	-0.053	0.252***	0.036***	0.019***
Male aged 19-22	0.028	0.003	0.002	-0.201	-0.025	-0.031	0.109 ^(*)	0.015 ^(*)	0.008 ^(*)
Male aged 23-35	ref.	.	.	ref.	.	.	ref.	.	.
Male aged 36-65	0.041 ^(*)	0.005 ^(*)	0.003 ^(*)	-0.179	-0.022	-0.028	-0.003	0	0
Male aged 66+	0.048 ^(*)	0.006 ^(*)	0.004 ^(*)	-0.449**	-0.055**	-0.070**	-0.139*	-0.020*	-0.010*
Female aged 0-6	0.080 ^(*)	0.009 ^(*)	0.006 ^(*)	-1.255***	-0.154***	-0.196***	-0.058	-0.008	-0.004
Female aged 7-12	0.046	0.005	0.003	-0.933***	-0.114***	-0.146***	0.087	0.012	0.007
Female aged 13-15	0.06	0.007	0.004	-0.775**	-0.095**	-0.121**	0.046	0.006	0.003
Female aged 16-18	0.035	0.004	0.003	-0.639*	-0.078*	-0.100*	0.078	0.011	0.006
Female aged 19-22	0.013	0.001	0.001	-0.862***	-0.106***	-0.134***	0.015	0.002	0.001
Female aged 23-35	0.055 ^(*)	0.006 ^(*)	0.004 ^(*)	-0.478*	-0.059*	-0.075*	0.074	0.01	0.006
Female aged 36-65	0.059*	0.007*	0.004*	-0.490**	-0.060**	-0.076**	-0.027	-0.004	-0.002
Female aged 66+	0.005	0.001	0	-0.853***	-0.105***	-0.133***	-0.119 ^(*)	-0.017 ^(*)	-0.009 ^(*)
<i>Dwelling</i>									
Owned	0.476	0.055	0.034	-25.303***	-3.167***	-4.458***	1.138	0.159	0.083
Occupied	ref.	.	.	ref.	.	.	ref.	.	.
Rented	-1.538	-0.174	-0.102	-18.264**	-2.194**	-2.543**	4.208 ^(*)	0.612 ^(*)	0.361 ^(*)
Household Finance									
Ln(Lagged Income pc)	3.428***	0.395***	0.249***	15.793***	1.936***	2.463***	-0.068	-0.01	-0.005
Household Investment									

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	(1) Financial Product			(2) Real Estate			(3) Business		
	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b
Real Estate	0.021***	0.002***	0.002***				0.032***	0.004***	0.002***
Business	0.013(*)	0.002(*)	0.001(*)	0.163***	0.020***	0.025***			
Financial products				1.384***	0.170***	0.216***	0.116**	0.016**	0.009**
Constant	-79.275***			-321.379***			-19.893(*)		
σ_u	10.980***			71.245***			18.183***		
σ_e	7.565***			69.621***			17.972***		
ρ	0.678			0.512			0.506		
Likelihood-ratio test	730			763			487		
Log-likelihood	-5523.17			-11478.39			-5993.63		
Wald chi2	538.37			449.32			545.77		
Left Censored	8110			7534			8196		
Right Censored	144			217			91		
Uncensored	984			1487			951		
Total Observations	9238			9238			9238		

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^a Marginal effects for the expected value of y conditional on being $E(y|x, 0 < y < L_j)$.

^b Marginal effects for the unconditional expected value of the dependent variable, $E(y^*)$, where $y^* = \max(0, \min(y, \text{top}))$

^c Wife's years of education over years of education of husband and wife combined.

Source: the Sample of Urban Household from the 2010–2014 CFPS. The sample include the households that resided in urban area during the survey.

Note: (d)-dummy variable; ref-reference category. Use Household as measurement unit.

5.6.2 Empirical Analysis of Investment Holdings

In this section I use the two-limit Tobit models to identify the empirical determinants of household investment holdings. Since the objective of this chapter is to investigate the effect of intra-household bargaining on household investments, the analysis starts with a sample of urban households. I then confine the sample to households with children, with a focus on the impact of children on parental decisions to invest. **Table 5.5** presents the results from the Tobit models using the sample of all 9,238 urban households. The dependent variables are the market values of investment holdings placed in financial products, real estate, and private businesses, on account of both left-censoring (The percentage of zero observations being 88%, 81%, and 89%, respectively) and right-censoring. Here, I use 10,000 RMB as the unit of measurement. Right-censoring is the top 10% of households holding the extremely high investment values of 200,000 RMB for financial assets, 1400,000 RMB for second homes, and 500,000 RMB for privately held businesses. The 1st, 4th, and 7th columns show the coefficients for three types of investment holdings. The marginal effects of regressors on observed value of investment assets are also reported as conditional expected values in the Mfx_a columns (based on *Equation 5.10*) and unconditional values in the Mfx_b columns (based on *Equation 5.11*). The explanatory variables include HRP characteristics, household characteristics, and household finance. **Table 5.5** also reports ρ as the indicator of the percent contribution to the total variance of the panel-level variance component. If ρ equals zero, the panel estimator does not differ from the pooled estimator. A likelihood-ratio test that compares the panel estimator with the pooled estimator at a 99% confidence level suggests that a Tobit approach, rather than a pooled regression, is more appropriate for the model to estimate characterisation of household investment holdings.

As the householders mature and become more educated, the values of both financial products and real estate assets rise, while the value of privately held businesses falls.

Specifically, the effect of either age or education on the value of real estate assets is much greater than on the value of financial products. For example, one year more of education is associated with an increase of 1,150 RMB in financial assets, 3,110 RMB in residential properties, and the relatively small amount of 500 RMB in privately held businesses. In terms of employment, self-employment leads to a considerable rise in the assets that urban households own as second homes and businesses. The strongly positive relationship between real estate assets and self-employment is consistent with the study in entrepreneurship by Liu and Huang (2016). They point out that entrepreneurs in a venture start-up process often turn to personal capital such as family assets to ease credit constraints. By contrast, having a householder who works for an employer leads to the significant increase of 12,420 RMB in real estate investments but reduces the value of investments in family-held businesses by 4,800 RMB.

Neither of the employment statuses show statistically significant impacts on household wealth in financial markets. However, having an employed householder leads to a loss in household investments in financial products. There is some literature that discusses the risk properties of labour income. Many scholars find that labour income is similar to an implicit holding of safe assets and thus stimulates investment in risky financial assets (Cocco, Gomes, and Maenhout, 2005). Benzoni, Collin-Dufresne, and Goldstein (2007) argue that labour income and capital income vary together in the long term while Storesletten, Telmer, and Yaron (2004) state that the volatility of wage income is correlated negatively with stock returns. As a result, labour income from outside employment crowds out household investments in the stock market. Such an impact of labour income on household stockholding behaviour provides a reasonable explanation for the loss in financial assets held by the households whose heads are employed outside the household.

Turning to the institutional factor, hukou status, we examine its effect on investment holdings by mixing hukou status with the variable on whether or not the HRP is a

migrant. Compared to the default of having a migrant householder with urban hukou status, the single most statistically significant factor is the dummy variable for being rural locals. This greatly decreases the conditional expected value of second homes by 45,590 RMB and financial products by 8,570 RMB. An interesting finding is that, in this case, urban hukou status is no longer an advantage, and acquiring an identification as an urban resident is associated with a loss of 31,730 RMB in the value of residential assets. This finding shows the clear impact of mobility on real estate investments. Although rural hukou status has been regarded as a negative factor on the urban life of rural migrants, this group also causes a dramatic growth in business assets.

Considering household characteristics, household size and dependent adult children play an important role in some types of investment holdings but affect them differently. For instance, one member joining a household leads to an increased value of 16,090 RMB in real estate assets and 3,070 RMB in private businesses. Additionally, the values of investment holdings devoted to both financial assets and businesses grow larger for households with children who enter adulthood but stay single. There is clear evidence that increasing women's bargaining power alters household investment holdings. Specifically, when female householders or female spouses receive more education, a one-unit increase is associated with added values of 280 RMB to financial products and 1,640 RMB to real estate assets. This finding is consistent with Lawson and Gilman (2009), who found that simple financial products are likely to be attractive to women who want investment assets held outside households under their direct control.

Focusing upon a set of dummy variables that describe the structure of the household, the referring category is males aged 23–35 years. For example, the value of real estate monotonically decreases as the proportion of age groups increases compared to households with more male members aged 23–35 years. Interestingly, a change in household composition has an opposite effect on the value of financial products and

privately held business assets. On the one hand, the existence of either more girls under 6 years old or male teenagers aged 16–18 years contributes to a slight increase in the value of financial products held by their households. Preschool girls make the greatest contribution. On the other hand, it is apparent that household assets placed in private businesses increase as the proportion of young male members increases, especially high school boys aged 16–18 years, and decrease as male members retire.

Turning to the tenure of main residences, and omitting the occupation without payment of rent category, householders who own their dwellings invest less value in real estate by 31,670 RMB; those who rent their dwellings invest less in real estate by 21,940 RMB. Nevertheless, living in a rented home results in an increase of 61,120 RMB in business asset investments.

Next step is to examine how household finance-related factors influence the value of investment holdings. First, current household income plays a strong role in all three investment holding categories. In order to solve the endogenous problem, we apply lagged income in the models. The result shows that lagged household income per capita is strong for both investment holdings as financial products and as real estate, and is even much stronger for the latter. For instance, a 1% increase in household income two years ago results in an added value in financial assets of 39.5 RMB and in real estate of 194 RMB.⁴ Furthermore, the finding that examines diversification in household investment behaviour indicates that as either of the other investment assets increase, the value of all investment holdings will increase. Among the investment holding categories, the influence of added value from financial investments is greater than from the others. For instance, a 10,000 RMB increase in financial assets is associated with a rise of 1,700 RMB in real estate assets and a rise of 160 RMB in business assets. **Table 5.6** reports the results of the subsample exclusive to urban households

⁴The level-log regression is the model with a normal dependent variable and some log transformed variables. Since a change in the log of .1 is about a 10 per cent increase in actual value, the interpretation of coefficient for a log variable will be “given one percent increase in x, we expect y to increase by ($\beta/100$) units of y” (Wooldridge, 2013).

Table 5.6: Tobit Regression Estimates for Investment Assets for Urban Households with Children

	Actual Market Value of								
	(1) Financial Product			(2) Real Estate			(3) Business		
	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b
HRP Characteristic									
Log of Age	3.449**	0.397**	0.249**	21.678**	2.710**	3.433**	-7.884***	-1.120***	-0.605***
Year of Schooling	1.004***	0.116***	0.073***	2.411***	0.301***	0.382***	0.340*	0.048*	0.026*
Employed(d)	-0.155	-0.018	-0.011	9.461**	1.188**	1.536**	-3.274**	-0.460**	-0.241**
Self-employed(d)	-1.563	-0.177	-0.103	19.951***	2.548***	3.560***	24.139***	4.097***	3.820***
<i>Hukou-Migration Status</i>									
Urban Local	-0.844	-0.097	-0.062	-25.998***	-3.266***	-4.252***	0.917	0.13	0.07
Urban Migrant	ref.	.	.	ref.	.	.	ref.	.	.
Rural Local	-7.981***	-0.892***	-0.505***	-38.357***	-4.719***	-5.612***	3.628	0.52	0.291
Rural Migrant	-4.479*	-0.490*	-0.243*	-13.734	-1.688	-1.982	8.924**	1.364**	0.926**
Household Characteristic									
No. of Household Member	0.418(*)	0.048(*)	0.030(*)	12.386***	1.548***	1.962***	2.190***	0.311***	0.168***
Women's Bargaining Power ^c	0.238(*)	0.027(*)	0.017(*)	1.065	0.133	0.169	-0.369(*)	-0.052(*)	-0.028(*)
Unmarried Adult Children(d)	2.671***	0.312***	0.209***	-5.024	-0.626	-0.784	1.262	0.18	0.099
Demographic Composition									
(0-100)									
Male aged 0-6	0.065	0.007	0.005	-0.925***	-0.116***	-0.146***	0.088	0.013	0.007
Male aged 7-12	0.029	0.003	0.002	-0.584*	-0.073*	-0.092*	0.205**	0.029**	0.016**

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	(1) Financial Product			(2) Real Estate			(3) Business		
	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b
Male aged 13-15	0.06	0.007	0.004	-0.710**	-0.089**	-0.112**	0.205**	0.029**	0.016**
Male aged 16-18	0.079(*)	0.009(*)	0.006(*)	-0.423(*)	-0.053(*)	-0.067(*)	0.273***	0.039***	0.021***
Male aged 19-22	0.033	0.004	0.002	-0.22	-0.027	-0.035	0.145*	0.021*	0.011*
Male aged 23-35	ref.	.	.	ref.	.	.	ref.	.	.
Male aged 36-65	0.04	0.005	0.003	-0.19	-0.024	-0.03	0.031	0.004	0.002
Male aged 66+	0.048	0.006	0.003	-0.549**	-0.069**	-0.087**	-0.098	-0.014	-0.008
Female aged 0-6	0.079(*)	0.009(*)	0.006(*)	-1.340***	-0.167***	-0.212***	-0.032	-0.005	-0.002
Female aged 7-12	0.051	0.006	0.004	-1.027***	-0.128***	-0.163***	0.105	0.015	0.008
Female aged 13-15	0.065	0.007	0.005	-0.872**	-0.109**	-0.138**	0.064	0.009	0.005
Female aged 16-18	0.041	0.005	0.003	-0.738**	-0.092**	-0.117**	0.096	0.014	0.007
Female aged 19-22	0.015	0.002	0.001	-0.859***	-0.107***	-0.136***	0.038	0.005	0.003
Female aged 23-35	0.066*	0.008*	0.005*	-0.596**	-0.075**	-0.094**	0.113(*)	0.016(*)	0.009(*)
Female aged 36-65	0.070*	0.008*	0.005*	-0.622***	-0.078***	-0.099***	-0.003	0	0
Female aged 66+	0.019	0.002	0.001	-0.931***	-0.116***	-0.147***	-0.096	-0.014	-0.007
<i>Dwelling</i>									
Owned	0.528	0.061	0.037	-27.035***	-3.461***	-4.899***	0.719	0.102	0.054
Occupied	ref.	.	.	ref.	.	.	ref.	.	.
Rented	-1.582	-0.179	-0.104	-18.145*	-2.221*	-2.561*	3.514	0.513	0.302
Household Annual Income									
Ln(Lagged Income pc)	3.399***	0.391***	0.245***	15.110***	1.889***	2.393***	-0.02	-0.003	-0.002
Household Investment									

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	(1) Financial Product			(2) Real Estate			(3) Business		
	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b	Coef.	Mfx ^a	Mfx ^b
Real Estate	0.023***	0.003***	0.002***				0.034***	0.005***	0.003***
Business	0.012(*)	0.001(*)	0.001(*)	0.160***	0.020***	0.025***			
Financial products				1.416***	0.177***	0.224***	0.117**	0.017**	0.009**
Constant	-78.050***			-287.936***			-21.632*		
σ_u	10.968***			70.524***			18.209***		
σ_e	7.565***			68.478***			17.771***		
ρ	0.678			0.515			0.512		
Likelihood-ratio test	694			745			487		
Log-likelihood	-5236.36			-11098.22			-5814.24		
Wald chi2	517.75			431.61			525.52		
Left Censored	7784			7204			7840		
Right Censored	138			205			88		
Uncensored	931			1444			925		
Total Observations	8853			8853			8853		

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

^a Marginal effects for the expected value of y conditional on being $E(y|x, 0 < y < L_j)$.

^b Marginal effects for the unconditional expected value of the dependent variable, $E(y^*)$, where $y^* = \max(0, \min(y, \text{top}))$

^c Wife's years of education over years of education of husband and wife combined.

Source: the Sample of Urban Household from the 2010–2014 CFPS. The sample include the households that resided in urban area during the survey.

Note: (d)-dummy variable; ref-reference category. Use Household as measurement unit.

with children. The effect of increasing the relative bargaining power of women disappears when considering the value of real estate assets; however, women's bargaining power shows a positive impact on household investments in financial assets and a negative influence over investments in business assets. The contribution from unmarried adult children is larger, and the opposite is that change in demographic composition shows a strengthened effect on the value of investment assets, especially in households with a higher proportion of children or younger members. Although we find a consistent pattern where the value of real estate monotonically decreases as the age-group proportion increases, compared to households with more male members aged 23–35 years, the values added to financial products and business assets cannot be neglected in the households with a higher ratio of preschool girls and teenage boys.

5.6.3 Empirical Determinants of Allocation

Table 5.7 presents the results of the fixed-effect models, using the sample of all 3,002 urban households that invested in at least one category during the three surveys. The dependent variable is the share in the household's total investment assets held in each category. The coefficients from the fixed-effect model are shown in the first three columns in the order of financial products, real estate, and businesses. A Durbin-WuHausman test at the significant 99% confidence level suggests that a fixed-effect approach is more appropriate than a random-effect model for estimating the relationship between investment holdings and household composition. Starting with the HRP's characteristics, getting older positively impacts household holdings in real estate assets but shows the opposite effect on investments in business assets. That is to say, regarding total household investments, a nearly 1% increase in age leads to a 0.18% increase in real estate investments and a 0.13% loss in business asset investments. An additional one year of schooling is associated with a 1.1% loss in financial asset investments and a 1.2% increase in real estate investments. The variables of

Table 5.7: The Estimated Results from the Fixed-Effect Models for Urban Household

	Share of Investment in		
	FP ¹	RE ²	Bus. ³
HRP Characteristic			
Log of Age	-4.525	17.81**	-13.28*
Year of Schooling	-1.114*	1.180*	-0.0667
Employed(d)	0.642	-1.316	0.674
Self-employed(d)	1.149	-3.228	2.079
<i>Hukou-Migration Status</i>			
Urban Local	1.831	-5.31	3.479
Urban Migrant	ref.	ref.	ref.
Rural Local	4.803	-4.365	-0.438
Rural Migrant	5.27	4.415	-9.685
Age-Gender Composition of Household			
Male aged 0-6	-0.258	0.740**	-0.482*
Male aged 7-12	-0.371	0.438	-0.0679
Male aged 13-15	-0.430(*)	0.064	0.366(*)
Male aged 16-18	-0.293	0.0278	0.266
Male aged 19-22	-0.00592	-0.00867	0.0146
Male aged 23-35	0.0461	-0.0803	0.0343
Male aged 36-65	ref.	ref.	ref.
Male aged 66+	0.273*	-0.250(*)	-0.0233
Female aged 0-6	0.414(*)	-0.283	-0.132
Female aged 7-12	0.4	-0.313	-0.0873
Female aged 13-15	0.554*	-0.371	-0.184
Female aged 16-18	0.203	-0.0384	-0.165
Female aged 19-22	0.103	0.145	-0.248
Female aged 23-35	0.283(*)	0.0249	-0.307*
Female aged 36-65	0.334*	-0.0188	-0.316*
Female aged 66+	0.264	-0.0966	-0.167
Household Characteristic			
Log of Household Size	-14.19**	16.87**	-2.678
Women's Bargaining Power	0.930(*)	-0.844	-0.0857
Household Finance			
Log of Lagged Household Income per Capita	-1.192	0.89	0.302
Log of Total Investment per Capita	-11.80***	15.31***	-3.513***
<i>Dwelling Type</i>			
Owned	-0.35	-5.127	5.477(*)
Occupied	ref.	ref.	ref.

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Table 5.7: – continued from previous page

	Share of Investment in		
	FP	RE	Bus.
Rented	-0.881	9.454	-8.574 ^(*)
Constant	184.0***	-206.3***	122.3***
Observations	3002	3002	3002
R^2 Within	0.376	0.42	0.112
R^2 Between	0.075	0.226	0.038
R^2 Overall	0.088	0.253	0.051

^(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: the Sample of Urban Household from the 2010–2014 CFPS.

FP: Share of Investment in financial products in total household investment.

RE: Share of Investment in real estate (second homes) in total household investment.

Bus.: Share of Investment in business in total household investment.

Note: (d)-dummy variable; ref.-reference category. Use Household as measurement unit.

employment and residential type are statistically insignificant for all three investment assets, which is not unexpected due to the limited period covered by the panel. Those individual features are not inclined to change.

Turning to household characteristics, one interesting feature is the fact that an increased relative bargaining power of women significantly influences the household share of investment holdings. The results indicate that an increase in women's bargaining power results in a larger proportion of household wealth being invested in financial markets but less in real estate and business assets investments, though statistically insignificant. Focusing on the effect of household composition, it is evident that more household members considerably alter household investment holdings. To meet new demand for increased space and stability, I made an adjustment by reducing the share of risky assets in financial markets and purchasing residential properties.

Furthermore, the study results confirm **Hypothesis 2** that daughters can significantly increase the share of household investments in financial products. This finding is consistent with (Bogan, 2013). It also reveals that more females who enter middle age can

increase household investments in financial products. Using the male group aged 23–35 years as the reference, the share of financial products gets smaller for households with more male offspring who are receiving an education. Conversely, households with more male offspring allocate a larger share of investment in real estate assets. Moreover, younger sons affect household investment holdings more than older sons do. Finally, both a larger proportion of very young male children and relatively older female members result in less household investments in business assets. However, households with more boys in middle school will allocate more wealth to business investments.

This finding indicates that income has no effect on household investment holdings. Apparently, urban households would not change the way they allocate their wealth in response to changes in household income. However, the dynamic effect of total asset investments is significantly important. As Working (1943) interprets, it is clear that real estate investments are crucial to urban households while the other investment categories, especially that of financial assets, are not favoured. Finally, ownership of a main residence is associated with around five and one-half percentage points added to household holdings in business assets, which is consistent with Liu and Huang (2016), who argue that entrepreneurs in the start-up process use informal funds such as family assets to ease financing shortages.

5.7 Conclusion

This chapter used household-level panel data collected every other year from 2010 to 2014 to investigate how urban households in China distribute their wealth among three investment categories: financial products, real estate (except main residences), and privately held businesses. The results can be summarised in three main findings. First, changes in demographic composition considerably alter household investment

holdings. The existence of a higher proportion of female children is strongly associated with an increase in household investments in financial assets. Specifically, the greatest impact on household investments in financial assets has been made by girls born in these households. This finding is not only consistent with the conclusion made by Bogan (2013) on the positive influence of female offspring on household stockholdings but also provides further evidence of the strong impact female children can have on the broad investment category of financial assets.

Additionally, male offspring make a significant contribution to an increasing fraction of household investments in real estate assets. As Li and Wu (2015) point out, urban parents of a son are more likely to access ownership of a second home earlier than their counterparts with a daughter. By contrast, the presence of a higher ratio of girls does not show a statistically significant influence over the share of residential properties in household investment holdings. This finding reflects that gender-preference exists in household investment holdings but varies in broad investment categories.

Second, intra-household bargaining power matters in household investment holdings, and the increasing relative bargaining power of women leads to a higher share of financial products in total household investment assets. The finding shows that the additional bargaining power gained by female householders or spouses adds more value to household investments in real estate assets but does not result in a change in the share of real estate assets in household investment allocations.

Third, mobility has a positive effect on accumulating investment assets but does not alter the composition of household investments. Hukou status has made migrants from rural area and other cities more likely to have extra dwellings, adding value to real estate assets. However, this hukou status advantage no longer exists when considering household investment holdings.

A number of questions still remain unanswered. First, is there a way to measure the reduction in parental consumption so they can increase investment in real estate or financial assets for the next generation by using panel data that is available in long time series? Second, how do we find a way to separate the consumption needs of parents from their need to invest for their offspring? These problems are left for future research.

Chapter 6

Conclusion

6.1 Summary

The composition of household wealth is unique in China, and housing assets stand out from the other components. According to the data from 2012 CFPS, housing assets account for nearly four-fifths of household wealth in urban areas, and slightly over two-thirds in rural areas. Despite the urban-rural gap, the existence of homeownership greatly complicates Chinese households' behaviour when making investment decision. The literature on household finance was pioneered by Campbell's work in 2006. The studies have increasingly sought to enhance our understanding of household investment, due to the prevalent sources of micro-level data available. The three studies in this thesis, which start with household decisions on housing and focus on investment choices, aim to add theoretical and empirical evidence on China to this field.

Chapter 3 examines regional disparity in homeownership and housing quality. Privatising the housing system leaves China a high level of homeownership that far exceeds most of the world, and adds substantial value to housing owned by urban households.

However, such housing outcomes vary considerably from the Eastern region to the Central and Northeastern regions that are relatively less developed. This study looks beyond the differences in socio-economic, and demographic characteristics to address the differences in employment and residential migration patterns, in order to identify regional trends in urban housing. The addition of these variables helps us to formulate a clearer picture of the sources of discrepancies in homeownership and housing value across the regions.

First, the results show that demographic characteristics shape regional outcomes regarding homeownership and housing value, but their effects differ across the regions. Older householders are more likely to own their high-value homes in the Central and Eastern regions. With a rather younger population, the Central region shows a higher rate of homeownership, but still lags behind the Eastern and Northeastern regions in terms of housing value. Meanwhile, urban households in the Eastern region have better outcomes in homeownership, because of a relatively larger number of children. In Northeastern China, even though the positive effect of a larger family is more obvious, the challenges of a low fertility rate, an ageing population, and an outflow of labour force, may continue depressing the housing market, and lead to worse housing outcomes for the Northeastern households.

Second, when we take employment status into account, the results show that housing outcomes are strongly associated with regional economic development. As China deepens the economic reform and further loosens its grasp over the market, the private sector has overtaken the state sector gradually. The self-employed enjoys higher housing values in the Eastern region, but still lags behind by the employed in the Northeastern region, which is dominated by the oversized and inefficient SoEs. The different patterns of regional development produce a substantial gap in homeownership and housing value across the regions in China.

Third, the findings also indicate that being a rural local has a positive effect on obtaining homeownership in the Eastern region, but holding rural hukou has a negative effect on both housing outcomes in the Central region whether being a migrant or not. The study shows the key role of demographic characteristics and the pattern of regional development on homeownership and housing values for urban households. Considering the regional issues, such as, population ageing, and large labour outflow, Northeastern households appear to be more vulnerable. In the Central region, hukou-based institutional exclusion makes it difficult for migrants to access homeownership in urban areas. The implication suggests that policies mitigating hukou discrimination can improve housing outcomes.

Chapter 4 characterises household choice of investment assets that falls into three broad categories: financial assets, real estate, and privately held business. This chapter employs household-level data from the CFPS survey undertaken between 2010 and 2014 to explore the determinants of being an investor and choosing among three investment categories. The contribution of this study could be summarised at least two points. First, the combined effect of rural hukou and migration is correlated to a higher possibility of making the decision to invest at least one investment category. Such a positive effect may be due to the fact that the majority of rural migrants have left homes behind and are inclined towards self-employment for hukou conversion to non-agricultural status (Cao et al., 2015).

Second, in addition to the nesting structure for the decision-choice model, we also employ a standard logistic model for a subsample of parental households to examine how parenthood alters household investment decisions empirically. The findings suggest a statistically significant, but minimal impact from adult consumption on parental investment decisions. Thus, we conclude that parents do not reduce their consumption in exchange for investment assets that may benefit their children. However, the results from the subsample reveal that the impact of demographic composition on in-

vestment choice significantly differ among three investment categories. Households with younger children show a tendency to hold financial assets over housing and businesses, but do not indicate gender preference for offspring. The findings on second-home ownership portray a simple picture. Over time, ageing households consistently reduce the probability of owning extra dwellings (other than main residence). More importantly, the results provide evidence of the relationship between son-preference and household investment in private business.

Chapter 5 looks at the relationship between intra-household bargaining and household investment holdings. This study uses the panel data from the 2010–2014 CFPS survey to further examine investment decisions made by urban households. The Tobit model with two-limit is used to estimate the value of assets for each investment category in two stages of decision-making: the probability of choosing such category to invest in, and the value of assets in this category. The fixed-effect model is also used to measure how household investment holdings respond to changes in age-gender composition and the relative bargaining power of women. The findings suggest that a higher proportion of daughters is strongly associated with an increase in the share of financial assets. On the other hand, an addition of male offspring to the household results in a higher proportion of housing (excluding main residence) or business assets in total investments. Therefore, we conclude that gender-preference for children does exist in household decisions on asset allocations. The study also provides empirical evidence of the positive relationship between women's relative bargaining power and the share of financial assets.

In summary, these three studies provide analytical frameworks to understand and explain Chinese households' behaviour regarding decisions on housing and household wealth allocations across broad investment categories. Then, by applying alternative econometric models and techniques to test the data, we attain a broader view to interpret the impacts from different perspectives depending on specific characteristics of the

sample and objectives of the studies. The estimated results support the predictions of the models. Overall, we conclude that the housing outcomes are substantially shaped by demographic characteristics. China's Northeastern region lags behind by the Central and Eastern regions. The findings suggest a solution to the housing dilemma in the Northeastern region that aims to change the development pattern of regional economy and encourages labour flows in dual directions.

In both studies on household investment, the demographic factor has a crucial impact on household decisions and the shares of investment holdings, although its effect considerably varies across three investment categories: financial assets, real estate, and private business. We do find empirical evidences on the considerably positive impact of household income per capita on household investment choice and the value of assets. Considering the importance of the middle class on encouraging production and feeding the market, it is matter of import to study the pattern of middle-income households' decision in China, still a developing country, but closing to the cutoff that distinguishes developing economies from their high-income counterparts.

We also find that increasing relative bargaining power of women drive household's participation in the financial markets, and a higher share of financial assets in total investment. In fact, female empowerment has been a key goal for development policy. This study measure and quantify the impact of empowerment at household level, and indicates that a shift in intra-household bargaining is related to the well-being outcomes. It implies that the specific interventions on women's empowerment helps policy makers achieve desired objectives.

Although the impacts vary across different conditions and subjects, the consistent evidence throughout the three studies shows that rural migrant households are often the most vulnerable group. Because of institutional exclusion, rural migrants lack the resources to achieve the same outcomes as rural locals or even urban migrants. The

evidence suggests for policy implementation that create incentives for rural migrant households in general.

6.2 Limitations and Future Research

Clearly, this thesis still has several limitations and remains some issues for future studies.

In Chapter 3, the study investigates regional disparities in homeownership and the value of housing. We examine the variation in housing value to measure the uneven distribution of housing quality across the regions. However, housing value may not be a suitable proxy for housing quality. It is always a vexing problem to measure the physical and environmental quality of the dwelling unit. Like the surrounding residential environment and local housing market, spatial factors are strongly associated with housing quality. Unfortunately, the CFPS survey does not provide a sufficient number of variables that indicate the physical and visual condition of residential dwellings for us to evaluate housing quality. The market value of the housing unit is the closest proxy that we could find to represent housing quality. After all, this value is estimated based on some key indices of housing unit, such as size, location and building type. It would be fascinating to look further into the regional pattern of housing quality using data that provides more details.

Chapter 4 evaluates the decision patterns of household investments. The analysis and evidence show the advantage of using the instrumental variable method to mitigate endogeneity bias and adopting the nested logit approach to solve the overlapping issue. However, the key assumption in this study is that parents reduce their consumption in exchange for investments benefitting their children. The analysis suffers from the fact that the CFPS only separates adult consumption on goods like alcohol and cigarettes

from food consumption in 2012 and, to some extent, also contains measurement errors. It would be nice to find long-term panel data with more information on adult consumption.

Chapter 5 finds that changes in demographic composition impact allocation patterns of household investment. With a caution about endogeneity, we replace the income variable with lagged income, which drops one-third of the observations. Since the dependent variables are the share of investment in the fixed-effect models, the crowding-out effect of housing asset/business asset produce a massive number of zeroes and one hundreds, and hence lots of observations are dropped in the regression. It would be interesting to examine how household investment holdings responds to changes in demographic composition and intra-household bargaining using long-term panel data. It would be worth to find out how the effect of women's relative bargaining power on household investment decision change if we measure it by using the informations other than educational attainment.

Appendix A

Measurement

A.1 Criteria for Selecting the HRP

- Economically active, employed, full-time, non-student
- Economically active, employed, full-time, student
- Economically active, employed, part-time, non-student
- Economically active, employed, part-time, student
- Economically active, unemployed, non-student
- Economically active, unemployed, student
- Economically inactive, retired
- Economically inactive, other

A.2 Variable Definitions

Male Dummy variable for male HRP.

Marital Status Set of four dummy variables measuring current marital status of the HRP: 1-Never Married, 2-Having a spouse (married or Cohabited), 3-Divorced, and 4-Widowed.

Age HRP's age in years.

Children Number of children in sampled household.

Education Set of five dummy variables for educational attainment of the HRP: 1-Primary School, 2-Middle school, 3-High school, 4-three-year college, 5-Undergraduate and above. Also year of schooling.

Women's Bargaining power Relative bargaining power of women is measured by using the ratio of a wife's education in years to the sum of the years both husband and wife received as the main indicator of bargaining power. If a male householder is never married or lost his spouse by death or divorce, the bargaining power should be set to zero. For a single female HRP, the bargaining power is 10.

Health Condition Set of four dummy variables describing the HRP's health status: 1-Underweighted, 2-Healthy, 3-Overweighted, and 4-Obesity; a continuous variable to measure physical health, Body Mass Index.

Employment: Set of five dummy variables that describe the employment status of the HRP: 1-Self-employed, 2-Employed, 3-Farming, 4-Other Type, 5-Out of Labour Market.

CCP Dummy variable for the HRP being a member of Chinese communist party.

Employer Set of six dummy variables categorising type of firm in terms of ownership: 1-Governments, 2-Public services, 3-SoEs, 4-PoEs, 5-Individual Enterprises, 6-Other types.

Seniority Dummy variable for the HRP holding an administrative position; Number of subordinates under HRP's direct order; Length of current occupation in

years.

Hukou-Migration Set of eight dummy variables that demonstrates status of hukou registration and migration for the HRP: 1-Rural Local in Countryside, 2-Rural Local in city, 3-Rural Migrant from another County, 4-Rural Migrant in city, 5-Urban Local in Countryside, 6-Urban Local in city, 7-Urban Migrants in countryside, and 8-Urban Migrant from another city; Set of four dummy variables for the HRPs in the sample of urban households: 1-Rural Local, 2-Rural Migrant, 3-Urban Local, 4-Urban Migrants.

Tenure Three dummy variables for tenure of current residence: 1-Owned, 2-Occupied without payment, and 3-Rented.

Household Income Household annual net income per capita

Expenditure Share of consumption on adult goods include beauty products, and alcohol and cigarettes.

Region Set four dummy variables for geographic location of household: 1-Eastern Region, 2-Central Region, 3-Western Region, and 4-Northeastern Region.

Appendix B

Supplementary Materials and Side Discussions

B.1 Supplementary Materials

Table B.1: Change in Shares of Asset in Total Household Wealth

Interview Year	Share (%)				
	Home	2 nd Homes	Business	Financial Products	Savings
2010	77.37	9.51	1.29	1.67	10.17
2012	66.96	7.95	2.90	1.29	20.91
2014	67.59	10.83	3.12	1.15	17.31
2016	61.08	12.29	3.29	1.36	21.97

Sources: *Calculated from the Sample of Urban Households from the 2010-2016 CFPS.*

Table B.2: Changes in the Homeownership Rate and the Averaged Market Value of Owner-Occupied Housing by Region (2010-2014)

Region	Year								
	2010			2012			2014		
	No.	%	Mean	No.	%	Mean	No.	%	Mean
Eastern	1691	76.8	47.3	1450	82.2	62.3	1696	68.5	71.2
Central	2131	84.6	19.3	1961	85.9	27.3	2187	80.2	33.2
Northeastern	889	78.9	25.9	719	76.9	32.8	705	73.6	37.3
Sample size	4,711			4130			4588		

Sources: *Calculated from the Sample of Urban Households from the 2010-2014 CFPS.*

Note: Wighting is applied to make the sample nationally representative.

Table B.3: Estimation from the Logistic Regression Using Pooled Sample

	Model A Odds Ratio	Model B Odds Ratio
HRP Characteristic		
Age	1.125***	1.142***
Age squared/100	0.909***	0.890***
Migrant Status by Hukou		
Rural Local	1.467***	1.359***
Rural Migrant	0.170***	0.142***
Urban Local	ref.	ref.
Urban Migrant	0.439***	0.412***
CCP Membership(d)		1.287*
Employment Status		
Employed	ref.	ref.
Self-Employed	1.104	1.039
Farming	2.648***	2.315***
Other Type	1.017	0.874
Out of Labour Market	1.055	0.866
Ownership of Employer		
Governments		0.898
Public Service		0.908
SoEs		ref.
PoEs		0.604***
Individual Enterprise		0.685*
Others		0.813
Seniority		
Length of Current Post		1.010
Year of Working for		
Governments		1.002
Public Service		1.008
SoEs		ref.
PoEs		1.025(*)
Individual Enterprise		1.014
Others		1.004
Household Characteristic		
No. of Household Members	1.399***	1.362***
Household Income per Capita		
Bottom 25%	0.707***	0.699**
Lower 25%	0.903	1.004
Upper 25%	ref.	ref.
Top 25%	1.262***	1.266**

Continued on next page

Table B.3: – continued from previous page

	Model A Odds Ratio	Model B Odds Ratio
Region		
East	ref.	ref.
Central	1.611***	1.534***
Northeast	1.301***	1.324***
Constant	0.047***	0.046***
Observations	16856	7801
Pseudo R^2	0.149	0.200

(*) $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: the Sample of Urban Household from the 2010–2014 CFPS.

Use Household as measurement unit.

Note: (d)-dummy variable; ref-reference category.

B.2 Side Discussion

B.2.1 Descriptive Statistics for Housing Tenure Choice

Table B.4: Household Characteristics by Housing Tenure

	Non-owner		Owners		Overall	
	Mean	SE	Mean	SE	Mean	SE
Household Characteristic						
The Number of						
Household Member	2.78	0.088	3.46	0.072	3.32	0.077
Children	0.98	0.048	1.26	0.040	1.20	0.042
-Living with Parents	0.60	0.043	0.81	0.029	0.77	0.033
Household Finance (¥10,000s)						
Household Income	4.12	0.265	4.65	0.247	4.55	0.231
Household Income per Capita	1.79	0.157	1.56	0.108	1.61	0.113
Investment in Real Estate	7.94	0.954	8.10	1.120	8.06	1.026
Proxies for Seniority						
No. of Subordinates	7.46	5.337	3.09	0.812	3.99	1.239
Length in Current Post	6.45	0.375	11.32	0.340	10.18	0.324
Observations	12,574					

Note: (d)-dummy variable. Use household as measurement unit.

Source: Calculated from the Sample of Urban Households in the 2010-2014 CFPS.

Table B.4 indicates demographic characteristics of homeowners in Chinese cities like household size and number of children. A child is defined as someone still financially linked to parents, no matter whether that child is above or below the age of 16 years. The size of the household is determined by members of the extended family who have financial links of shared expenditures such as remittances, or who receive money such as tuition fees, no matter where they actually live. The variations in household size regarding the number of children share a similar pattern. Homeowners have more children and a larger family, whereas non-homeowners have smaller families and fewer children.

Financial characteristics vary considerably by housing tenure. While homeowners enjoy higher incomes, when considering household size, per capita incomes are lower. For example, if householders own their own residences, their average total household income is 46,500 RMB, which is 5,300 RMB higher than for non-homeowners. The mean household income per capita for homeowners is 15,600 RMB and less than 17,900 RMB for non-homeowners.

I choose the number of subordinates as another perspective to find the relationship between seniority and homeownership. The homeownership variation in the number of subordinates and length in current post follows a different pattern. Homeowners have fewer subordinates and stay longer in the same jobs, whereas those who have more subordinates stay less time in the same jobs. In fact, the average number of subordinates under direct order of homeowners is three, less than half the number for the first group. Hence, this variable shows a negative effect on homeownership acquisition. We can only presume that having a higher position in a firm does not necessarily mean a person has more employees under his or her direction. For example, while there are only a handful of secretaries under a firm's CEO, there can be 100 workers under a low-level plant manager. Additionally, homeowners stay in a same post about twice as long as non-homeowners do.

B.2.2 The Mixed Effect of Gender and Marital Status

Table B.5: The Mixed Effect of Gender and Marital Status on Housing Value

	Gender					
	Female		Male		Overall	
	Mean	SE	Mean	SE	Mean	SE
Marital Status						
Never Married	42.80	6.95	49.68	10.77	47.10	9.04
Having a Spouse*	38.60	4.95	37.54	4.68	37.85	4.72
Divorced	38.06	10.63	37.87	8.96	37.98	7.61
Widowed	30.61	4.81	36.71	8.75	32.33	4.97
Total	37.32	4.97	37.96	4.86	37.74	4.84

Sources: *Calculated from the Sample of Urban Households in the 2010-2014 CFPS.*

Note: The measurement unit of housing value is 10,000s RMB. A spouse is a partner in marriage or cohabitation.

Table B.5 shows the mixed effect of gender and marital status on the value of owner-occupied housing in urban China. The never-married have a clear advantage over the other groups. It is obvious that having a spouse (married or cohabited) and being divorced influences households with a female householder more than households with a male householder. However, urban households with a never-married male householder are dwellings with the highest values. Although the state of widowhood is the greatest drawback to adding value to housing, widowhood does slightly improve the financial situation of the widow.

B.2.3 Tobit with Random Effect

Since the Tobit model relies crucially on normality, I use natural logarithms to transform the right-skewed data on household investment into a near normal distribution. $\ln I_{it}$ represents the log of market value of investment assets, $\ln I_{it}$, for household i at time t . Therefore, the Tobit specification is modified for log normality (Cragg, 1971;

Wooldridge, 2010):

$$I_{it}^* = \exp(X_{it}'\beta + \alpha_i + \varepsilon_{it})$$

where the random effects, $\alpha_i \sim i.i.d.N(0, \sigma_\alpha^2)$ and $\varepsilon_{it} \sim i.i.d.N(0, \sigma_\varepsilon^2)$ with α independent of ε . X_{it} denote the characteristics of urban households and their HRPs. This latent function characterises household decisions on investments, defined as the observation of positive holding value; and behaviour, defined as the household investment share given the status of investment holdings. The observation rule is also adjusted with a non-zero threshold γ

$$I_{it} = \begin{cases} I_{it}^* & \text{if } \ln I_{it}^* > \gamma \\ 0 & \text{if } \ln I_{it}^* \leq \gamma \end{cases}$$

where the dependent variable is $\ln I_{it}$, and the threshold equals the minimum uncensored value of $\ln I$. The probability of a household being non-censored is:

$$Pr(I^* > 0 | x_t) = \Phi(x_t\beta + \alpha)$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function.

However, in the computational application for the Tobit model, extra attention is needed for choosing the threshold. First, the dependent variable is originally set to missing if the value of investment assets in category j equals zero, but it should be set to a non-missing value, a lower limit for censoring the households that do not hold any investment asset. Second, the smallest positive value of investment asset is 1, in which case $\ln I$ equals 0. The households would be mistakenly treated as censored rather than zero, which leads to a shrinkage in the sample size. In my sample, the number of mistakenly ‘censored’ households would be 6, due to the small value of their financial assets. To avoid such loss, I set all censored households of $\ln I$ to an amount slightly smaller than the minimum non-censored value of $\ln y$ (Cameron and Trivedi, 2010). It

also requires extra care to interpret parameters:

$$E(I|x) = \exp\left(X'\beta + \frac{\sigma^2}{2}\right) \left\{ 1 - \Phi\left(\frac{\gamma - X'\beta - \sigma^2}{\sigma}\right) \right\}$$

Here, β measures the proportionate change in $E(I|x)$ as X_i changes (Duan, 1983). The expected value of I_t for the non-censored households can be shown to be:

$$E(I|x, I > 0) = \frac{E(I|X)}{1 - \Phi\{(\gamma - X'\beta)/\sigma\}}$$

or

$$E(I|x, I > 0) = \exp\left(\mu + \frac{\sigma^2}{2}\right) \times \frac{\Phi\{\sigma - (0 - \mu)/\sigma\}}{1 - \Phi\{(0 - \mu)/\sigma\}}$$

where $I \sim N(\mu, \sigma^2)$ and $\phi(\cdot)$ is the standard normal density. The log-likelihood for the censored regression model is:

$$\ln L = \sum_{I>0} -\frac{1}{2} \left[\ln 2\pi + \ln \sigma^2 + \frac{(I - X'\beta)^2}{\sigma^2} \right] + \sum_{I=0} \ln \left[1 - \Phi\left(\frac{X'\beta}{\sigma}\right) \right]$$

The two parts correspond to the classical regression for the non-limit observations and the relevant probabilities for the limit observations, respectively. This likelihood is a nonstandard type because it is a mixture of discrete and continuous distributions (Greene, 2012).

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