The Effects of Chinese Special Reverse Mortgage Loans on Retirement Behaviours

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Declaration

This thesis has not been submitted in support of an application for another degree at this or any other university. It is the result of my own work and includes nothing that is the outcome of work done in collabouration except where specifically indicated. Many of the ideas in this thesis were the product of discussion with my supervisors Steve Bradley and Ian Fletcher.

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Abstract

China has witnessed an aging population since 1999. Now, it is faced with such problems as a large population base and the rapid growth of the elderly population, and the level of aging is increasing. The social endowment security system is also facing problems such as the weakening of family pension function (family members help old people in their family) and pension funding gap. The housing Reverse Mortgage Loan has become a mature pension system in foreign countries. However, due to the influence of the traditional pension culture in China, the start date of this research is later than other countries. The housing reverse mortgage loan is helpful in coping with the problem of aging population in China, helping to build a multi-level and sustainable old-age security system, and promoting the healthy development of society.

Based on this, this paper analyses the data from the perspective of "the impact of reverse mortgage on retirement behaviour" by using PSM+DID model analyses and qualitative thematic analyses, respectively. The results of this mixed research method approach shows that gender has no statistically significant influence on retirement behaviour, but health factors showing a significant positive effect on retirement behaviour. Moreover, family income has significant positive effects on retirement behaviour. The final results show that reverse mortgage products have a certain degree of influence on people's retirement behaviour, but the influence varies with the year, region or retirement policy. Finally, based on my results, we put forward practical implications as follows: China's reverse mortgage pension market needs more pilot exploration; Insurance companies and the government should harmonize; Establish a comprehensive platform for reverse mortgage loans; Strengthen publicity, change the traditional old-age concept; The improvement and perfection of retirement policy.

Key words: Reverse Mortgage Loan (RML); Retirement Behaviour; Mixed Research Method; Propensity Score Matching (PSM); Difference in Differences (DID); Thematic Analyses

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Chapter I Introduction

1.1 Background

1.1.1 Population Aging

Population aging can be measured by the ratio of retirees to workers and the increase in the proportion of retirees is raising sustainability issues for public Social Security Systems. In many countries the government, through the social security system, provides a pension to retirees. To ease financial pressures as well as to increase older workers' labour force participation, policy makers have been promoting the expansion of working lives finding measures that make postponed labour market exit attractive. However, there have been increasing concerns about the sustainability of these (mainly unfunded by government finances) social security systems and the adequacy of households' private retirement savings (Banks, Blundell, Tanner, 1998, Kotlikoff, 2001, Scholz, Seshadri, and Khitatrakun,2006). In China, according to a report on Population Aging (2017), the current aging population has exceeded 160 million, and it is increasing by nearly 8 million a year. The latest data showed that in the first 10 years of the 21st century, the average annual population growth rate was 0.57%, lower than the last 10 years average annual population growth rate of 1.07%. Based on a research report of China's Pension Industry (2017) in terms of the situation between 2017-2022 with respect to their investment strategy, the current problem in China is that, the retirement population (aged 60 and over) and the working population (population between 15 to 59 years old) ratio is about 19 to 100, and this ratio is expected to be as high as 64 to 100 in 2050, which means that 100 workers will need to support 64 retirees.

Thus, under the background of increasing average life expectancy, declining fertility rate and the aging population structure in China, many challenges have been created for the traditional old-age pension model. In order to enable the elderly to maintain a quality of life, the old people's pension mode should be changed more from dependence on their children to greater self-reliance. Through the way of reverse mortgage loan, we might be able to build up a new pension mode to replace the traditional one. This is an innovation of the pension mode and a significant change to the pension system. In addition, the application of reverse mortgages can

effectively alleviate the contradiction between supply and demand in China's current real estate market, maintain the stability of housing prices, and promote the healthy development of the real estate market (Burdekin & Tao, 2014).

If the elderly find that they do not have enough funds to support near retirement, they may be forced to return to work or delay retirement. However, this is not conducive to the health of the elderly themselves and the virtuous cycle of the labour market (Young people take the place of old people when they retire). Older people not only need to prepare for retirement costs, but also need to plan the funding sources of medical expenses and long-term care in their later years. Once retirement pensions are exhausted, it will be difficult to maintain the expected standard of living for the elderly by relying solely on social insurance, social assistance or child support. The application of a reverse mortgage can increase the income of the elderly and can be used as a supplement to the social security system and self-security system, so as to make the elderly's life safer and more stable in their later years. What is more, Reverse Mortgage Loans (RMLs) help to put forward the strategy of coping with the phenomenon of early retirement, and optimize the delayed retirement policy in the current plan, in order to improve citizens' acceptance of the delayed retirement policy and reduce the pressure of the pension system. Only when the elderly have no worries about their living conditions can they maintain their consumption level which then has the positive effect on the growth of the national economy.

1.1.2 Differences Between Chinese National Conditions and Other Countries

As China's prices continue to rise, the problems that limited pensions are not enough to cope with the cost of living for the elderly are also exposed. In China, the government divides pension insurance into three parts in order to enable pension insurance to play a role in ensuring personal wellbeing and social harmony. Older people can accumulate their pensions through these three sources. The first is basic pension insurance, the second is enterprise supplementary pension insurance, and the third is personal savings pension insurance. However, due to the continuous improvement of the average life expectancy of residents, the return on investment of pension funds and other issues, the replacement rate expected by the basic pension insurance provided by the government does not meet the consumption needs of the elderly. In addition,

because the enterprise's supplementary pension insurance is implemented by firm decision-making, the scope of coverage of the second source is limited.

The high rate of housing ownership in China is an important reason for studying reverse mortgages. According to a report on Chinese households (the People's Bank of China, 2012), among the 3,996 families surveyed, the self-owned housing ownership rate was 85.39%. Additionally, as inflation persists, the real value of property reduces, which is increasingly problematic for residents. In large cities such as Shanghai and Beijing, a property located in a suitable location, even if the area is small, the value will be more than three or four million yuan. According to the national family sector asset structure, the real estate assets take up about 40% of the total net assets, with a total of 22,282.3 billion yuan (National Bureau of Statistics, 2014). Most people in China now use loans to buy properties, so salaries are usually used to pay for mortgages, and they often do not have enough money to enjoy life after retirement. So later life became people own a house but without cash.

Figure 1: House Price Index and CPI (Xing global fund, 2019)

China has put forward the implementation of a gradual delayed retirement system, which it is hoped, will have a positive effect in enabling China to cope with the aging population and alleviating the burden on the social pension system. Postponing retirement is the most sensible policy in the current situation. It can not only solve the pressure of the pension crisis, but can also contribute to the stable operation of China's social security fund, and improve the pension

system. Additionally, in the case of an increasingly aging population and a shortage of funds for the old-age security system, real estate, as the greatest wealth of urban residents, exists only in the form of real estate, and it is apparent that it has not fully utilized its value (it means house can not only be your fixed assets but also contain other benefits.). If the government considers developing the value of the property which belongs to residents and applying it to the lives of the elderly in a suitable way when it develops the retirement policy, it can not only reduce the pressure on the social security system, but also improve the quality of life of the elderly.

At present, the world's population is increasingly concentrated in urban areas. According to the relevant data of the United Nations, it is estimated that 61% of the population will live in cities in the future, and there will be more than 20 "big cities" with a population of more than 10 million. The cities with the fastest population growth will be in developing countries (Su, 2014). Compared with other countries, China's aging population has the following characteristics:

First, huge elderly population: According to China National Bureau of Statistics Report, at the end of 2004, China's elderly population aged 60 and above was 143 million, which 11% of the population. The number will reach 200 million in 2014, 300 million in 2026, 400 million in 2037, and a maximum of 300 to 400 million in 2051. According to UN predictions, in the first half of the 21st century, China has been the country with the largest elderly population in the world, accounting for one fifth of the world's total elderly population. In the second half of the 21st century, China still has the second oldest population after India (He and Liu, 2016).

Second, aging is developing rapidly: the proportion of the elderly over 65 years old in the total population has increased from 7% to 14%, which takes more than 45 years in most developed countries (Guo, 2016). China can complete this process in only 27 years, and will maintain a high growth rate for a long time, which is among the fastest aging countries.

Third, the number of urban and rural elderly population inversion: the degree of rural aging has reached 15.4%, which is 2.14 percentage higher than the national average level of 13.26%,

which is higher than the degree of urban aging. This urban-rural inversion will continue until 2040 (Zhu, 2021). In the second half of the 21st century, the level of aging in urban areas will surpass that in rural areas, and the gap will gradually open up. This is one of the important characteristics of China's aging population, which is different from that of developed countries.

Fourth, the elderly population of females is more than that of males: according to the research of Chen and Guo (2016), there are more females than males in the elderly population. It will peak in 2049 with 26.45 million more. In the second half of the 21st century, the increase of the elderly female population basically stabilized at 17 million to 19 million. 50 to 70 percent of the increased number of female senior citizens are senior citizens.

Fifth, unbalanced regional development: The development of aging population in China is characterized by an obvious regional cascade from east to west, and the economically developed eastern coastal areas are significantly faster than the economically underdeveloped western areas (Li, 2015). In 1979, Shanghai was the first to enter the ranks of the aging population. Compared with Ningxia, which entered the ranks of the aging population in 2012 at the latest, the time span is as long as 33 years.

1.1.3 Reverse Mortgage Loans

The problem of population aging not only challenges the social security system of our country, but also has become a major social problem facing the world. In order to deal with this common topic, many countries have carried out a lot of research and practice to explore and establish new ways of creating pension security. For example, the United States, Canada, Singapore and other countries have successfully put forward the solution of "housing for the aged", and established the housing reverse mortgage market.

Reverse Mortgage Loans (RMLs) are one of Home Equity Conversion (HEC) product. It is a kind of mortgage loan that allows the elderly to convert housing assets into cash without moving out of their home. All obligations, including principal, interest and expense, will be

paid when the house is sold, the owner permanently moves out of the house or the borrower dies, and the borrower is also able to repay all obligations at any time. Comparing with traditional mortgages, RMLs are helpful to homeowners later in life. According to Nakajima and Telyukova (2012), the older borrowers will face more constraints such as bank assessing the ability to repay, which lead to the difficulty of borrowing. In this situation, older homeowners, such as retirees, are forced to sell their homes if they experience large medical expenses or other additional expenses. Therefore, such an equity borrowing product which is beneficial for the older can reduce the stress of heavy cash burdens and relax borrowing constraints. In other countries, the reverse mortgage loan is the most successful model in terms of housing endowment, originated in Holland, and the most representative operation should be United States (Shan, 2011). In addition to these two countries, Canada, Singapore, Britain and France also have good performance on RMLs.

1.1.4 RMLs History and Current Situation

As early as four centuries ago, reverse mortgage products appeared in Europe in a regional and personal way. Modern reverse mortgage products were issued in 1986 with the support of the federal government. Subsequently, European countries, Australia, Singapore, Canada, Japan and other countries have tried to develop this financing model. International experience shows that the housing reverse mortgage market has great development space. It can effectively integrate and play the advantages of the real estate market, insurance market and financial market, so that the real estate of the elderly can play the triple functions of residence, pension and investment at the same time, providing a useful supplement for the traditional pension security system of various countries.

The United States is the first country in the world to develop the housing reverse mortgage market. Its first housing reverse mortgage contract can be traced back to 1961. So far, the United States is also one of the countries with the most mature development and the most sound system of the housing reverse mortgage market. The U.S. housing reverse mortgage market was initiated by the Ministry of Housing and Urban Rural Development in 1987, and guaranteed by the government to convert housing rights and interests into mortgage loans. In the last decade, it has developed very rapidly. Its market value has increased from $1 billion in

1999 to $32.4 billion in 2009. There are various types of reverse mortgage contracts in the market, and the number of applications has increased significantly, from more than 7900 in 1999 to 114000 in 2009. The U.S. housing reverse mortgage market is roughly divided into three categories: the Home Equity Conversion Mortgages (HECM) plan, the home keeper plan and private market products. HECM is the earliest and most mature housing reverse mortgage plan in the United States, accounting for more than 90% of the whole housing reverse mortgage market.

Australia began to discuss the establishment of the housing reverse mortgage market in the late 1980s. The establishment of the market was in early 2005, led and supervised by the Australian Equity Release Association of Lenders. In the absence of government intervention, the housing reverse mortgage market in Australia has developed rapidly. Its market value has increased from a $850 million in 2005 to a $2.7 billion in 2009, and the number of applications has increased from more than 16000 to more than 38000.

Britain, France, Singapore and Japan have also launched the anti mortgage market business, and its market scale is gradually expanding. It is worth mentioning that the targets of the aforementioned national housing reverse mortgage business are all the elderly with housing property rights.

1.1.5 Changes in China's Pension Policy

In the study of the factors which affect retirement behaviour, Classen (1977) believed the change in the value of the pension, or the impact of ill, made it impossible for people to retire as expected. Chan et al (2004) pointed out that the discounted income of the future pension was the main factor affecting the individual's expected retirement age. Riedel and Hofer (2013) also believed that the replacement rate and pension wealth both were negatively correlated to planned retirement age, and pension systems assumedly enabled more retirees to live from a pension alone, or with wage levels that facilitate the accumulation of sufficient savings to retire earlier. Additionally, Coile and Levine (2007) found that the increase of in the value of a

pension tended to make elderly men retire early, but the retirement behaviour of elderly women was not affected. Women's retirement behaviour is often related to their family environment.

Wang (2016) argued that the pension insurance system would inhibit the delayed retirement intention of the labour force, while good health, higher wage income and better family welfare level will play a significant role in promoting the delayed retirement intention. Zhang et al (2016) found that the social pension potentially had remarkable effects on the lives of the elderly and called for evidence from individual level data. Among the pension-eligible group, rural people with ages 60 and over were more likely to receive a pension just after the New Rural Pension Scheme (NRPS). However, among the ineligible groups, there is no significant effects on pension receipt, income, labour supply, health and mortality.

Table 1 Changes in China’s policy

Year	Achievement	Standard Personal Payment (per year)	Special Points
2012	The 100% coverage of urban residents' pension insurance system has been basically reached.	100 yuan, 200 yuan, 300 yuan, 400 yuan, 500 yuan, 600 yuan, 700 yuan, 800 yuan, 900 yuan, 1000 yuan	The local government can add the payment grade according to the actual situation. The government pays the full amount of basic pension for the urban residents' pension insurance to the insured persons who are eligible for the treatment.
2013	Carry out the elderly reverse mortgage pension insurance pilot, encourage the pension institutions to insure liability insurance, and the insurance company underwrites liability insurance.	100 yuan, 200 yuan, 300 yuan, 400 yuan, 500 yuan, 600 yuan, 700 yuan, 800 yuan, 900 yuan, 1000 yuan	If the payment period is less than 15 years, the insured will not get the basic pension, in personal account, the amount saves will be paid at once, and the basic pension insurance relationship will be terminated.
2014	The endowment insurance fund of urban and rural residents is made up of individual payment, collective subsidy and government subsidy.	100 yuan, 200 yuan, 300 yuan, 400 yuan, 500 yuan, 600 yuan, 700 yuan, 800 yuan, 900 yuan, 1000 yuan, 1500 yuan, 2000 yuan	The subsidy standard for the 500 yuan or above grade should be more than 60 yuan per person per year.
2018	The enterprise annuity has been implemented as a supplement to the old-age insurance	100 yuan, 200 yuan, 300 yuan, 400 yuan, 500 yuan, 600 yuan, 700 yuan, 800 yuan, 900 yuan, 1000 yuan, 1500 yuan, 2000 yuan	The occupational annuity, which is established by the enterprise through consultation with the employees, is not compulsory.

1.1.6 Chinese Special Reverse Mortgage Loans

a. Nanjing "Rental and replacement"

This mode stipulates that if the elderly in Nanjing have 60 square meters or more housing property and the age is 60 years old or above, they can mortgage their existing housing in accordance with the principle of voluntary application. After being notarized by the office, they can move into the old age apartment in Nanjing and enjoy a lifetime exemption from all expenses. Finally, the housing property is owned by the nursing home when the old man dies. This model is more suitable for the middle- and low-income elderly who have one or more houses in the city with no son or daughter. But this model has two restrictive conditions: (i) it has to be at least 60 square meters of housing in Nanjing, and (ii) the elderly need to reach 60 years of age or above, which limits the applicable population to a very small range.

b. Shanghai "Self-help for the aged"

This policy mainly establishes the housing property right transaction market and the corresponding housing tenancy mechanism through the Shanghai Provident Fund Management Centre. The specific steps are: Firstly, elderly people aged 60 or above sell their property to the Shanghai Provident Fund Management Centre through the property rights trading market, and get all the money from the sale at once; Secondly, through the corresponding housing leasing mechanism, the Shanghai Provident Fund Management Centre will then rent the house back to previous homeowners. The rental fee is the same as the rental market price of the house; Finally, the elderly can pay rent to the Provident Fund Management Centre in a single lease period, and other expenses are paid by the Provident Fund Management Centre. This model mainly uses the difference between the price of the house and the rent to get the pension, which is more suitable for elderly homeowners who own one or more houses in large or medium-sized cities but are unwilling to leave the original place of residence. That is, they seek to rent a house that is cheaper than the current one in order to make a profit on the difference between rents.

c. Beijing "Pension house bank"

Under this model, those aged 60 and above can first put forward the demand to the Beijing Fuhai international endowment service centre, and deliver the property right to the Zhongda Henderson real estate brokerage company. The rent is used to offset the cost of a nursing home. The remaining rent is arranged by the elderly. This policy also involves renting and selling, but the old people can always retain the property rights of the houses. This policy is run by commercial companies, and commercial companies aim at making profits.

d. Hangzhou “Multiple choices”

Hangzhou's "housing endowment" puts forward four options: First, the elderly who have housing property rights and live alone arrange to live in a home for the elderly, and their original house is rented out to increase the daily income of the elderly. Second, the housing of the elderly who owns the property right and lives alone can sell up, and the income from the housing sale will be used to live in a nursing home and to meet daily expenses. Third, the housing of the old people living in public housing will be returned to the housing management department, and the housing management department will subsidize the elderly according to the market price, so that the elderly can be admitted to the nursing home. Forth, houses with better qualities are rented out, while the elderly are moved to houses with lower qualities, and the price difference between the rental sector of the house is used to increase the daily income of the elderly.

1.1.7 The Feasibility of RMLs in China

"Housing reverse mortgage loans", have proved to be an effective way of providing for the aged in developed countries, however, whether they are suitable for the national conditions of China, whether it can be successfully implemented in China is debateable. According to National Statistics (2013), 89% of Chinese households own their own houses, 40% of which are purchased through the market. This provides a huge development opportunity for the operation of a housing reverse mortgage market. From the perspective of potential demand and practical conditions, it is worth exploring to develop reverse mortgage of housing. Lai Ming, former director of the Department of Science and Technology of the Ministry of Construction, proposed to explore the model of "housing for the aged" during the "two sessions" in 2006, and

put forward that they would carry out pilot projects in some large cities. The reasons why reverse mortgage is feasible in China are as follows.

Firstly, according to the sixth census of the population, the percentage of the old illiterate population in China (primary school and below) has fallen to 21%, which means that the average education level increased significantly. More highly educated people tend to accept new ideas more easily and this help RMLs establish a good social foundation. Moreover, the Statistical Communique (2011) shows that the proportion of elderly people who are willing to live in the pension institutions such as nursing homes has dropped from 18.6% to 11.3% in 10 years in China, and more elderly people tend to want to live at home. At the same time, the improvement in the self-care ability of the elderly also has a positive impact on the implementation of RMLs. The sixth census of population indicates that among the people over the age of 60, the proportion of people who can take care of themselves completely is 83.15%, partial self-care people account for 13.9%, and only 2.95% of them cannot take care of themselves.

Secondly, the reform of housing system and the development of the real estate market provide material assurance for the development of RMLs. With the continuous progress of urbanization in China, the housing ownership rate has been greatly improved. According to the Chinese Family Finance Report (2012), China's home ownership rate is 85.39%, which is much higher than the world's average level of 60%. At the same time, the Chinese Consumer Financial Investigation Report (2011) shows that among the 5800 respondents in 24 cities, the average liability to asset ratio is 6.39%, and the property is the most important asset for the interviewed family. Additionally, the Population Tracking Report (2010) shows that the proportion of homes owned by the elderly is higher for those in areas 75.7% versus 71.2% in rural areas.

1.1.8 Problems implementing RMLs in China

Nevertheless, in view of the current problems in China, some argue that the housing reverse mortgage market is difficult to develop in China for a variety of reasons.

Firstly, the idea of house-for-pension has not yet been widely accepted by the public. In China, only a few families are able to have a rational discussion related to health problems, the death of their parents and other associated problems (Chai, 2006). These topics are taboo in most Chinese families and it leads to the situation that the elder who are suffering poorer lives do not know that their own assets can be used more extensively, such as improving their income and supporting daily consumption (Chen, Gao & Liu, 2015). Therefore, based on the actual situation of Chinese traditional ideology and culture, the elderly will think that a house-for-pension can inevitably lead to conflicts between parents and their sons or daughters in terms of inheritance. However, young people are more familiar with the concept of endowment insurance, annuities and other financial instruments, which means that they may have a completely different attitude with RMLs comparing with previous generations.

Secondly, as a financial product, RML has many risks, including interest rate risk, longevity risk, moral hazard and adverse selection (Chou et al, 2006). For example, the applicant's life expectancy is difficult to predict, which could undermine benefit balance between borrower and lender. Compared with general insurance products, the actuarial model of RMLs is more complex and the duration is longer, while facing various uncertain risks (Chou et al, 2006). The uncertainty of interest rate changes in long run increases the risk faced by insurance companies; When the actual life expectancy of older people is longer than expected, it will cause losses to insurance companies. The lack of motivation of borrowers for housing maintenance will also pose a potential moral hazard. Consequently, physically healthy seniors will also be more willing to apply for reverse mortgages. In this way, such RMLs risk factors which are different from traditional insurance products have led to a decline in the promotion of insurance companies (Wang & Kim, 2014). Additionally, the fluctuation of house prices in China is affected by the policy, and the trend of house price changes is difficult to predict (Burdekin & Tao, 2014). The asymmetry of information and the liquidity risk will increase the difficulty of institutions' actual operation as well. China's current financial environment lacks a risk diversification mechanism, and the risk of housing reverse mortgage loans is highly fastened on the providers, which is not conducive to mobilizing the initiative of the financial institutions to operate the business.

1.1.9 Summary

Based on above-mentioned content, we can find that the differences between China and other developed economies in population aging are mainly reflected in regional differences. The huge land area leads to significant differences in China's regional development. At the same time, we can find that due to the huge population base, China is aging faster than other developed economies. The gender gap, however, is less pronounced than in other economies. The difference between the number of aging of male and female shows that the number of elderly women is larger than that of men in many countries (Cai, 2020). As for reverse mortgage, China is still in the experimental stage, so there are many differences with other economically developed countries, among which the most significant one is the different reverse mortgage products designed according to the different backgrounds of pilot cities. In other developed countries, reverse mortgages follow almost the same framework as in China, where many terms are revised. This is also because of the traditional concept of "raising children for the elderly" and the financial concept of more emphasis on the ownership of house.

1.2 Research Questions

To sum up, it is a very important research topic to explore and analyse a new way of pension security as a supplement to the current pension security system. Thus, this research is expected to explore the role of reverse mortgages amongst the elderly by studying whether reverse mortgage can affect the retirement behaviour of people. It is hoped that this study will improve China's old-age security system and promote retirement policies more in line with the expectations of the labour market and ordinary citizens. At the same time, from the perspective of microeconomics, this research studies the relationship between reverse mortgage and labour market, mainly focusing on exits from the labour market in terms of retirement behaviour, in order to explore whether reverse mortgage can be used as a financial tool for the government to regulate retirement policy.

This thesis adopts a mixed methods approach, combining quantitative analyses and qualitative analyses, focusing on the role of personal factors, economic factors, social factors and other factors to address the following research questions:

(1) From the perspective of quantitative research, what are the factors influencing people's retirement behaviour in China? In addition, does reverse mortgage have an impact on people's retirement behaviour? Given that there are different types of RMLs, what are the effects of these different approaches on retirement behaviour.

(2) From the perspective of qualitative research, what factors do people think will affect their retirement decisions and their choice of reverse mortgage products in China? In addition, does reverse mortgage have an impact on people's retirement behaviour? On this basis, we hope to explore whether the traditional Chinese concept of "raising children for old age" will have an impact on the choice of reverse mortgage and the relationship between reverse mortgage and the new retirement policy through further research.

(3) Qualitative research helps us to go deeper into the quantitative findings, through analysing different results under different research methods, we hope to confirm what are the factors influencing people's retirement behaviour in China? At the same time, what influence do these factors have on people's choice of reverse mortgage products? In addition, does reverse mortgage have an impact on people's retirement behaviour?

(4) What are the practical implications of this study? Can it help us improve our retirement policy and relieve the financial pressure brought by an aging population? we hope to explore the feasibility of reverse mortgage loans in China and what the future path is through mixed research methods.

1.3 Research Contribution

Previous studies have reached different conclusions about the factors that influence retirement behaviour. This thesis presents a new perspective, that is, it establishes the relationship between reverse mortgage loans and retirement behaviour in China. we decide to explore this point of view through quantitative research and qualitative research. First of all, in terms of quantitative research, we estimate a Propensity Score Matching (PSM) model to ascertain what factors influence retirement behaviour. we find that there is no significant effect of gender on retirement behaviour, which contrasts with previous studies on China. Health condition has a significant inverted U-shaped impact on retirement behaviour. For education level, age, family income and retirement income, they all meet our expected hypotheses, which means that they have significant positive effects on retirement behaviour. Meanwhile, basic pension insurance of urban residents presents a completely opposite result to the expected hypothesis, that is, it has a significant negative effect on retirement behaviour. Household registration system with Chinese characteristics and commercial insurance fully conform to our expected hypotheses, that is, they have positive and negative effects on retirement behaviour respectively. For the type of property in the current residence, in 2012 and 2014, it does not have a significant role, but only in 2016 has a significant positive role. By combining Propensity Score Matching (PSM) and Difference in Differences (DID), the result shows that reverse mortgage has an inverted u-shaped effect on the retirement behaviour of middle-aged and elderly workers in China. This not only enriches the literatures on the factors influencing retirement behaviour, but also helps Chinese authorities in considering and formulating relevant retirement policies. It also gives people a clearer understanding of how reverse mortgages work in China and their related influence.

From qualitative research, we used the method of thematic analyses to study the interview records of 25 interviewees and found that there were 3 factors affecting their choice of reverse mortgage loans: Retirement income, Health and Housing ownership. Retirement income has a significant effect on the possibility of choosing reverse mortgage, and the less retirement income, the easier people choose reverse mortgage products. Additionally, Healthy interviewees think they can get the benefits of reverse mortgage to a greater extent, while a small number of unhealthy interviewees think reverse mortgage can make up for their medical

expenses. Moreover, Housing ownership also has a significant impact on the choice of reverse mortgage, and products that will not lose housing ownership are more likely to attract potential customers. Similarly, income and health were considered when studying the factors that influence retirement choices. The income gap before and after retirement has a significant impact on people's retirement choice, that is to say, the greater the income gap before and after retirement, the more people tend to delay retirement. Personal health factors have a significant impact on whether people choose to retire or not, and the healthier people are, the more likely they are to retire normally or delay retirement. However, the impact of retirement policy on people's retirement choice is not significant. Finally, we find that reverse mortgage loans have a significant impact on retirement policy, that is, reverse mortgage owners will be more inclined to change the plan of delayed retirement or normal retirement, but reverse mortgage has no significant effect on people who are planning to retire early.

After combining qualitative research and quantitative research, we find that health factors and family income have a significant impact, although qualitative and quantitative studies show different directions of influence. For age, quantitative study considers that age has a significant positive effect, while the qualitative study considers that age has no significant effect. Additionally, we find that reverse mortgage products have a certain degree of influence on people's retirement behaviour, but this influence will change with the difference of year, region or retirement policy. Based on mixed research methods, we also discover that reverse mortgage policies of different cities have a certain degree of influence on people's retirement behaviour and their choice of reverse mortgage products.

Chapter II Literature Reviews

2.1 Theorical Approaches

In this chapter, the following theories inspired me to analyse the reverse mortgage loan. They gave me a variety of factors affecting reverse mortgages and the data sources we needed for my research, especially for the qualitative part. In other words, the economic theories and management theories mentioned below provide framework support for my thesis.

2.1.1 Economic theories

2.1.1a Overlapping generations model

In 1947, Maurice Allais first proposed overlapping generation theory in the context of pure-exchange economy. Samuelson came up with a more formal theory in 1958. In 1965, Diamond added a collection of neoclassical production to the model. With the development of Galor (1992), and the OLG model introducing endogenous fertility, this OLG model with yield has been further enhanced (Galor and Weil, 2000). The overlapping generations (OLG) model is one of the dominating frameworks of analyses in the study of macroeconomic dynamics and economic growth. The OLG model is also the natural framework for the study of: (a) the life-cycle behaviour (investment in human capital, work and saving for retirement), (b) the implications of the allocation of resources across the generations, such as social security, on the income per capita in the long-run, (c) the determinates of economic growth in the course of human history, and (d) the factors that triggered the fertility transition (İmrohoroğlu et al, 1999).

In a typical overlapping model, the living family population at any point in time consists of a group of consumers with limited life expectancy. A group of young consumers are born on each date. If the growth rate is positive, the number of each group will be larger than that of the previous group. It is assumed that the life cycle of each consumer is divided into two periods, namely, the working period and the retirement period. Generations at the same time constitute the current economic subject:

Generations	Period					
	0	1	2	3	4	5
-1	Working period					
0	Retirement period	Working period				
1		Retirement period	Working period			
2			Retirement period	Working period		
3				Retirement period	Working period	
4					Retirement period	Working period

Suppose the government obligates young consumers in period t to contribute a portion of their income to the social endowment insurance system, and we will call this contribution of young consumers d_t。Of course, when the young consumer becomes an old person, he (she) can also obtain corresponding benefits from the endowment insurance system. Let's call the benefits he (she) gets b_{t+1}。Thus, under the fund system, because the contribution of the young consumer in period t is invested as capital, he or she will receive $b_{t+1} = (1 + r_{t+1})d_t$ in period t+1 when he or she is old 。Under the pay-as-you-go system, the government directly transfers the current pension contributions collected from young consumers to the current elderly, because the ratio of young people to old people is $\frac{N_t}{N_{t-1}} = 1 + n$, so a young person born in stage t will earn $b_{t+1} = (1 + n)d_{t+1}$ in old age. Since social pension insurance in a pay-as-you-go system is purely a transfer arrangement, it does not save at all, so the only source of capital in this system is private savings. The introduction of pay-as-you-go pension system will reduce the capital stock per capita in stable state. A natural question to ask is whether this result is appropriate. The answer to this question depends on the state of the economy in which it stabilises. If the economy is in the dynamic invalid region when it is stable, that is, in the state of $r^* < n$, the introduction of the pay-as-you-go system is a pareto improvement because it can reduce the per capita capital stock, so that the capital stock in the stable state is closer to the

gold capital stock. On the other hand, if the economy is in the dynamic efficient region at the time of stability, i.e., at the state of $r^* > n$, the introduction of pay-as-you-go will not be a Pareto improvement.

Overlapping generation model helps us to obtain the result of "searching friction", which means both sides need to spend time and energy to find and understand each other. "Search friction" is especially prone to occur when there is no standardized product to be bought and sold (Voigt et al, 2012). The OLG model is also built for the labour market. It can suggest ways to employ workers more efficiently, protect the unemployed better and produce more sensibly. Its application extends beyond the labour market to become a useful tool for governments to formulate welfare policies, real estate policies and even monetary policies (Sánchez Martín and SánchezMarcos, 2010).

2.1.1b Pull Effect, Push Effect and Personal Effect

There are also several theoretical approaches developed by academic thesis in management field. One of these approaches is “pull effect, push effect and personal effect”.

A pull system initiates production as a reaction to present demand, which means that the succeeding node makes order request for preceding node, and then preceding node reacts by producing the order, which involves all internal operations, and replenishes when finished. In retirement behaviour area, the pulling effect was that workers were affected by the economic benefits related to retirement and chose to retire under the driving force of economic rationality (Lin, 2017). Given different ways of calculating pension benefits, workers might choose to retire at different times, and the pension wealth obtained might be different (Feldstein & Samwick, 1992). In Germany and the United States, where the pension flexibility mechanism was established, the actual pensions obtained by workers in advance of their pensions were higher, thus, leading workers to choose to receive pension in advance (Diamond & Gruber, 2008). Maltby, Vroom, Mirabile and Øverbye (2004) put forward that many countries guided workers to retire through diversified pathways of retirement, and workers might be encouraged

by the economic incentives of unemployment benefits, disability benefits, occupational pensions and employer benefits and then workers chose to retire ahead of time. According to OECD (2011), the retirement behaviour in western countries still showed a diversified State guided by Retirement pathways.

As for the push effect, it means that workers are forced to retire because they are restricted by retirement policies, labour market rules and regulations, labour contracts and other factors. Walker (1999) pointed out that many countries allowed enterprises and industries to set up a retirement age that was earlier than the age of public pensions under the framework of collective bargaining in the labour contract, in order to make workers retire early. With the increasing pressure on the labour supply of the aging population, many countries began to concentrate on the early retirement under the pressure of relevant policies, systems and contract terms, and they established anti age discrimination rules and regulations to ensure the employment rights of the elderly workers (Snape & Redman, 2003).

Personal effects are a combination of the push and pull effects from the micro perspective, that is to say, personal effect refer to incentives or limitations on retirement decisions due to various personal and family factors. Meadows (2003) believed that because of differences in property, income, health, education, marriage, children and occupation types, workers' decisions on retirement were also different. Venti and Wise (2015) pointed out that a variety of microeconomic factors push and pull the workers' retirement decisions, in which the objective factors, such as health, age and other objective factors had been push effects, and the subjective factors, such as education and income had played a pulling role. Additionally, Wise (2012) believed that pension insurance payment, treatment and other pension related factors had incentives to the retirement decision, while the factors such as health, employment and employment of children had different degrees of restriction on the early retirement decision of the workers.

2.1.1c Life-cycle theory

Life-cycle models predict that individuals will work and accumulate assets while young and middle-aged, and retire and draw down assets when old. If there is no uncertainty, life-cycle consumers will never find it optimal to deviate from the retirement age and consumption path chosen at the beginning of their lives (Gourinchas & Parker, 2002).

In reality, consumers face uncertainty regarding the outcomes of economic variables such as future income and investment returns, as well as individual and family characteristics such as health status and marital status. Individuals must make retirement plans and consumption decisions that maximize their expected utility based on their best guess about future realizations of uncertain variables.

The formation of retirement expectations (RE) by the following equation:

Equation 1:

$$R_t^E = E(R|A_t, y_t, Z_t)$$

where R is the year of expected retirement, A is net worth, y is income and Z is a vector of personal and family characteristics such as marital status and health status.

As time goes by, some uncertainty about investment returns, health status and family status is resolved. For example, one year after forming initial retirement expectations, the consumer will have observed the realizations of health status, family composition, and investment returns over the course of that year. To the extent that these realizations differ from previous expectations, workers will re-optimize and update their expectations about their retirement age and consumption path accordingly.

The difference between retirement expectations at any two points in time (say, time t and t+Δ) is a function of variables at the initial point in time (t) and unexpected changes in those variables over that period (t to t+Δ). According to this theory, only unexpected changes should

alter the optimal retirement path. However, it is likely that individuals with different personal characteristics at the outset will respond differently to unexpected changes in the relevant variables. For example, those with larger initial levels of wealth may revise their expected retirement dates down by more in the event of a health shock than those with lower levels of initial wealth. As a result, individuals with different observable characteristics at time t may update their expectations differently in response to similar shocks to wealth, health or other variables. That is, retirement expectations (equation 2) are updated for each worker according to equation:

Equation 2:

$$R^E_{t+\Delta} = E(R|R^E_t, \Delta A, \Delta y, \Delta Z, A_t, y_t, Z_t)$$

Where

$\Delta A = A_{t+\Delta} - E_t[A_{t+\Delta}]$

$\Delta y = y_{t+\Delta} - E_t[y_{t+\Delta}]$

$\Delta Z = Z_{t+\Delta} - E_t[Z_{t+\Delta}]$

In sum, workers update their retirement expectations in response to unexpected changes in wealth, health and other variables. Hence, if wealth grew at a faster-than expected rate between time t and t+Δ, i.e., At+△, i > Et [At+△, i], then the expected date of retirement (RiE) would be revised down. That is, there is a wealth effect on planned retirement age given by $\frac{\partial R^E_i}{\partial \Delta A_i} < 0$.

2.1.2 Management theories

2.1.2a Continuity theory

Continuity theory was developed as a general framework for understanding the adaptation to individual aging (Atchley, 1989). According to Atchley, continuity theory was developed to explain common research finding that: Despite significant changes in health, functioning, and

social circumstances, a large portion of older adults show considerable consistency over time in their patterns of thinking, activity profiles, living arrangements, and social relationships. That is to say, the continuity theory of normal aging stated that older adults would usually maintain the same activities, behaviours, relationships as they did in their earlier years of life (Atchley, 1989). Based on such theory, older adults try to maintain this continuity of lifestyle by adapting strategies that are connected to their past experiences. It means that if retirees can maintain their identity and self-concept during the retirement transition, they should not experience a significant change in their well-being. Kim and Feldman (2000) suggested that there were two ways to understand such theory. First, that retirees can engage in continuity is to apply familiar strategies in different or new areas of their lives. Individuals who experience extreme difficulty in maintaining their identity and self-concepts during the transition from work to retirement life would experience negative change in well-being (e.g., psychological well-being). Second, that retirees can maintain continuity by viewing retirement as another career stage or by continuing to work during retirement.

Additionally, two types of continuity have been proposed: internal and external. Internal continuity is related to mental and psychological states (e.g., self-efficacy, goals, skills); external continuity is related to environment-based features (e.g., social roles, living and transportation arrangements, income; von Bonsdorff & Ilmarinen, 2012). These two types come into play when important decisions are to be made that may not allow for continuity. A balance between internal and external continuity permits retirees to use past life events to make decisions on future events.

Continuity theory states that if a person can maintain the personality and lifestyle of middle age into old age, he or she will have a happy old age (Ke, 2011). Therefore, each person does not have to adapt to the common norm, but sets the standard according to his own personality, which is the basis of old people's satisfaction with life. Continuity theory combines the views of disengagement theory and active theory, emphasizing people's need to maintain the connection between the past and the present (Ke, 2012). People only need to maintain their required level of social participation to get the maximum happiness and self-esteem. Activity itself is not important, he argues, but rather the continuity of lifestyle it reflects. For older

people who have always been active and involved in society, it may be important to continue to maintain a high level of activity. Many people are perfectly happy when they continue to do work or leisure activities that are similar to what they enjoyed in the past (Chau, 2022). On the other hand, people who have never been very active might be just fine watching the world from a rocking chair, taking a walk in a quiet place, and reading a book by themselves (Naderyan et al, 2019). When aging brings significant physical and cognitive changes, older people may become dependent on caregivers or have to make new arrangements for their lives. Support from family, friends or community services may help reduce this fragmentation. According to continuity theory, the elderly should be kept in the community rather than in nursing homes and helped to live independently as much as possible (van Leeuwen et al, 2022).

Although continuity theory recognizes the important role of personality in adapting to aging, an overemphasis on continuity can be misleading: The pursuit of continuity may reduce the self-esteem of older persons in their later years and may prevent them from changing their lifestyles according to their individual desires when they are unable to maintain their earlier lifestyles due to poor health or financial constraints (Lei, 2012). The biggest flaw of this theory is that it neglects the influence of external social factors on personality change and aging process. In fact, the elderly with high life satisfaction tends to be those who do not stick to a fixed lifestyle, and can constantly change their lifestyle as social circumstances change (Li, 2018).

2.1.2b Social Identity Theory

Social identity theory (SIT) is described as a theory that predicts certain intergroup behaviours on the basis of perceived group status differences, the perceived legitimacy and stability of those status differences, and the perceived ability to move from one group to another (Turner et al, 1986). In other words, social identity is a person's sense of who they are based on their group membership. Social identity theory attempts to explain how and why individuals identify as members of a group, and to quantify the impact of that identification on their behaviour. Based on the study of Tajfel and Turner (1979), social identity theory has three main concepts: social categorization, social identification and social comparison and positive distinctiveness. Social categorization means that people usually regard the society as two distinct camps:

ingroup and outgroup. This classification is based on many different factors, including race, religion, gender, age, ethnic background, occupation, etc. (Turner, 1999). Meanwhile, social classification is also one of the sources of prejudice. Tajfel (1979) proposed that the groups which people belonged to be an important source of pride and self-esteem. Social identification is that when people think they belong to groups that are classified according to their standards, they will accept the values and behaviours of the group in varying degrees. Because self-concept based on membership to social groups, when we interact with another person as a member of a social group, our social identification affects our behaviour towards them. Cialdini et al. (1976) also claimed that social identity was able to improve people's self-esteem. As for social comparison and positive distinctiveness, it means that positive distinctiveness is motivation to show that our ingroup is better than an outgroup. People usually improve and establish the superiority of their group through comparing with outgroup in a similar status. Additionally, it contains the central hypothesis of social identity theory which is that group members of an in-group will seek to find negative aspects of an out-group, thus enhancing their self-image (Papacharissi, 2010).

Obviously, one of the advantages of such a grand theory is that it has demonstrated the social categorization in intergroup behaviours, allowed people to differentiate between social and personal identities and has provided explanations for other areas of economics (Hogg et al, 1987). For example, social identity theory supports the contention that our behaviours are influenced by those with whom we associate. In labour market, if the ingroup (like age) has the intention to retire ahead of time, the group's retirement behaviour will tend to become making early retirement decisions. On the contrary, if the group desires to continues to work after reaching the retirement age, the retirement behaviour of this group will tend to postpone retirement. Another advantage of social identity theory is that it can be applied to many different problems, such as interethnic conflict, political activism and workplace behaviour (Haslam et al, 2000). Eckel and Grossman (2005) also suggested that experiments in economics had found that social identity might affect behaviour in various situations. For example, Chen and Li (2009) use a number of different games to quantify differences in altruism, reciprocity, and punishment towards in- and out-group members. Additionally, Li et al. (2011) showed that group identity affects the choice of trading partners and the prices realized in an experimental oligopolistic market. Overall, social identity theory is beneficial for people to understand and

resolve large number of social and organizational problems as well as economic problems as it has provided an analytical framework and lots of experimental work.

However, there are also some limitations in social identity theory. Firstly, some people realised that there are some problems about the availability of social identity theory as they hold the idea that hypotheses as well as counterhypotheses coexist at the same time (Brown, 2000). In fact, one of the prominent features of social identity theory is that it does not provide a simple truth, but emphasizes the inherent contingency in many social processes (Bourhis & Gagnon, 2001). In other words, social identity theory makes people adapt to their perception and behaviour in order to adapt to the opportunities and limitations inherent in the current situation. Secondly, in the process of development in recent years, both SIT and the relationship between social identity theory and other theories have been discussed (Smith, 2014). Some new theories have exerted a great impact on social identity theory, making people use social identity theory more critically. For example, uncertainty identity theory (Hogg, 2007) holds that individuals' perception of uncertainty encourages them to identify with certain groups. These groups can help them reduce or control the uncertainty they feel. Postmes and Jetten (2006) believe that as for the relationship between individuals and groups, the two are not at two extreme dimensions. The relationship between individuals and groups is mutual influence. Experience is restricted by group norms, and group norms can also be questioned, discussed and modified by individuals.

In the study of social identity, people usually regard organizations, enterprises, leadership and employees as their research objects (Hogg & Terry, 2000). The main purpose of these studies is to explore the best organization operation mode and create the best working atmosphere for employees, so as to provide theoretical support for enterprises to increase production and increase profits (Van Zomeren, 2008). From the perspective of social identity theory, some scholars have explored how the process of employee social identification and self-categorization come into being in organizational environment, and how these processes can promote the emergence of a series of organizational phenomena (Desmette and Gaillard, 2008; Marique et al, 2013). In addition to the research at the micro level of the organization, there are many new discoveries in the research on enterprises and companies. Miller, Breton-Miller and

Lester (2011) believed that different types of companies had different social environment, and then had different role identification and institutional logic. These differences could explain these companies' differences in company strategy and company performance.

In terms of the research topic addressed in this thesis - retirement behaviour in Chinese labour market - the social identity theory inspires me a new perspective which is that focusing on individual employees in different groups. The influence of social identification on individual employees will also be generated in the employee group (Ellemers et al, 2004). The formation process of social identity affects not only individual work motivation, but also group work motivation. That is to say, social identity theory provides theoretical support for the data sources of qualitative research, thus making the data collection of qualitative research more rigorous and scientific. Another new point of view is that there is a positive correlation between social identity and job satisfaction, while social identity and stress experience have a significant negative correlation (Haslam et al, 2005). Social identity will affect the stress experience of the individual, the higher the level of identification, the better the response to the stress (Haslam & Reicher, 2006). The counteraction of social identity to stress is also very obvious. From this, we can see that social identity process is indeed related to individual health and happiness. Social identity theory can play more roles in this field. In my study, health and satisfaction (qualitative interviewees) are important factors that affect retirement. Because different social identification factors will lead to the rise or fall of individual job satisfaction, which is equivalent to whether employees decide to leave the job or retire earlier.

2.1.2c Network Theory

Since the 1970s, the empirical study of networks has played a central role in social science, and many of the mathematical and statistical tools used for studying networks have been first developed in sociology. Social network theory views social relationships in terms of nodes and ties (Dunn, 1983). Nodes are the individual actors within the networks, and ties are the relationships between the actors. The concept of social network has surpassed the category of interpersonal relationship. The actor of network can be either an individual or a gathering unit, such as family, department and organization (Liu et al, 2017). Berkowitz (2013) claimed that social network was closely related to the acquisition of enterprise knowledge, information and

other resources. Different members of the network shared various scarce resources. The factors such as the number, direction, density, strength and actor's location in the network affect the way and efficiency of resource flow. According to the different points of view, the social network theory has two main aspects: the relationship elements and the structural elements (Ding et al, 2019). Relational elements concern the social adhesion between actors, and illustrate specific behaviours and processes through the density, intensity, symmetry and scale of social connections. Structural elements are concerned about the location of network participants in the network, and discuss the social structure reflected by the relationship between two or more than two actors and third parties, as well as the formation and evolution mode of this structure. Specifically, the weak and strong ties, social capital and structural holes are the three core theories of social network theory. Granovetter (1973) put forward the theory of "strong and weak ties" and "embeddedness". He believed that people's economic actions were always embedded in social relations, and weak ties played the role of information bridges. Lin (2013) thought that social capital referred to the social structure resources that individuals had. They were composed of elements that constituted a social structure, mainly in social groups and social relations networks. Burt (2004) believed that there was a direct or indirect relationship between actors. Occasional interruption would create structural holes, resulting in opportunities and advantages to get information, time, personnel and control.

Based on the previous introduction, one of advantage of social network theory is that it offers an explanation for how random people are connected. It's useful in the study of large groups and understanding how their members relate to others in the group (Bullmore & Sporns, 2009). From the micro level, social network theory focuses on the interactive relationship and evolution process of individuals (Wellman, 2008). It describes the interaction relationship among individual objects through quantitative indicators, which not only reflects the overall network structure characteristics, but also reveals the status and attributes of individual objects. Another main strength of social network theory is the information it provides on the existing institutional actors and relationships, the existing decision framing, and thus the influence and exchange of information for progressing adaptation (Lin, 1999). In addition, quantitative social network analyses provides additional information and can explore correlations between network variables and attribute variables or other social indicators (Madey et al, 2002). The third advantage of such theory is that it can applied into many different fields. Social networks

can be simply regarded as the interaction structure of the various relationships within the body of behaviour and the interaction model between the behaviour subject and the external. Therefore, social network theory can be applied in the organizational structure of enterprises, the strategic alliance of enterprises, the initiation and development of SMEs, and other related research fields (Ter Wal & Boschma, 2009). Additionally, social network theory helps in the study of the physical and mental health of urban and rural residents (Szreter & Woolcock, 2004). In rural areas or urban areas, the scale of personal network plays a positive role in physical and mental health. People's social network structure plays a different role in physical health and mental health.

Nevertheless, the limitations of social network theory are also obvious. First of all, when you interpret relationships or ties, it is difficult to avoid the subjective bias and it is difficult to generalise them (Bowler & Brass, 2006). Different people organize perception from different categories, while each person has its own characteristics and content which can draw the attention. Therefore, when studying social relations, there will inevitably be bias caused by factors such as personal emotion or personal experience. That is to say, researchers may have subjective bias in interpreting social relations. Secondly, quantitative methods in social network theory are time-consuming, it requires a large sample size, or ego-centric partial networks. It tends to focus on methodology and technical issues rather than on hypotheses and theories, and can be subject to the over-interpretation of results (Cross, 2002). Additionally, data are often difficult and resource intensive to obtain, and empirical studies are often quite small, which can make it hard to use for exploration of alternative measurement strategies. Thirdly, for the study of social network theory, more attention is paid to social relations at a point of time, and the dynamic evolution and formation mechanism are not fully revealed (Fowler & Christakis, 2008). Further, previous studies didnot observe the change of network structure elements and their relationship changes in different periods, so they could not effectively reveal the main influencing factors and roles of network relationship changes.

Over time, social network theory is gradually combined with more fields, thus developing more new content. In recent years, the application results of social network theory mainly include the following aspects: government and social resource allocation, competitive intelligence,

knowledge management and user services (Ter Wal & Boschma, 2009). Social network research represented by these areas gradually reflects its important application value. For example, in organizations or companies, we can start with a comparative analysis of informal relations network and formal working relationship network. Then we should have an in-depth understanding of the degree of interaction among the members of the organization, the connection density, the way of information transmission and the layout of the connection hierarchy, so as to provide help for the more efficient management within the organization.

In my research area, social network theory provides me a new horizon about how to analyses retirement behaviour. we can integrate a variety of informal relations networks within the organization to measure the comprehensive power and influence of different members (Wellman, 2008). This will be reflected more in the interview process of collecting qualitative research data. And on the basis of further consideration, if a number of members (or cores) that play a key role in an organization (or network) are deleted, how much is the extent of the damage to the organization and the impact of the normal operation. In addition, in order to ensure the normal operation and security of the organization, how to manage the different members (consider retirement choice or leave the current job) and so on. Another inspiration for me through the social network theory is about job allocation and job searching behaviour. According to previous research, people with poor human capital and political capital are more likely to use social network resources to achieve career mobility more frequently (Feinberg, 2019). The flow of social network resources is from the government and state-owned enterprises to individual, collective, foreign joint ventures, wholly foreign-owned, new economic sectors or a market-based economic entity without a supervisor. That is to say, we can study the potential employees who have possibilities to leave the job or retire ahead of time through the social network. The third point which can enrich my research topic is about health. Since retirement is closely related to pensions and mortgages, health is an important part of the study. People's social network structure plays a different role in physical health and mental health. The proportion of strong ties in the network does not play a significant role in mental health, but it is negative to the health of the body (Enriques & Romano, 2019). Furthermore, the relative status of individuals in the social network also plays a role in people's health. The higher the relative position of individuals in urban residents, the better their mental health. This may be due to the higher psychological satisfaction of people with higher network status.

Higher network status brings a stronger sense of control, which makes it more likely for individuals to call the resources in the network. Overall, social network theory provides a certain theoretical framework for data collection and analysis of my qualitative research.

2.2 The Determinants of Retirement Decisions

In this chapter, we will focus on analysing the factors that influence people's retirement behaviour. Based on the framework support provided by the previous theoretical chapter, it not only analyses the factors that people consider when making retirement choices, but also lays a solid foundation for my subsequent research on the relationship between reverse mortgage loan and retirement behaviour.

2.2.1 Gender and Retirement

Based on the social identity theory mentioned in the previous chapter, gender is considered to be an influential factor in retirement behaviour to a certain extent. McNamara and Williamson (2004) thought that many prior studies had reported evidence of lower labour force participation rates for women, but this literature gave very little attention to how gender and age jointly moderated the effect of various other predictors of labour force participation. They believed that women were more likely than were men to spend substantial amounts of time in child rearing and care-giving, and were correspondingly more likely to work intermittently or in low wage jobs. The results for a simplified version of the model with which McNamara and Williamson started this phase of our analyses. The model initially included all two-way interactions for gender, and all significant two-way interactions for age. This table showed that, for example, while marital status had little effect on the labour force participation of men, it had a strong negative effect for women.

Overall, gender had differentiated retirement behaviour over the twentieth century, although women’s and men’s work histories had become more similar. Gender differences had been addressed in many studies. In general, men were more likely to engage in paid work at higher

ages than women. Obvious reasons for this were, on the one hand, lower statutory retirement ages for women in some countries and, on the other hand, social roles and responsibility within the family that lead to engagement in informal work (Komp, et al., 2010). Some studies, however, found different trends. Finch (2014) stated that women with interrupted careers, e.g., due to care for children or family members, were likely to extend their career life in order to make up for opportunity costs. Their counterparts, or in other words, women with high work orientation also tended to prolong paid work due to 'status maintenance'. However, extending career life might be more difficult for the first group of women depending on the length of career dis-attachment (Finch, 2014). Status maintenance as a pull factor to stay in employment could be related to the continuity theory since individuals tend to preserve their identity with a work role in the case of high job involvement (BarnesFarrell, 2003). Looking at both sexes, one aspect that men and women had in common was that they tended to take decisions according to retirement plans of life partners or close friends (Nilsson, et al., 2011).

In China, Lee (2005) examined whether gender would influence retirement decision among older workers in Hong Kong based on telephone survey of 950 respondents. According to Lee's study, there was almost an even split in terms of gender, males accounted for 44% of the sample, while females accounted for 56% of the sample. In terms of economic activity, among males, both males and females reaching mandatory retirement appeared to be the main reason for work stoppage, in particular for older men. Over 80% of men and 50% of women cited mandatory retirement age as the reason for stopping work. Based on Lee's findings, older men were more likely to participate in the labour force than older women. Interestingly, older workers, in particular older women, with pension were less likely to retire. Having a working spouse decreased the likelihood of retirement and older workers, in particular older women, living with married children were more likely to retire.

As for other studies about the early retirement in China, Sun and Wu (2009) used a normal linear regression model to find that women were more likely to be influenced by economic factors, while men were more susceptible to personal factors. Wu (2013) believed that gender had a significant impact on early retirement. Compared with men, Wu used Logit model to analyses his data and discovered that the possibility of early retirement was 89% lower than

that of men. For men, it was easier for them to retire early. It should arouse the attention of the human resources and social security departments. Although the average life expectancy of women was significantly higher than that of men in terms of average years of education, the age of policy retirement and the actual age of retirement were significantly lower than those of men (Zhao, 2013). Early retirement women were mainly female government workers who retired passively, while most of men were workers. Regression analyses showed that the top three factors that affected the actual retirement age in the model were age, gender and policy retirement age respectively (Dong & Jiang, 2015). Based on gender differences, China has set a policy retirement age for men with high and low women (men with high retirement age, while women with low retirement age). At the same time, based on the difference in sex and policy retirement age, the gender difference between male and female workers at different ages was significantly different.

2.2.2 Education level and Retirement

Hypothesis 1: Education level has a significant positive effect on retirement behaviour.

The personal effect and social identity theory in the theoretical chapter provide a theoretical framework for me to choose education as one of the important factors of retirement behaviour. Joo and Grable (2005) developed a framework that could be used to examine the retirement savings decision and they believed having a retirement savings program related positively to retirement confidence. Their model showed that among the individual differences, respondents who indicated having a savings program for retirement were not statistically significantly different from those who did not have a program in terms of their age, gender, marital status, and ethnicity. However, those who had higher educational attainment levels (i.e., college graduate and higher) were more likely to have a savings program for retirement than those who had lower educational attainment levels.

Lawless, Buggy and Codd (2015) further studied the relationship between education level and retirement behaviour through Stepwise Linear Regression, and believed that the elderly with lower education level had a higher proportion of early retirement through disability. A total of

334 of 1179 study subjects (28%) retired early through disability. Comparison of those retired early with and without disability showed a significantly higher frequency of lower educational attainment both personally and for parents. Men with lower educational attainment and from a non-professional background were more likely to retire early through disability. Non-professional disabled respondents with less well-educated parents had lower educational attainment than non-disabled respondents. Based on their results, respondent's education, their father's education and their own professional status were independently and significantly associated with the outcome of interest.

Overall, levels of education are said to have an impact on the timing of retirement. Whereas lower education was associated with early retirement (Siegrist, et al., 2006), higher education was related to a later exit from the labour force. The postponement of retirement could be explained by a later career onset due to schooling or by the connection to more attractive jobs and working conditions (Peiro, et al., 2012). Even though human capital investment in terms of education usually paid off in the long run, pension entitlements were often bound to years of contribution to the pension system. Longer time spent on education means consequently that the time to contribute to the pension system had to be made up in later life (Micheel, et al., 2010). Furthermore, to pass on knowledge among higher educated workers was a major reason to take up post-retirement activities next to personal development and gain recognition (Maxin & Deller, 2011). Over-education did not appear to have an impact on early retirement decisions. Rubb (2009) suggested that over-education in later career stages might not be reflective to skills mismatch if workers engaged in a bridge job between their career job and complete labour force withdrawal.

In China, by combining the anticipation and actual behaviour of the middle-aged and old people to delay the withdrawal of the labour market, Zhao (2013) examined the impact of the education level of the Chinese and elderly people on the retirement choices at the present stage. He found that from the actual retirement behaviour of workers, the actual retirement age of the people with the highest and lowest education level was relatively late, and women were particularly prominent. Under other conditions, higher education level had a positive effect on real labour participation. The table below showed that after controlling other factors, the expected delay

in retirement was 21% (11%) for the male respondents who had at least a junior college degree, while those who had not received formal education expected that the rate of delayed retirement was 6.36 times as much as those of a junior high school diploma.

Most Chinese researchers also believed that the improvement of the education level was beneficial to the improvement of the manpower capital level and the increase of the effective labour supply, thus the educational level of the workers was closely related to their retirement choices (Niu 2015). Fan (2011) established a normal liner regression model and put forward that the education level was positively related to the labour supply, that was, the workers with higher education were more inclined to prolong the labour supply time. For higher educated workers, the possibility of a decline in the rate of return (or wages) with age was relatively small (Niu, 2015). The delay in retirement not only had higher expected returns, but also a rational choice to compensate for the initial cost of education (Ding, 2013). After a stepwise linear regression model, Tian and Xi (2017) came up with the idea that the labour supply had a "inverted U" trend with the improvement of the education level, and the effect of the improvement of the education level on the labour supply included the reception effect and the substitution effect. Based on the income effect and substitution effect, the level of labour supply presented a nonlinear change which increased first and then decreased with the increase of education level.

2.2.3 Health and Retirement

Hypothesis 2: Health condition has a significant positive influence on retirement behaviour.

From the personal effect and life-cycle theory in Chapter 2.1, we can find that health has a significant impact on people's retirement behaviour. As many studies examining the relationship between health and retirement had failed to reach agreement on the relative importance of health in comparison to financial variables, McGarry (2004) took advantage of a unique measure of labour force attachment, the subjective probability of continued work, to re-examine the role of health and changes in health status. By focusing exclusively on workers, McGarry eliminated the concern about justification bias among retired individuals and found

that subjective reports of health did have a positively significant effects on retirement, effects that were arguably stronger than those of the financial variables. The effects of subjective health remained large even when more objective measures of health, such as disease conditions, are included in the model. McGarry used Logit model to show that despite the lack of justification bias, poor health had a large and significant effect on labour market attachment. Additionally, when these alternative measures of health were included along with subjective health status, several have significant effects. In particular, the probability of living to age 85 remained a strong predictor of expected behaviour.

Conley and Thompson (2013) also examined how health shocks affected retirement decisions. They used data from the Panel Study of Income Dynamics to estimate a first-differences model of health shocks on retirement over the course of the 2000s in the United States. However, based on their analyses, they suggested that acute health shocks were associated with labour market exits for older American men but not women. These results appeared particularly strong for blacks, whose labour force participation seemed particularly sensitive to health status, which might be due to different occupations for blacks and whites.

Other researchers (e.g. Roberts, et al., 2010) also believed that health was a key determinant for the timing of retirement, especially in view of early retirement. Most of them believed health factor had a significant positive effect on retirement behaviour. The impact of health on the timing of retirement is as well connected to the continuity theory. Accordingly, poor health can be considered as discontinuity within the working sphere. As individuals seek to maintain stability, they are likely to choose retirement over employment (von Bonsdorff & Ilmarinen, 2012). According to Feldman (1994), poor health and work ability can be reasons to retire early, however, it might not impact the personal attitudes towards work. Because of that, early retirement has also been observed for people with good health, who would like to spend more time with family and pursue leisure activities (Feldman, 1994). Analysing self-ratings of health versus objective instruments to measure health, Dwyer & Mitchell (1999) found that poor health influences retirement plans more than economic variables. However, even though poor health has been identified to be an important influential factor for early retirement, individuals

with good health also choose to retire instead of prolonging their working life (Büsch, et al., 2014).

In China, Zhang (2018) thought problems arising from different health measurements were also different. There was a difference between subjective and objective health measurement. He believed that it was not only necessary to examine the physical health of the observers, but also to observe the mental health of the observers. Based on principal component analyses, Wang put forward that due to illness or injury or low working ability (because of emotional and mental health problems), these male observers had lower opportunity cost and higher opportunity cost for leisure. Thus, they were more likely to retire earlier than healthy men. Similarly, due to physical health problems, women with low working ability would choose to retire early, but not as men with low working ability. In general, Wang believed that health factors had a significant positive effect on the choice of men's retirement opportunities, especially for men with low working abilities, which might lead to their early retirement. In contrast, health factors were not particularly significant for female workers.

Most Chinese researchers also held the point that the level of personal health was the basis for workers to work. Health conditions determined the type and workload of a person (Ding, 2013). Sun (2018) used a logit model to find out that each increase in health status would increase the participation of rural residents by 3.48 percentage points, and the impact of health on the labour participation of rural residents in China was higher than that of the labour participation of rural residents. Qian and Li (2018) also suggested that health conditions had a significant positive effect on the willingness of workers to retire and their retirement age via a linear regression model. The better their health was, the more they tended to postpone retirement. However, an empirical study by Zhang (2010) found that health was a motivation for women to retire early, but it was not the reason why men retire early. The results showed that health was an important factor in the withdrawal of the labour force for all the samples; health had a significant impact on male withdrawal, while it had a weak impact on the exit of women; the health of rural labour had a significant impact on withdrawal, and the health of urban labour had no effect on withdrawal.

2.2.4 Age and Retirement

Hypothesis 3: Age has a significant positive effect on retirement behaviour.

Based on the theoretical framework provided by life-cycle theory, age is regarded as one of the factors affecting people's retirement behaviour. Age discrimination and negative age stereotypes still hinder older workers to continue working at higher ages (Radl, 2012). In 2000, the EU introduced a framework for equal treatment in employment, which is also specifically directed to age discrimination (Council Directive 2000/78/EC). In the following years, age was included into the discrimination law in many European countries, e.g. 2008 in Sweden. Posthuma & Campion (2009) point out that age stereotypes are different from prejudice as they can be unconscious and subtle. However, they impact labour market opportunities for older workers and seems to be especially prevalent in the hiring process, selection for trainings and layoffs (Posthuma & Campion, 2009).

Pensionable ages and age norms are strongly related to each other. Institutional settings, which may facilitate the timing of retirement (early, on-time, late) are important to look at when comparing different countries. Compared to Nordic countries where labour participation at higher ages is relatively common, other European countries have difficulties to engage older workers in the labour market, especially female workers (Komp, et al., 2010). These gaps might reflect different pension legislations of countries with regards to the age of pension entitlement, early retirement windows, flexible transitions into retirement and special regulations for unemployed or disabled persons (Hamblin, 2013). Most of the European countries have increased the official retirement age in the past few years, however, there is still an observable difference between countries. For instance, Denmark is planning to connect the retirement age to life expectancy in order to create sustainable retirement schemes. Other countries such as Finland, Sweden, or Norway have abolished the fixed statutory retirement age and introduced a flexible age span to retire. The United Kingdom only has a lower limit of the retirement age, which means that there is no threshold that automatically terminates working contracts (Sievert, et al., 2013).

In China, people are more concerned about retirement age than their own age. Liu et al (2011) point out that the retirement of men and women at different ages makes a significant difference in economic income and welfare benefits between men and women, especially female cadres and female technicians. They find out that prolonging retirement age has significant negative effect on people's retirement behaviour. Xu (2012), from the unique perspective of working age, studied the factors that affect people's choice of work or retirement from both micro and macro perspectives. By comparing the difference between working age and retirement age, he found that working age has a significant negative effect on retirement behaviour.

2.2.5 Household registration and Retirement

Hypothesis 4: People with non-agriculture household are more likely to choose to continue to work rather than retire.

The household registration system is a basic administrative system in China. At present, only one country in the world, the people's Republic of China, has a strict household registration system (Zhu, 2020). For example, a citizen with a rural household can still work in the city, but the benefits are for rural household, not non-rural household. In the history of China, the household registration system is directly related to the land, which is based on family and clan. The modern household registration system is a legal system for the state to collect, confirm and register the basic information of citizens' population, such as birth, death, kinship, legal address, etc (Zhu, 2020). The household registration system involved in this study is divided into two categories: rural household registration and non-rural household registration. Lin and Xie (2016) suggested that when people studied the retirement behaviour of labour market, they inevitably needed to pay attention to the household registration of workers, because it involved the workers' own ideology and behaviour mode. And in China, rural household registration and non-rural household registration enjoy and face different systems and regulations (Feng and Hu, 2008). For people with different types of household registration, there are even different rules and regulations between different cities. However, Li and Zhao (2010) showed that the enterprise would buy the corresponding enterprise annuity as the supplement of endowment insurance for them, which promoted employees to work to the legal retirement age. While for the workers who were not registered in rural areas, most of them preferred not to retire early in

order to get enough pension. Other people who tended to retire early belong to special types of work, such as electrical industry and aerial work. Li and Song (2009) also made it clear that different household registration had a random effect on retirement behaviour. They could not clearly put forward that household registration had a positive or negative impact on retirement behaviour, but the different rules and regulations brought by household registration do have a significant impact on workers' retirement behaviour.

2.2.6 Houses and Retirement

Hypothesis 5: The ownership of house has significant positive effect on retirement behaviour.

Housing was selected as a major topic for the 2017 Risk Survey because it is a very important issue for retirees, many of whom must make several big decisions about housing (Risk report, 2017). Nakajima & Telyukova (2013) found through thematic analyses that although the housing assets had no response to the expenditure risk and could not be regarded as a preventive asset, owning their own houses had an impact on people's retirement behaviour to a certain extent. They believed that houses had a significant positive effect on retirement behaviour because people were more inclined to the stability of life after retirement, and owning real estate met the demand of stability. It could not only meet the needs of living, but also be very convenient when people wanted to move. Desmond (2018) also pointed out the situation via summarizing the policy that one of the benefits of homeownership was that people was able to deduct mortgage interest and property taxes on federal returns. Though the 2017 tax bill lessened these benefits somewhat, they still exist. Other deductions, including mortgage points, could also work to lower the amount of tax people need to pay to the IRS (Internal Revenue Service).

In China, Zhang (2016) proposed through statistical analyses of questionnaire data that the elderly have a higher proportion of housing ownership, a higher proportion of housing equity in their total wealth, and less mortgage debt. The potential need to tap into housing wealth became more pressing as retirement approaches, and an unexpected decline in housing wealth could lead to a delay in retirement or a return to the workforce. Zhang believed that the real

value of housing had a significant negative effect on retirement behaviour. At the same time, mortgage loans were associated with later retirement, and falling home values had a greater impact on later retirement and were more likely to reverse the retirement of mortgage holders. Qian and Li (2018) combined the total value of a home with the number of houses owned, suggesting that the number of properties owned should also be taken into account when estimating the value of a property, if it was related to an individual or a family.

2.2.7 Pension and Retirement

Hypothesis 6: Urban resident basic pension insurance has a significant positive effect on retirement behaviour.

The pull Effect in Chapter 2.1 discusses the effect of social security on retirement behaviour, so we choose pension as one of the factors affecting people's retirement behaviour to study. Cross-section studies had also been used to determine the effect of pension schemes on inducing retirement. Disney et al. (1994) and Meghir and Whitehouse (1997), in studies using UK data, put forward that pension had a significant positive effect on retirement behaviour. They found that workers with occupational pension rights tended to remain longer in particular jobs, but also tended to retire earlier than those without them; also, the earlier the age at which workers began to accrue these rights, the more likely they were to take early retirement. The income and wealth effects of occupational pension assets therefore appeared to dominate the intertemporal substitution effect which would tend to delay retirement since greater work leaded to a higher final salary pension. Selin (2017) also find that for workers without occupational pension rights, the most likely causes of permanent job exit prior to normal retirement age were redundancy and ill-health. There were also offsetting effects present with unfunded state pension schemes, but they were rather different from those operating with funded private pension schemes. On the one hand, Kim (2020) argued that if higher social security taxes were needed to pay the state pensions of the growing elderly population, this provided a disincentive effect that could lead to a reduction in labour force participation and earlier retirement. That is, pension has a significant positive effect on retirement behaviour. On the other hand, Gorden and Blinder (1980) argued that state pensions did not necessarily have the effect of encouraging earlier retirement, since delayed retirement after state pension age

could result in a more than actuarially fair increase in the state pension. That is, pension has no significant positive or negative effect on retirement behaviour. The effects differ with different social security systems, of course, and the net effect remains an empirical question for each system (Blake, 2004).

In China, Shen (2015) used a liner regression model to show that the basic pension replacement rate was an important indicator reflecting the relative level of retirement pension for workers. Pension was an important source of income after workers' retirement, and the substitution rate of pension might have an important impact on the retirement choice of workers (Liu et al., 2019). The higher the substitution rate, the more the workers tended to retire in advance. The results of Zhang (2018) also showed that the increase of pension made older men tend to retire ahead of time, but the retirement behaviour of older women was not affected, and the retirement behaviour of women was often related to their family environment. Che, Wang and Ma (2006) had pointed out further that the discounted income of the future pension was the main factor affecting the individual's expected retirement age. They created a Logit model to find that the pension reform did have a significant positive impact on people's retirement expectations, but the agreement between the expected retirement age and the actual retirement age depended on whether people can accurately anticipate the pension changes. Additionally, Lin (2017) found that the welfare expansion of the public pension system in the 60~80 years of the twentieth Century was accompanied by the labour participation rate of the elderly and the decline of the actual age of the withdrawal of the labour market. In 1990s, the slow recovery of the labour participation rate of the elderly and the improvement of the effective retirement age were synchronized with the welfare contraction of the public pension system. That is, pension was regarded as an important role on retirement behaviour.

2.2.8 Insurance and Retirement

Hypothesis 7: Commercial endowment insurance has a significant negative effect on retirement behaviour.

Based on the theoretical framework provided by the pull effect, we also found the role of insurance in social security, whether governmental or commercial. Gruber (1998) put forward that 63 percent of working Americans "would delay retirement until becoming eligible for Medicare (age 65) if their employers were not going to provide health coverage" despite the fact that 50 percent "said they would prefer to retire early-by age 62". From his research, the rationale for why health insurance should affect retirement is straightforward. French and Jones (2011) also believed that health insurance would have a positive impact on people's retirement behaviour. They used case study to investigate people aged 60-65 and found that people aged 62 and 63 would tend to retire early if they had corresponding health insurance. In their survey, except for the corresponding insurance purchased by enterprises, if individuals still had investment insurance, these people were more likely to retire than those mentioned above. In the United States, there is currently a strong link between health insurance and employment (Nyce et al, 2013). They believe that in the United States, health insurance had a significant positive effect on retirement behaviour, which means that the close link between health insurance and employment may cause workers to delay retirement until they are 65. However, some employers provide medical insurance benefits to retirees, and individuals eligible for such benefits do not have to wait until age 65 to receive group medical insurance. Thus, Nyce et al. (2013) investigated the impact of retiree health insurance on early retirement using employee-level data from 54 diverse firms to establish a Logit model and they found that retiree health insurance had the greatest impact between the ages of 62 and 64. Moreover, the turnover rate in this age group was significantly higher than that of workers of other ages.

In China, because most of the workers have urban basic endowment insurance, researchers should pay more attention to the impact of commercial insurance when studying the relationship between insurance and retirement behaviour (Qiao, 2019). Liu, Zheng and Zhou (2019) also claimed that in China, the initial amount of pension after retirement was related to the year of payment, so workers who only had basic urban pension insurance were more inclined to work to the legal retirement age to get the maximum amount of pension. However, people aged between 60 and 65 who had additional pension insurance, such as commercial bank insurance, were more likely to apply for early retirement. They put forward that commercial insurance had a significant positive effect on retirement behaviour. Kang (2014) also identified a link between insurance and retirement behaviour via a stepwise linear

regression. But he argued that there was no significant impact on China's basic pension, because workers' pension benefits could grow normally as they retired. Thus, this means that even though they're retiring early and getting a smaller initial pension, they're getting a bigger pension every year. In addition, Sun (2018) used a logit model to point out that although commercial insurance had influenced the retirement decisions of middle-aged and elderly people to some extent, it was far from having a significant effect. Through interviews with retirees, he found that although the extra commercial insurance encouraged people to think about retirement, in real life, barring illness or accident, they still tended to work until the full retirement age.

2.2.9 Family Income and Retirement

Hypothesis 8: Both family income and retirement income have a significant positive influence on retirement behaviour.

Family income is one of the most discussed factors in all theories. Personal effect, life-cycle theory and continuity theory all provide theoretical expenditure and framework for this factor. Retirement planning is inextricably linked with accumulation of wealth. Without sufficient financial resources to meet one's obligations during retirement, workers simply cannot afford to retire. Thus, wealth not only determines the decision to retire but also affects its timing, which means that family income should have a significant positive effect on retirement behaviour. This hypothesis had been confirmed by several studies showing that financial factors like wealth and labour income affected the retirement decision (Dorn & Sousa-Poza, 2005; Bütler et al., 2004). Consequently, while early retirement was barely affordable to poorer individuals, richer individuals had the option to accumulate sufficient wealth in order to retire early (Dorn and Sousa-Poza 2005). Existing research showed that individuals' retirement decisions often failed to maximize retirement wealth (Brown, 2009). Some authors pointed out that information biases and financial illiteracy played important roles for retirement planning (Clark et al., 2012). Accordingly, it had been shown for the US that richer individuals were more successful in retirement planning, while individuals with low educational attainment lacked financial literacy and were therefore less successful (Lusardi & Mitchell, 2011). A positive relationship between successful retirement planning and financial literacy had also

been found for different countries (Bucher-Koenen & Lusardi, 2011; van Rooij et al., 2011). Future pension wealth not only depended on personal financial resources such as wages and wealth, but it was also subject to the generosity of national pension schemes. The relevance of wealth and income thus had to be discussed in the framework of national retirement systems.

In China, the savings and property of individuals and families could generally be used as one of the main sources of life after workers' retirement (Zhou, 2019). Then the savings and property owned by individuals and families would affect the retirement decision and retirement age of workers, and the more personal savings and property, the more they tended to retire in advance and enjoy leisure, which means that family income truly had a significant positive impact on retirement behaviour. Yang and He (2021) also suggested that the main source of life cost for workers after retirement was the savings in working income. Their empirical study showed that the income of workers at work had a significant impact on the retirement decision. The higher the level of workers' income was, the more reluctant to leave the labour market, the more they were willing to postpone the retirement age.

2.2.10 Reverse Mortgage Loans and Retirement Decisions

Hypothesis 9: Reverse mortgage loans have a significant positive effect on retirement behaviour.

Bridge et al (2010) believed that the rapid increase in older people should lead to a significant increase in the demand for reverse mortgage products over the next twenty-five years, especially if industry and government can work together to ensure a sustainable industry with a range of innovations and policy and industry safeguards in place, so that older people with reverse mortgage loans preferred to retire. Castagnetti (2015) also claimed that prime-age homeowners, aware of the product, will anticipate this higher income in the old age, and thus they can choose to retire on time rather than delay the retirement.

However, Chatterjee (2016) showed that although a reverse mortgage provided an opportunity for those households that might not have sufficient liquid assets or financial savings to convert

some of their housing wealth to cash without needing to move or sell their residences, it might also lead some workers to consider early retirement after they are adequately guaranteed for their old age.

Many Chinese researchers also hold a variety of views. Zheng (2018) found that after participating in the housing anti-mortgage insurance, the housing reverse mortgage insurance provided liquidity for retired residents, increased their income after retirement, reduced the saving pressure during their working period, and made the middle-aged and old people more inclined to retire rather than continue to work after reaching retirement age. This not only increased young people's employment opportunities, but also reduced the financial pressure of the government for the aged. Additionally, Ma (2018) used the data from CLASS in 2012 to show that the development of reverse mortgage could effectively increase the income and consumption of the elderly residents who owned real estates, improved their quality of life, and made them more inclined to enjoy life after retirement than to continue working to alleviate financial pressure after reaching retirement age.

2.3 The Determinants of the Choice of Reverse Mortgage Loans

Different from the influencing factors of retirement behavior before, this chapter will pay more attention to the factors related to reverse mortgage products. In other words, this chapter will focus on the factors that influence people's choice of reverse mortgage products.

As increasing longevity had become a risk to quality of life, it might be that older people would be willing to trade off housing equity, for a level of financial security should they have a long life, Rowlingson (2006) showed that for many individuals, housing wealth could represent a significant source of income in retirement as many older people were ‘asset rich, but income poor’.

Bridge et al (2010) summarized previous research concerning RMLs that the reverse mortgage variables mentioned by authors within the 51 sources included in this review could be thematically grouped under seven themes: income, health care, home care, modification, maintenance, investment and special. Rasmussen, Megolughe and Morgan (1997) believed that older people were taking out reverse mortgage products with the intent of making their housing more suitable, and access to home equity might be very important in the context of home modifications and maintenance. Furthermore, Leith (2006) suggested that the majority of older people wanted to stay in their homes not simply because they owned them, frequently mortgage free, but because their homes were repositories of, and gave locational access to, physical, social, and biographical meanings of place.

However, Cutler (2007) and Tilse (2005) showed that the research of retirement decisions should focus more on financial factors. They argued for much greater levels of financial literacy and sound professional advice given the complexities of retirement decisions. Lusardi and Mitchell (2007) also warned that concerned in terms of pension entitlements would become more significant as baby boomers demonstrated a pattern of poorer saving and retirement planning than earlier chohorts. Additionally, Sabia (2008) found that older peoples' ability to age in place was affected by concerns regarding increasing utility charges and property taxes. Boehm and Ehrhardt (1994) said that the importance of product type choice from consumer perspectives was also critical as the interest rate risk of a reverse mortgage often was several orders of magnitude greater than the interest rate risk of other fixed-income securities.

Some Chinese papers are also showed different views on the determinants of the choice of reverse mortgage loans. Through a survey of some middle-aged and elderly people in Nanjing, Li and Quan (2012) used principal component analyses to point out that age, education level, health status, and purchase of health insurance had positive and significant effects on the willingness of middle-aged and elderly people to accept reverse mortgage products, while the number of children, houses, perceptions of income adequacy and traditional concepts have a negative and significant impact on the willingness of middle-aged and elderly people to accept reverse mortgage products.

Liang (2007) showed that there was a positive correlation between the choice of reverse mortgage loan and education level, and whether or not there had been loan experience. Additionally, he found that the choice of reverse mortgage was negatively correlated with age and the number of houses owned via a linear regression model. The older the age, the lower the willingness to choose reverse mortgage. The majority of people who choosed to accept reverse mortgage loans were between 40 and 60 years old. For the number of housings, the elderly with several housings, had strong abilities to feed themselves. It did not need to replace funds through housing, but could achieve a higher level of old-age security through investment and other methods.

Based on a stepwise linear regression model, Li and Quan (2012) found that at 95% confidence level, it is considered that: (1) perfect market management mechanism; (2) government guarantees; (3) enjoy the value-added income of house prices; (4) live to the end of life, these four factors were the key factors affecting the application for reverse mortgage loan.

Zheng (2018) found out the results from the logit model that that the group difference of income effect of reverse mortgage was mainly reflected in age and income. From the changes of income before and after the purchase of housing reverse mortgage products, they found that the income of the insured elderly increased in varying degrees after the purchase of housing pension products. The lower the income of the insured elderly and the older the age, the more significant the effect of income increase will be. Thus, Zheng claimed that retirement income had a negative effect on the choice of RMLs, while there is a positive correlation between age and RMLs.

2.4 Summary

In the chapter of literature review, we firstly sorted out and analysed economic theories and management theories, which provided theoretical framework support for my thesis. After that, we conducted theoretical collation and analysis from the perspectives of retirement behaviour and the choice of reverse mortgage loans. Then we explored the results of previous studies and the contradictions between them, thus providing a further theoretical framework for my

research, such as various influencing factors. Finally, these frameworks and previous research results also provide a research basis for empirical analyses in the next chapter. However, network theory is not used in subsequent analysis. Although network theory helped us to establish the framework to some extent, it was very difficult to collect qualitative interview data during COVID-19, so we did not apply network theory in the subsequent research.

Chapter III Research Methodology

3.1 Introduction

The term “mixed methods” refers to an emergent methodology of research that advances the systematic integration, or “mixing,” of quantitative and qualitative data within a single investigation or sustained program of inquiry. The basic premise of this methodology is that such integration permits a more complete and synergistic utilization of data than do separate quantitative and qualitative data collection and analyses. Mixed methods research originated in the social sciences and has recently expanded into the health and medical sciences including fields such as nursing, family medicine, social work, mental health, pharmacy, allied health, and others. In the last decade, its procedures have been developed and refined to suit a wide variety of research questions (Creswell and Plano Clark, 2011). These procedures include advancing rigor, offering alternative mixed methods designs, specifying a shorthand notation system for describing the designs to increase communication across fields, visualizing procedures through diagrams, noting research questions that can particularly benefit from integration, and developing rationales for conducting various forms of mixed methods studies.

Mixed methods research suggests that quantitative and qualitative research, when combined, allow a better understanding of the problem than quantitative or qualitative approaches alone (Creswell & Plano Clark, 2007). Qualitative methods produce more in-depth, comprehensive information and also use subjective information and participant observation to describe the context, or natural setting, of the variables under consideration, as well as the interactions of the different variables in the context (Miles et al., 1994). It seeks a wide understanding of the entire situation. Whereas there are some disadvantages of qualitative research. The very subjectivity of the inquiry leads to difficulties in establishing the reliability and validity of the approaches and information (Key, 1997). It is very difficult to prevent or detect researcher induced bias. Its scope is limited due to the in-depth, comprehensive data gathering approaches. In this paper, the reverse mortgage loan is almost the new stuff to China. Due to the different social contexts between western and eastern countries, it is not credible to use the conclusions of other countries to explain China's phenomenon. Being deductive and particularistic, quantitative research is based upon formulating the research hypotheses and verifying them empirically on a specific set of data (Somekh & Lewin, 2005). Kealey and Protheroe (1996)

also stated that quantitative research would be strengthened in stating the research problem in very specific and set terms, following firmly the original set of research goals, arriving at more objective conclusions, testing hypothesis, determining the issues of causality, eliminating or minimizing subjectivity of judgment, and allowing for longitudinal measures of subsequent performance of research subjects. Therefore, a combination of qualitative and quantitative methods would help us to obtain a much richer understanding.

3.2 Mixed Method Design

Morse (1991), a nursing researcher, created a notation system that has gained broad acceptance by researchers conducting mixed method studies. As shown in Table 2, Morse's system presents four kinds of mixed method approaches. A plus (+) sign, indicates simultaneous collection of quantitative and qualitative data. An arrow (→) is used to denote that one form of data collection follows another. Uppercase letters (e.g., QUAN, QUAL) indicate major emphasis on the form of data collection, and lowercase letters (e.g., quan, qual) suggest less emphasis. Additionally, Morse describes two types of designs, simultaneous and sequential. Simultaneous designs are implemented at the same time. In the sequential design, one form of data, either the qualitative or quantitative, is collected before the other.

Table 2 mixed method

Approach	Type
QUAL + quan	Simultaneous
QUAL → quan	Sequential
QUAN+ qual	Simultaneous
QUAN → qual	Sequential

Creswell et al. (2003) identified six different types of mixed method designs that a researcher might employ. The designs are Sequential Explanatory; Sequential Exploratory; Sequential Transformative; Concurrent Triangulation; Concurrent Nested, and Concurrent Transformative.

There are four criteria—implementation, priority, integration, and theoretical perspective—that can be used to assist the researcher in using these designs effectively.

3.3 Sequential Explanatory Design

According to Creswell et al. (2003), the sequential explanatory design is "characterized by the collection and analyses of quantitative data followed by the collection and analyses of qualitative data" (p. 223). The steps in this design are illustrated in Table 3. In this design, priority is generally given to the quantitative data, and then the two methods are integrated during the interpretation phase of the study. The objective of the sequential explanatory design is "typically to use qualitative results to assist in explaining and interpreting the findings of a primarily quantitative study" (Creswell et al., 2003, p. 227). Morse (1991) stated that this method can be particularly useful when unexpected results arise in a quantitative study. The qualitative data are useful in examining unexpected results in greater detail. The simplicity of this design is one of its main strengths (Creswell et al.). Thus, in my research, sequential explanatory design will be chosen as mixed research design method.

Table 3 sequential explanatory design

sequential explanatory design								
Quan → Qual								
QUAN	→	QUAN	→	Qual	→	Qual	→	Interpretation of Entire Analyses
Data collection		Data analyses		Data collection		Data analyses		

3.4 Uses of Mixed Methods Research Designs

Mixed methods can be an ideal technique to assess complex interventions (Homer et al., 2008). In my opinion, the mixed research method used in this thesis has the following two uses:

Firstly, validate findings using quantitative and qualitative data sources. Evaluators can use a convergent design to compare findings from qualitative and quantitative data sources. It involves collecting both types of data at roughly the same time; assessing information using parallel constructs for both types of data; separately analysing both types of data; and comparing results through procedures such as a side-by-side comparison in a discussion, transforming the qualitative data set into quantitative scores, or jointly displaying both forms of data. For example, we can collect personal information of interviewees through interviews in qualitative research, and we can also collect personal information through labour market database using quantitative research methods. The two types of data can provide mutual validation and provide a solid foundation for conclusions about interventions.

Secondly, using qualitative data to explore quantitative findings. This explanatory sequential design typically involves two phases: (1) an initial quantitative instrument phase, followed by (2) a qualitative data collection phase, in which the qualitative phase builds directly on the results from the quantitative phase. In this way, the quantitative results are explained in more detail through the qualitative data. For example, findings from instrument data about retirement decisions can be explored further with qualitative focus groups to better understand how the personal thoughts or experiences of individuals match up to the instrument results. This kind of study illustrates the use of mixed methods to explain qualitatively how the quantitative mechanisms might work.

3.5 Advantages and disadvantages

To begin with, the combined strengths of both quantitative and qualitative research can be found when using this method of research (Malina et al, 2011). Further, terms, pictures and narratives can be used to add connotation to numbers. In addition, while using mixed methods of research, researchers have the advantage of using numbers to add precision to words, pictures, and narratives. Another advantage of applying the mixed method in research is that researchers can generate and actually test a grounded theory.

Applying the mixed method of research allows the researcher to tackle a broader and a more complete range of research questions because the researcher is not confined within the tenets of a particular method of research. In addition, researchers have the ability to use the strength of one method of research to counter or overcome the weaknesses in another method (Driscoll et al, 2007). In other words, it incorporates the concept of complementarity. In the advent of a researcher conjuring up a conclusion under this method of research, they are in a better position to provide stronger evidence in the conclusion bit through convergence and collaboration of findings (Hammond, 2005). Furthermore, the method of research allows the researcher to add insights and methods that might be omitted when only a single method is adopted (Wainwright et al, 2007). Similarly, the method allows the researcher to simplify to increase the simplicity of the results. Finally, since the mixed method of research is all about the incorporation of both qualitative and quantitative methods of research, the researcher can produce more complete knowledge necessary to inform theory and practice.

Unfortunately, this method of research also has a few shortcomings despite its overwhelming support from researchers. Firstly, owing to its duplicity content, the application of the mixed methodology in one study can prove difficult to handle by any one single researcher. This is the case especially when the researcher has two apply two or more approaches concurrently (Malina et al, 2011). Furthermore, a researcher choosing to rely on this method of research has to learn about multiple methods and approaches and understand how to appropriately mix them. Similarly, a lot of researchers are of the view that any one researcher should work within either the qualitative or the quantitative method. Moreover, the mixed method of research is more expensive and time consuming than any other method of research due to its duplicity content (Driscoll et al, 2007). Finally, since it is a mixture of two relatively different methods of research, a lot of researchers and methodologists have yet to fully workout problems of interpreting conflicting results, quantitative data and the paradigm mixing.

3.6 Quantitative Methodology

I use matching methods combined with difference-in-differences to estimate the effect of reverse mortgage loans on retirement behaviour. However, it is possible in our context that selection bias may influence our estimates. There are only four pilot cities to implement reverse

mortgage loans, while there are as many as 27 other cities. From Table 2, it can be found that in the experimental group, some variables are observed very little, which may cause a certain degree of bias. In order to deal with this situation, we decided to apply propensity score matching to select a restricted sample of cities without reverse mortgage loans similar to the pilot cities in terms of pre-treatment retirement characteristics.

In the statistical analyses of observational data, propensity score matching (PSM) is a statistical matching technique that attempts to estimate the effect of a treatment, policy, or other intervention by accounting for the covariates that predict receiving the treatment (Rosenbaum & Rubin, 1983). PSM attempts to reduce the bias due to confounding variables that could be found in an estimate of the treatment effect obtained from simply comparing outcomes among units that received the treatment versus those that did not. From the statistical point of view, the general observation and research did not use the method of random grouping, which cannot be based on the effect of the large number theorem, weaken the influence of different variables between the treatment group and the control group, and it is easy to produce systematic bias. Since the treatment group has 4 cities and the control group has 27 cities in our thesis, PSM can effectively help us eliminate the interference factors between groups. According to the research content, we set four cities with reverse mortgage as the treatment group and other cities as the control group. Define the variable D_{kt} = {0,1}. When the interviewee k decides to retire in the period t, the value of D_{kt} is 1, otherwise it is 0. If the subscript k = {i, j}, k = we indicates the respondents in the treatment group and k = j indicates the respondents in the control group, then the average treatment effect can be written as:

Equation (3): $ATT = E(\tau \,|D_{kt} = 1) = E(Y(1)|D_{kt} = 1) - E(Y(0)|D_{kt} = 1)$

Matching is based on the observable features. In the treatment group, find the same or similar respondents with the control group to meet the condition $E\left[Y_{jt}\middle|D_{jt} = 0\right] = E[Y_{it}|D_{it} = 0]$. However, too many or too few dimensions of matching features may produce inappropriate matching results. Therefore, based on the practice of Rosenbaum & Rubin (1983), we first

estimate the probability of retirement of interviewee k in period t by a probit model based on interviewee characteristic *X*, which is called the propensity score:

Equation (4): $P = P(D_{kt} = 1|X)$

After that, the treatment group and the control group were matched according to the approximation of *P*. It should be noted that whether the matching results are valid depends on whether the conditional independence assumption and common support are satisfied. The former means that after controlling for *X*, the implementation of reverse mortgage loans is independent of the decision-making of the respondents' retirement behaviour. The latter means that the respondents in the treatment group can always find the same or similar control group respondents. Finally, we get the average effect estimate, *ATT*, based on propensity score matching. According to the processing methods of Heckman et al. (1997) and Smith & Todd (2005), we can write the formula as follows:

Equation (5): $ATT = \frac{1}{N_t}\sum_{i\in(D=1)}[Y_{it}(1) - \sum_{j\in(D=0)} w(i,j)Y_{jt}(0)]$

Nt means the number of respondents in the treatment group, $w(i,j)$ means the weight of $Y_{jt}(0)$.

The estimation of an average treatment effect on the treated using propensity score matching relies heavily on the validity of the conditional independence assumption. Therefore, it only estimates a causal effect in the absence of selection on unobservable. Rather than simply test for the presence of hidden bias, a more robust method for removing such bias is to combine propensity score matching with difference-in-differences methods (Bradley & Migali, 2019). This is motivated by recent studies which argue that standard matching estimators are usually unsatisfactory, but in combination with difference-in-differences methodology can have the potential to "…improve the quality of non-experimental evaluation results significantly" (Blundell and Costa Dias, 2000). The difference-in-differences matching estimator has the additional advantage of eliminating unobserved time-invariant differences in wages between

acquired and non-acquired firms that standard matching estimators fail to eliminate (Smith and Todd, 2005). Blundell and Costa Dias (2009) claim that the difference-in-differences approach does allow for unobservable affecting treatment participation as long as this bias is constant over time. Therefore, according to the extended content of Smith & Todd (2005), the average effect estimates based on propensity score matching and difference in differences method can be expressed as:

Equation (6): $ATT = \frac{1}{N_t}\sum_{i\in(D=1)}[\Delta Y_{it} - \sum_{j\in(D=0)} w(i,j)\Delta Y_{jt}]$

And $\Delta Y = Y_{t1} - Y_{t2}$

3.7 Qualitative Methodology

We will use thematic analyses as my methodology for qualitative research. Thematic analyse is one of the most common forms of qualitative research. It emphasizes precisely locating, examining, and recording topics or patterns in the data (Braun & Clarke, 2006). Themes are patterns across data sets that are important for the description of a phenomenon and are associated with a particular research question (Guest, MacQueen & Namey, 2011). Thematic analyses can be understood as an umbrella term for various research methods, rather than a single method (Braun & Clarke, 2006). First of all, we will select customers who have purchased reverse mortgage products or are considering buying reverse mortgage products as the interviewees, so as to collect the data needed for qualitative research. Secondly, on the basis of the epistemology of interpretivism and the ontology of constructivism, we will transform the collected data into codes, so as to begin to explore my research questions in the way of thematic analyses.

Although the flexibility of thematic analyses can make it difficult for novices to decide which aspects of data to focus on, and thematic analyses does not allow researchers to make technical claims about language use (e.g., verbal and narrative analyses) (Braun & Clarke, 2006). But thematic analyse is easy to use and suitable for novice researchers who are not familiar with

more complex types of qualitative analyses (Javadi & Zarea, 2016). It allows researchers flexibility in their choice of theoretical framework. Other analyses methods are closely tied to specific theories, but thematic analyses can be used with any theory the researcher chooses (Neuendorf, 2018). With this flexibility, thematic analyses enable a rich, detailed and complex description of the data. In my research this time, we will strictly follow the six steps of thematic analyses and analyse the data collected through interviews in detail to obtain the research results, we need. The six steps are: Becoming familiar with the data; Generating codes; Generating initial themes; Reviewing themes; Defining and naming themes. we will give a more detailed explanation of thematic analyses in the following chapter.

3.8 Summary

Thus, for my research, we will take sequential explanatory method as our mixed research method and the structure of the mixed research methodology should include five parts as follows. First of all, collect and analyse both quantitative (database or close-ended) and qualitative (open-ended) data. Then we will use rigorous procedures in collecting and analysing data appropriate to each method's tradition, such as ensuring the appropriate sample size for quantitative and qualitative analyses. Additionally, we will focus on integrating the data during data collection, analyses, or discussion and using procedures that implement qualitative and quantitative components either concurrently or sequentially, with the same sample or with different samples. The last is framing the procedures within philosophical/theoretical models of research, such as within a social constructionist model that seeks to understand multiple perspectives on a single issue.

Chapter IV The effect of RMLs on Retirement Behaviour – Quantitative method

4.1 Introduction

Population ageing can be measured by the ratio of retirees to workers and the increase in the proportion of retirees is raising sustainability issues for Government Social Security Systems. In many countries the government, through the social security system, provides a pension to retirees. To ease financial pressures as well as to increase older workers' labour force participation, policy makers have been promoting the expansion of working lives finding measures that make postponed labour market exit attractive. However, there have been increasing concerns about the sustainability of these (mainly unfunded) social security systems and the adequacy of households' private retirement savings (Banks, Blundell, Tanner, 1998, Kotlikoff, 2001, Scholz, Seshadri, and Khitatrakun,2006). In China, according to a Report on Population Aging (2017), the current aging population has exceeded 160 million, and it is increasing by nearly 8 million a year. The latest data showed that in the first 10 years of the 21st century, the average annual population growth rate was 0.57%, lower than the last 10 years average annual population growth rate of 1.07%. Based on a Research Report of China's Pension Industry (2017) in terms of 2017-2022 situation analyses and investment Strategy, the current problem in China is that, the retirement population (aged 60 and over) and the working population (population between 15 to 59 years old) ratio is about 19 to 100, and this ratio is expected to be as high as 64 to 100 in 2050, which means that 100 workers will need to support 64 retirees.

As China's prices of products continue to increase, the problems that limited pensions are not enough to cope with the cost of living for the elderly are also exposed. In China, the government divides pension insurance into three parts in order to enable pension insurance to play a role in ensuring life and social harmony. Older people can accumulate their pensions through these three sources. The first is basic pension insurance, the second is enterprise supplementary pension insurance, and the third is personal savings pension insurance. However, due to the continuous improvement of the average life expectancy of residents, the return on investment of pension funds and other issues, the replacement rate expected by the basic pension insurance

provided by the government does not meet the living needs of the elderly. In addition, because the enterprise's supplementary pension insurance is implemented by internal decision-making, the scope of coverage of the second source is limited.

Reverse mortgage loans (RMLs) are one of home equity conversion (HEC) products. It is a kind of mortgage loans that allow the elder to convert housing assets into cash without moving out of their houses. All obligations, including principal, interest and expense, will be paid when the house is sold, the owner permanently moves out of the house or the borrower dies, and the borrower is also able to repay all obligations at any time. Comparing with traditional mortgages, RMLs is conducive to homeowners later in life. According to Nakajima and Telyukova (2012), the older borrowers will undertake more constraints which lead to the difficulty of borrowing. In this situation, old homeowners, such as retirees, are forced to sell their homes if they experience large medical expenses or other additional expenses. Therefore, such an equity borrowing product which is beneficial for the older can reduce the stress of heavy cash burdens and relax borrowing constraints. In foreign countries, the reverse mortgage is the most successful model in terms of housing endowment, originated in Holland, and the most perfect and representative operation should be United States (Shan, 2011). In addition to these two countries, Canada, Singapore, Britain and France also have good performance on RMLs.

The purpose of this chapter is to understand the relationship between reverse mortgage loan and retirement behaviour in China. My data comes from the China Labour Force Dynamic Survey (CLDS), which tracks the dynamics of Chinese labour households. Then we put forward nine hypotheses based on the descriptive statistics and theory. It includes five factors mentioned in the previous literature: age, education level, health status, family income and retirement income. There are also three factors rarely mentioned in the previous literature: the type of household registration with Chinese characteristics, the type of current residential property and endowment insurance. Finally, we focus on the main factor in this chapter: reverse mortgage loans. After putting forward 9 hypotheses, we use the method of combining PSM and DID to build a model to explore the relationship between these mentioned factors and retirement behaviour. Among them, we use PSM to verify the first 8 hypotheses, and then use

DID to explore the relationship between reverse mortgage loans and retirement behaviour. In addition, the balance test is used to verify the accuracy and applicability of our model.

In this chapter, we hope to supplement the literature on the relationship between these factors and retirement behaviour in China by studying the relationship between these factors and retirement behaviour. At the same time, it verifies that the factors influencing retirement behaviour have different effects under different political systems. Based on the results of the study, we expect that under the background of population aging, when China formulates relevant policies for statutory retirement, these policies can be considered more comprehensively and more in line with the expectations of the labour market.

4.2 Literature Review

Previous studies have provided us with a number of factors that influence retirement behaviour, and these factors will form the basis of our design models so that we can find out the relationship between reverse mortgages and retirement behaviour.

4.2.1 Gender and Retirement

As we mentioned in chapter II, in China, Lee (2005) built a logit model based on the data collected and found a statistically significant relationship between gender and retirement behaviour, and he used the logit model to analyse different age groups. Based on Lee's findings, older men were more likely to participate in the labour force than older women. Interestingly, older workers, in particular older women, with pension were less likely to retire. Having a working spouse decreased the likelihood of retirement and older workers, in particular older women, living with married children were more likely to retire. As for other studies about the early retirement in China, Sun and Wu (2009) also used a logit model to analyses the relationship between gender and retirement behaviour. They found that gender had a strongly statistically significant influence on retirement behaviour. The result showed that women were more likely to be influenced by economic factors, while men were more susceptible to personal

factors. Wu (2011) used a multiple stepwise regression meth to find out that gender had a statistically significant impact on early retirement. Compared with men, the possibility of early retirement was 89% lower than that of men. For men, it was easier for them to retire early. It should arouse the attention of the human resources and social security departments (Ming & Qi, 2013). Although the average life expectancy of women was statistically significantly higher than that of men in terms of average years of education, the age of policy retirement and the actual age of retirement were statistically significantly lower than those of men (Xin, 2009). Early retirement women were mainly female government workers who retired passively, while most of men were workers. Regression analyses showed that the top three factors that affected the actual retirement age in the model were age, gender and policy retirement age respectively (Niu, 2017). Based on gender differences, China has set a policy retirement age for men with high and low women (men with high retirement age, while women with low retirement age). At the same time, based on the difference in sex and policy retirement age, the gender difference between male and female workers at different ages was statistically significantly different.

Based on chapter II, McNamara and Williamson (2004) used quantitative method to find that gender had a significant effect on retirement behaviour, and different genders had opposite effects. In their results, married men had a statistically positive effect on retirement choice, while married women had a statistically significant negative effect on retirement choice. Obvious reasons for this were, on the one hand, lower statutory retirement ages for women in some countries and, on the other hand, social roles and responsibility within the family that lead to engagement in informal work (Komp, et al., 2010). However, as we mentioned in chapter II, Finch (2014) mainly used personal work factors to construct a multiple regression model, and thus came up with the conclusion that there was a statistically significant relationship between gender and retirement behaviour. The result showed that women with interrupted careers, e.g., due to care for children or family members, were likely to extend their career life in order to make up for opportunity costs. Their counterparts, or in other words, women with high work orientation also tended to prolong paid work due to ‘status maintenance’. But extending career life might be more difficult for the first group of women depending on the length of career dis-attachment (Finch, 2014).

4.2.2 Education level and Retirement

In China, by combining the anticipation and actual behaviour of the middle-aged and old people to delay the withdrawal of the labour market, Niu (2017) examined the impact of the education level of the Chinese elderly people on the retirement choices with a logit model. He discovered that from the actual retirement behaviour of workers, the actual retirement age of the people with the highest and lowest education level was relatively late, and women were particularly prominent. Under other conditions, higher education level had a statistically significantly positive effect on real labour participation. Most Chinese researchers also found that the improvement of the education level had a statistically positive effect on the improvement of the manpower capital level and the increase of the effective labour supply, thus the educational level of the workers was significantly related to their retirement choices (Li, 2010; Zhao & Xin, 2012). Shen (2010) also used a logit model to analyse the relationship between education and retirement behaviour. He found that the education level was statistically positively related to the labour supply, that was, the workers with higher education were more inclined to prolong the labour supply time. For higher educated workers, the possibility of a decline in the rate of return (or wages) with age was relatively small (Li, 2014). The delay in retirement not only had higher expected returns, but also a rational choice to compensate for the initial cost of education (Yue, 2012). However, Zhang and Xu (2015) set up a new logit model with Charls database and came up with the idea that the labour supply had a "inverted U" trend with the improvement of the education level, and the effect of the improvement of the education level on the labour supply included the reception effect and the substitution effect. Based on the income effect and substitution effect, the level of labour supply presented a nonlinear change which increased first and then decreased with the increase of education level.

According to chapter II, Joo and Grable (2005) used a logit model to help them to find that among the individual differences, respondents who indicated having a savings program for retirement were not statistically significantly different from those who did not have a program in terms of their age, gender, marital status, and ethnicity. However, those who had higher educational attainment levels (i.e., college graduate and higher) were more likely to have a savings program for retirement than those who had lower educational attainment levels. Lawless, Buggy and Codd (2015) also used a general logit model to claim that comparison of those retired early with and without disability showed a statistically significantly higher

frequency of lower educational attainment both personally and for parents. Men with lower educational attainment and from a non-professional background were more likely to retire early through disability. Non-professional disabled respondents with less well-educated parents had lower educational attainment than non-disabled respondents.

Combined with the conclusions mentioned in Chapter II and the above-mentioned results, education level will have a statistically significant impact on retirement time. Lower education levels were statistically significantly associated with early retirement, while higher education levels were associated with later withdrawal from the labour force (Siegrist, et al., 2006). Furthermore, to pass on knowledge among higher educated workers was a major reason to take up post-retirement activities next to personal development and gain recognition (Maxin & Deller, 2011).

4.2.3 Health and Retirement

In China, Wang (2017) firstly used the difference in differences model to study the effect of different health levels on retirement behaviour. The results from his research showed that due to physical health problems, women with low working ability would choose to retire early, but not as men with low working ability. Wang also used a general probit model to find out that health factors had a great statistically significant impact on the choice of men's retirement opportunities, especially for men with low working abilities, which might lead to their early retirement. In contrast, health factors were not particularly significant for female workers. Most Chinese researchers also held the point that the level of personal health was the basis for workers to work. Health conditions determined the type and workload of a person (Lin, 2008). Luo (2011) built a logit model and found that health conditions had a statistically important impact on the willingness of workers to retire and their retirement age. The better their health was, the more they tended to postpone retirement. Hai (2008) also claimed that based on his logit model, each increase in health status would increase the participation of rural residents, and the impact of health on the labour participation of rural residents in China was higher than that of the labour participation of rural residents. However, an empirical study by Jie (2010) found that health was a motivation for women to retire early, but it was not the reason why men retire early. She set up a different logit model with CGSS database and the results showed

that health was a statistically important factor in the withdrawal of the labour force for all the samples; health had a significant impact on male withdrawal, while it had a statistically weak impact on the exit of women; the health of rural labour had a statistically significant impact on withdrawal, and the health of urban labour had no effect on withdrawal.

Based on chapter II, McGarry (2004) eliminated the concern about justification bias among retired individuals and found that subjective reports of health did have statistically important effects on retirement, effects that were arguably stronger than those of the financial variables. The effects of subjective health remained large even when more objective measures of health, such as disease conditions, are included in the model. Conley and Thompson (2013) also found that acute health shocks were statistically significantly associated with labour market exits for older American men but not women. These results appeared particularly strong for blacks, whose labour force participation seemed particularly sensitive to health status, which might be due to different occupations for blacks and whites. Other researchers (e.g., Roberts, et al., 2010) also discovered that health was a key determinant for the timing of retirement, especially in view of early retirement. The impact of health on the timing of retirement is as well connected to the continuity theory. Accordingly, poor health can be considered as discontinuity within the working sphere. As individuals seek to maintain stability, they are likely to choose retirement over employment (von Bonsdorff & Ilmarinen, 2012). From chapter II, Dwyer & Mitchell (1999) also found that poor health influences retirement plans more than economic variables. Even though poor health has been identified to be a statistically important influential factor for early retirement, individuals with good health also choose to retire instead of prolonging their working life (Büsch, et al., 2014).

4.2.4 Age and Retirement

In China, Zheng and Jiajia (2009) used the logit model to explore the relationship between age and retirement behaviour. According to the data collected by the questionnaires, age had a statistically significant positive effect on retirement decision-making. They found that the older the workers were restricted by physical strength, the less jobs they could be competent for; at the same time, the older the workers were, the shorter the expected death years of the workers were, and they wanted to enjoy leisure in a limited time to maximize their effectiveness. Thus,

age would have a statistically significant positive effect on the workers' retirement behaviour. Luo (2012) had a similar view. He firstly found that there might be a linear relationship between age and retirement behaviour through descriptive data, and then verified the relationship by establishing a logit model. His results showed that the older workers were, the more likely they were to retire when other factors were the same. However, Zhu and Mei (2014) held a different point. They came up with a new logit model which focused more on the gender influence. Their results showed that the male workers did not show a statistically significant impact on retirement behaviour with the increase of age, while the female workers showed a statistically significantly negative impact on the retirement decision-making with the increase of age.

According to chapter II, Posthuma & Campion (2009) put forward a logit model included age and age square in order to explore the relationship between age and retirement behaviour. The results showed that retirement decision was statistically significantly positively influenced by age. Hamblin (2013) also used a logit model to find out the statistically significant effect of age on retirement behaviour. However, Sievert (2013) claimed that people should not just focus on the impact of age on retirement behaviour. By building a new logit model and combining the DID method, he found that the older people were more likely to retire, but if the family income was low, the older people were more likely to continue to work. At the same time, the middle-aged and elderly people with higher education level showed a statistically significant negative correlation between age and retirement behaviour.

4.2.5 Family Income and Retirement

In China, the savings and property of individuals and families could generally be used as one of the main sources of life after workers' retirement (Liu, 2010). Liu used a general logit model to find out that the savings and property owned by individuals and families would statistically affect the retirement decision and retirement age of workers, and the more personal savings and property, the more they tended to retire in advance and enjoy leisure. Zhao and Li (2015) pointed out that the main source of life cost for workers after retirement was the savings in working income by using descriptive statistics. The empirical study showed that the income of workers at work had a statistically significant impact on the retirement decision. The higher

the level of workers' income was, the more reluctant to leave the labour market, the more they were willing to postpone the retirement age.

Based on chapter II, early retirement was barely affordable to poorer individuals, richer individuals had the option to accumulate sufficient wealth in order to retire early (Dorn and Sousa-Poza 2005). Brown (2009) also confirmed this hypothesis by building a new logit model. He found that for US, richer individuals were more successful in retirement planning, while individuals with low educational attainment lacked financial literacy and were therefore less successful. A statistically positive relationship between successful retirement planning and financial literacy had also been found for different countries (Bucher-Koenen & Lusardi, 2011; van Rooij et al., 2011).

4.2.6 Pension and Retirement

In China, Xu (2008) pointed out that the basic pension replacement rate was an important indicator reflecting the relative level of retirement pension for workers. Pension was an important source of income after workers' retirement, and the substitution rate of pension might have a statistically important impact on the retirement choice of workers (Li, 2009). Li used a logit model to prove that the higher the substitution rate, the more the workers tended to retire in advance. Liang and Zhang (2012) also found out that the discounted income of the future pension was the main factor affecting the individual's expected retirement age. The results showed that the pension reform did have a statistically significant impact on people's retirement expectations, but the agreement between the expected retirement age and the actual retirement age depended on whether people can accurately anticipate the pension changes. The results of Li (2011) also showed that through a general regression model, the increase of pension made older men tend to retire ahead of time, but the retirement behaviour of older women was not affected, and the retirement behaviour of women was often related to their family environment.

As can be seen from chapter II, Disney et al. (1994) and Meghir and Whitehouse (1997), in studies using UK data, found that workers with occupational pension rights tended to remain longer in particular jobs, but also tended to retire earlier than those without them; also the

earlier the age at which workers began to accrue these rights, the more likely they were to take early retirement. For workers without occupational pension rights, the most likely causes of permanent job exit prior to normal retirement age were redundancy and ill-health. On the one hand, Boskin (1977), Boskin and Hurd (1978) and Sheshinski (1978), pointed out that higher social security taxes provided a disincentive effect that could lead to a reduction in labour force participation and earlier retirement. On the other hand, Blinder et al. (1980) argued that state pensions did not necessarily have a statistically significant effect of encouraging earlier retirement, since delayed retirement after state pension age could result in a more than actuarially fair increase in the state pension. The effects differ with different social security systems, of course, and the net effect remains an empirical question for each system.

4.2.7 The Determinants of the choice of RMLs

In China, through a survey of some middle-aged and elderly people in Nanjing, the results showed that by using a general regression model, age, education level, health status, and purchase of health insurance had statistically significant positive effects on the willingness of middle-aged and elderly people to accept reverse mortgage products, while the number of children, houses, perceptions of income adequacy and traditional concepts have a statistically significant negative and significant impact on the willingness of middle-aged and elderly people to accept reverse mortgage products (Bian et al, 2019). Zhou and Shen (2019) pointed out that the group difference of income effect of reverse mortgage was mainly reflected in age and income. They used a cox proportional hazards model to show that from the changes of income before and after the purchase of housing reverse mortgage products, the income of the insured elderly increased in varying degrees after the purchase of housing pension products. The lower the income of the insured elderly and the older the age, the more statistically significant the effect of income increase will be. Thus, Zhou and Shen claimed that retirement income had a statistically significant negative effect on the choice of RMLs, while there is a statistically significant positive correlation between age and RMLs. Pan (2013) also came up with a general logit model and his results showed that there was a statistically significant positive correlation between the choice of reverse mortgage loan and education level. Additionally, he found that the choice of reverse mortgage was negatively correlated with age and the number of houses owned. The older the age, the lower the willingness to choose reverse mortgage.

Based on the results of researchers in chapter II, Bridge et al (2010) summarized previous research concerning RMLs that the reverse mortgage variables mentioned by authors within the 51 sources included in this review could be thematically grouped under seven themes: income, health care, home care, modification, maintenance, investment and special. Leith (2006) used a regression model to show that the majority of older people wanted to stay in their homes not simply because they owned them, frequently mortgage free, but because their homes were repositories of, and gave locational access to, physical, social, and biographical meanings of place. However, Cutler (2007) and Tilse (2005) through a DID method showed that the research of retirement decisions should focus more on financial factors. They argued for much greater levels of financial literacy and sound professional advice given the complexities of retirement decisions. Lusardi and Mitchell (2007) also used a logit model to warn that concerned in terms of pension entitlements would become more statistically significant as baby boomers demonstrated a pattern of poor saving and planning retirement. Additionally, Sabia (2008) found that older peoples' ability to age in place was affected by concerns regarding increasing utility charges and property taxes. Boehm and Ehrhardt (1994) said that the importance of product type choice from consumer perspectives was also critical as the interest rate risk of a reverse mortgage loan often was several orders of magnitude greater than the interest rate risk of other fixed-income securities.

4.3 PSM and DID Model Data

4.3.1 Database

We use the China Labour-force Dynamics Survey (CLDS) as my main database. The survey is a national follow-up survey organized by the social science research centre of Zhongshan University. It investigates many research topics, including education, work, migration, health, social participation and economic activities, including urban and rural labour force. The survey was conducted every two years, aiming to dynamically track the family and labour situation in urban and rural areas in China. By observing various changes of data, the tracking data database is established at the three levels of labour force, family and community, thus providing basic data for empirical theoretical research and policy research.

The CLDS Database is slightly different from other specialized Reverse Mortgage databases, such as the FHA Reverse Mortgage Database in the United States. First of all, other professional reverse mortgage databases have clear purchase or not data, unlike China's CLDS database, which requires us to match data according to retirement or not and pilot cities. Secondly, different from other professional reverse mortgage databases, China's CLDS database is traceable database, that is to say, data of the same target in different years can be analysed according to ID. In addition, these databases (China and other countries) have similar data on the variables we need to apply in our research, such as gender, education, health, etc.

Thus, first, we use IID and FID in the database as identification variables to merge the personal and family parts of the database. Then, since this database is an annual tracking database, we combined the 2012, 2014 and 2016 years of this database according to IID as the identification variable again, and discarded unnecessary variables. The final merged database has 50605 observations. For missing data and uncertain data in the database, we choose to delete them and the data corresponding to the corresponding ID, in order to improve the accuracy of the model.

In this database, we choose "have you worked since XXXX" as the dependent variable. In the case of "no work", we decided whether an individual will retire by excluding the answers other than retirement, and generated variable “Retirement” to show if people choose to retire or not. Then, because the reverse mortgage pilot cities are Nanjing, Shanghai, Beijing and Hangzhou, we divide the "city" variable in the database into two parts, one is the city that promotes the reverse mortgage, the other is the city that does not implement the reverse mortgage, as the judgment variable of the reverse mortgage. Finally, from the questions of gender, age, education level and health status in the database questionnaire, we also get the variables we want to get to support the establishment of the model. These variables in the database are showed in Table 4.

Among them, the household registration type indicates whether the object of observation in China is urban or rural household registration. In China, the type of household registration has

a significant impact on the adaptability of many policies. And to some extent, it can reflect the average education level of the family. For type of current residence, I've divided this variable into three types, in which rent means that the observation object is in the rental state, and he or she doesn't own the current property. Owned means that the subject's ownership of the property in which he or she lives is his or her own, i.e., he or she can dispose of the current property. Free said that the property the subject currently lives in belongs to the type of government relief or is provided by the company free of charge, which means that he or she is unable to trade the property.

Urban Resident Basic Pension Insurance is an endowment insurance system covering non-employees with urban household registration, and it is an important part of China's endowment insurance system. The pension of urban resident basic pension insurance consists of two parts: individual account pension and basic pension. The level of individual account pension is determined by the amount of account storage, that is, the total amount of individual contributions and government subsidies; the basic pension is paid in full by the government. Commercial Pension Insurance is a kind of commercial insurance. It takes people's life or body as the insurance object. When the insured retires or the insurance period expires, the insurance company pays the pension according to the contract. The annuity insurance, endowment insurance, fixed-term insurance and life-long insurance in the commercial insurance can play the purpose of providing for the aged in different degrees, all of which belong to the category of commercial endowment insurance. Commercial endowment insurance can also be used as a means of compulsory savings to help young people prepare for the future and avoid excessive consumption when they are young.

4.3.2 Descriptive Statistics

It can be seen from Table 4 that we divided the data into two parts: male and female. This is because different genders respond to different retirement ages in China. Therefore, the gender distinction first helps us to study people's retirement behaviours more intuitively. In Table 4, we used the four pilot cities (Beijing, Hangzhou, Shanghai and Nanjing) as the treated group and the other cities as the control group to make a preliminary comparison before DID. The

data in Table 4 are descriptive statistics of the data used, recording the mean values of the variables we used and the observed quantities respectively.

a. Education Level

First of all, it can be seen from Table 4 that for the education level, in 2013, in the cities where reverse mortgage was implemented, the retirement tendency of the women who had not received education and the women whose education level reached the level of primary school decreased year by year. In the same situation, men showed a rising tendency to retire first, then a falling tendency (not receiving education) and a continuous rising tendency (primary school level). For people with middle school education level, both men and women, and whether they were in the treated group or the control group, their tendency to retire first declined and then increased, with a smaller change in women than in men. For women with high school education level and higher education level, the trend of retirement tendency increased with the increase of years. But for men, those who reach the high school level tend to decline first and then increase, while those who reach the university level and above show the same trend as women.

After comparing the treated group with the control group, it shows that both the uneducated women and the women with primary education level show that the retirement tendency of the treated group is higher than that of the control group, but in 2016, the treated group is smaller than the control group. The corresponding men showed that the treated group was first larger than the control group, then smaller than the control group, and finally larger than the control group (without education), and the retirement tendency of the treated group was always smaller than the control group (primary school level). For the women with junior high school education, the situation of the treated group and the control group is the same as that of the men with primary school education, but the men with junior high school education show the trend that the treated group is always smaller than the control group. For people with high school and college degrees, the opposite is true for men and women. Among them, men with high school education and women with college or above education showed the situation that the treated group was smaller than the control group first and then larger than the control group. Additionally, women with high school education showed the situation that the treated group

was always smaller than the control group, while men with college or above education showed the trend that the treated group was always larger than the control group.

Overall, from the descriptive statistics, we can preliminarily believe that education level has a statistically significant positive correlation with retirement behaviour. On this basis, we can also preliminarily infer that the education level increases the possibility that people will choose reverse mortgage products because of the relationship between retirement behaviour and pension.

b. Health Condition

For the health status, the retirement tendency of men and women who think their health status is bad is consistent in the pilot cities, that is, with the increase of years, the retirement tendency first decreases and then increases. For men and women who think their health status is normal, there is a consistent trend, that is, with the increase of the year, the retirement tendency has been declining. However, there are some differences between men and women who think that they are in good health. Among them, men's retirement tendency has been on the rise, while women's retirement tendency has been on the decline first and then on the rise. Finally, for people who think their health is very good, the retirement tendency of men and women remains the same, that is, they all show a trend of rising first and then declining.

Through the comparison between the treated group and the control group, it shows that men and women who think their health is bad show an increase with the year, the retirement tendency of the treated group is first greater than the control group and then less than the control group. However, for men and women who think their health status is normal, there is just the opposite trend. Among them, the treated group of women showed the situation of smaller than the control group, and then changed to the situation of larger than the control group. For men, the treated group was first larger than the control group, and then became smaller than the control group with the increase of years. In addition, men and women who think they are in good health maintain the same retirement trend, that is, the treated group is smaller than the

control group first and then larger than the control group. Men and women who thought they were in better health showed that the treated group was larger than the control group and then changed to smaller than the control group.

From the results of descriptive statistics, we can obviously find that there is a inverted-U influence trend between health condition and retirement behaviour. Without considering the weak effect of gender, we can easily find that health condition increases retirement possibilities in 2012 and 2014, and decreases retirement possibilities in 2016.

c. Age

The age variable shows that in cities with reverse mortgages, the average retirement age of women decreases with the increase of years. On the contrary, the average retirement age of men first decreased and then increased slightly with the increase of the year. In addition, through the comparison between the treated group and the control group, it is easy to find that the average age of women and men in the treated group is greater than the average age in the control group, but with the increase of the year, the age gap between the treated group and the control group is narrowing. Although it can be seen from the descriptive statistical results that there is a statistically significant influence between age and retirement behaviour, the accuracy of this result cannot be guaranteed before further model establishment due to the difference in retirement age between males and females in China.

d. Type of household

For the type of household registration, rural household registration and urban household registration show the opposite trend of retirement in the cities with reverse mortgage. Among them, women with rural household registration tend to rise first and then decline, while men with rural household registration tend to rise continuously. On the contrary, women with urban household registration tend to decline first and then rise, while men with urban household registration tend to decline continuously.

Through the comparison between the treated group and the control group, it shows that the difference between the treated group and the control group still shows the opposite trend in rural and urban household registration. For men and women with rural household registration, both the treated group and the control group showed that the treated group was larger than the control group, and then the treated group was smaller than the control group. For men and women with urban household registration, the treated group was first smaller than the control group and then larger than the control group.

When gender and reverse mortgage loans are taken into account separately, we can still find that the overall trend of the type of household registration with Chinese characteristics is to increase the possibility of retirement. In other words, we can take a preliminary view that the type of household in China has a statistically significant positive effect on retirement behaviour.

e. House type

For the type of current residential real estate, in the cities where reverse mortgage is implemented, the number of women who own the property shows a rising retirement trend, while the number of men who own the property shows a declining and rising retirement trend. However, for men and women who are renting the property, the change in their propensity to retire is quite different from that of people who own the property. Among them, men renting the property showed a trend of rising first and then declining, while women showed a trend of declining retirement. For men and women who live on the property for free, their retirement trend is consistent with that of people who rent the property.

Through the comparison between the treated group and the control group, it shows that the female who owns the house presents the situation that the treated group is smaller than the control group, then increases with the year, and larger than the control group, while the male who owns the house presents the situation that the treated group is larger than the control group first, then smaller than the control group, and finally larger than the control group. In addition,

for men and women who rent the property, their treated group and the control group have the same trend of change, that is, the treated group is always larger than the control group. Finally, for the women who live in the house for free, the treated group shows a trend of first larger than the control group and then smaller than the control group. At the same time, the male treated group always shows a situation of smaller than the control group.

Overall, we preliminarily believe that there is no statistically significant rule between housing type and retirement behaviour because the trend changes of housing type are different under different conditions of reverse mortgage loans and gender. That said, we preliminarily believe that housing type does not increase or decrease the possibility that people will choose to retire.

f. Urban Resident Basic Pension Insurance

It can be seen from Table 4 that for people with urban resident basic pension insurance, the retirement situation of both men and women shows a downward trend first and then an upward trend. On the contrary, for those who do not have urban resident basic pension insurance, the retirement situation of both men and women shows a trend of rising first and then declining. Through the comparison between the treated group and the control group, it shows that both men and women with urban resident basic pension insurance show the situation that the treated group is larger than the control group, while on the contrary, people without urban resident basic pension insurance, both men and women, show the situation that the treated group is smaller than the control group.

The influence of urban resident basic pension insurance on retirement behaviour has an opposite trend, that is to say, the retirement behaviour of people with urban resident basic pension insurance is opposite to that of people without urban resident basic pension insurance. At the same time, we can also preliminarily find that reverse mortgage loans increase the possibility of retirement choice for people with urban resident basic pension.

g. Commercial Pension Insurance

For people with commercial endowment insurance, the retirement situation of both men and women shows a trend of rising first and then declining. On the contrary, for those who do not have commercial endowment insurance, the retirement situation of both men and women shows a trend of decline first and then rise. Through the comparison between the treated group and the control group, it is easy to find that both men and women with commercial endowment insurance show the situation that the treated group is larger than the control group, while on the contrary, people without commercial endowment insurance, both men and women, show the situation that the treated group is smaller than the control group.

Similar to urban resident basic pension, the retirement choices of people with commercial pension insurance are the opposite of those of people without commercial pension insurance. Additionally, we can preliminarily find that reverse mortgage loans increase the possibility of retirement choice for people with commercial pension insurance.

h. Family Income and Retirement Income

From table 4, it is easy to find that the average family income and the average retirement income increase with the increase of the year, and both men and women show an upward trend. In addition, through the comparison between the treated group and the control group, it shows that whether the family income or the average income, whether male or female, the results show that the treated group is always larger than the control group.

Therefore, we preliminarily believe that family income and retirement income have statistically significant positive effects on retirement behaviour.

j. Multicollinearity VIF Test

Multicollinearity means that the model estimation is distorted or difficult to estimate accurately due to the existence of precise correlation or high correlation between explanatory variables in the linear regression model. Multicollinearity is represented by correlation between explanatory variables, so it is mainly tested by statistical methods, including simple correlation coefficient method, comprehensive statistical test method, variance inflation factor and rank condition. The task of multicollinearity test: to identify whether the model has multicollinearity and to determine the range of multicollinearity (Chan et al., 2022). Multicollinearity test is a common technique in statistics, which is used to check the linear correlation between multiple variables and to diagnose whether variables in statistical models have multicollinearity. In my thesis, the variance inflation factor (VIF) method is used to detect the collinearity of my model. The higher the VIF value, the more serious the multicollinearity problem. It is generally accepted that if the maximum VIF is not more than 10, there is no significant multicollinearity (Nwankwo Chike & Nnaji Peace, 2022). From the last Table in Table 4, we can see that the VIF value of all my variables does not exceed 2, so we believe that there is no obvious multicollinearity in the model in this thesis.

k. Conclusion

In this section we discuss the data description analysis of the model. For all the variables discussed, we have carried out detailed analysis one by one, and tested them with multicollinearity to ensure the accuracy of the model. However, in some variables, such as education level, we can obviously find that the data amount of some categories is very small. From the overall perspective of our database, the sample size is not enough. This small sample size can lead to false negatives and false positives, which can reduce the accuracy of our model.

Table 4 Descriptive statistics of treated and control people in and out reverse mortgage loan pilot cities.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Education level:										
	Never	2012	0.224	0.204	0.116	0.199	0.168	0.312	0.141	0.368
			13	131	17	963	18	162	42	1495
		2014	0.137	0.113	0.156	0.107	0.219	0.237	0.251	0.216
			36	67	162	613	82	135	445	1230
		2016	0.037	0.047	0.061	0.05	0.163	0.149	0.148	0.171
			13	32	121	346	97	87	566	1029
	Primary	2012	0.259	0.173	0.197	0.218	0.159	0.181	0.164	0.192
			15	111	29	1050	17	94	49	780
		2014	0.202	0.226	0.184	0.252	0.171	0.209	0.201	0.273
			53	134	191	1447	64	119	357	1553
		2016	0.148	0.199	0.19	0.249	0.173	0.187	0.237	0.281
			52	137	376	1737	103	109	911	1692
	Middle	2012	0.362	0.306	0.415	0.331	0.355	0.21	0.44	0.252
			21	197	61	1592	38	109	131	1025
		2014	0.347	0.327	0.335	0.385	0.275	0.257	0.31	0.315
			91	194	348	2213	103	146	551	1789
		2016	0.387	0.367	0.404	0.438	0.306	0.316	0.355	0.332
			136	252	802	3056	182	184	1361	1993
	High	2012	0.103	0.149	0.17	0.144	0.206	0.108	0.218	0.084
			6	96	25	692	22	56	65	343
		2014	0.141	0.162	0.23	0.14	0.171	0.118	0.167	0.095
			37	96	239	807	64	67	296	540
		2016	0.217	0.148	0.221	0.133	0.185	0.101	0.171	0.082
			76	102	438	930	110	59	657	490
	Higher	2012	0.052	0.168	0.102	0.108	0.112	0.19	0.037	0.104
			3	108	15	519	12	99	11	423
		2014	0.172	0.173	0.094	0.117	0.163	0.179	0.071	0.101
			45	103	98	672	61	102	126	572
		2016	0.211	0.239	0.124	0.129	0.171	0.247	0.089	0.134
			74	164	247	902	102	144	341	808
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Health condition:										
	Bad	2012	0.224	0.036	0.122	0.096	0.159	0.062	0.138	0.159
			13	23	18	463	17	32	41	647
		2014	0.103	0.061	0.119	0.114	0.104	0.097	0.129	0.152
			27	36	123	657	39	55	229	866
		2016	0.117	0.08	0.187	0.117	0.121	0.087	0.187	0.159
			41	55	372	819	72	51	718	956
	Normal	2012	0.276	0.281	0.408	0.319	0.542	0.304	0.513	0.35
			16	181	60	1535	58	158	153	1421
		2014	0.237	0.283	0.23	0.284	0.294	0.261	0.311	0.298
			62	168	239	1632	110	148	551	1696
		2016	0.237	0.222	0.225	0.28	0.247	0.224	0.265	0.291
			83	152	448	1954	147	131	1018	1751
	Good	2012	0.362	0.39	0.423	0.392	0.215	0.404	0.282	0.345
			21	251	62	1887	23	210	84	1402
		2014	0.347	0.404	0.411	0.398	0.38	0.389	0.385	0.384
			91	240	426	2286	142	221	683	2181
		2016	0.454	0.481	0.351	0.391	0.448	0.473	0.361	0.374
			159	330	697	2725	266	276	1387	2248
	Better	2012	0.138	0.292	0.048	0.193	0.084	0.231	0.067	0.146
			8	188	7	927	9	120	20	594
		2014	0.313	0.253	0.24	0.204	0.222	0.254	0.175	0.165
			82	150	249	1173	83	144	311	939
		2016	0.191	0.217	0.237	0.211	0.184	0.216	0.187	0.176
			67	149	470	1473	109	126	719	1059
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Age										
		2012	66.224	44.771	61.796	44.229	61.51	42.51	58.094	43.427
			58	643	147	4816	107	520	298	4066
		2014	46.019	46.707	37.274	46.061	45.38	45.684	40.999	45.094
			262	594	1038	5752	374	569	1774	5683
		2016	44.477	46.173	40.085	46.641	46.618	44.084	43.595	44.802
			352	686	1989	6962	595	583	3847	6011
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

		Female				Male			
		Treated		Control		Treated		Control	
		Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Agriculture	2012	0.207	0.72	0.116	0.744	0.15	0.708	0.037	0.763
		12	463	17	3582	16	368	11	3103
	2014	0.626	0.715	0.668	0.765	0.572	0.749	0.702	0.767
		164	425	693	4403	214	426	1246	4357
	2016	0.595	0.723	0.635	0.754	0.612	0.734	0.654	0.775
		209	497	1262	5246	363	428	2509	4654
Non-Agriculture	2012	0.793	0.28	0.884	0.256	0.85	0.292	0.963	0.237
		46	180	130	1234	91	152	287	963
	2014	0.374	0.285	0.332	0.235	0.428	0.251	0.298	0.233
		98	169	345	1349	160	143	529	1327
	2016	0.405	0.277	0.365	0.246	0.388	0.266	0.346	0.225
		142	190	724	1715	230	155	1329	1351
Total size	2012	58	643	147	4816	107	520	298	4066
		701		4963		627		4364	
	2014	262	594	1038	5752	374	569	1775	5684
		856		6790		943		7459	
	2016	351	687	1984	6971	594	583	3836	6012
		1038		8955		1177		9848	

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Housetype:										
	Owned	2012	0.741	0.77	0.857	0.794	0.813	0.769	0.789	0.817
			43	495	126	3822	87	400	235	3322
		2014	0.798	0.786	0.832	0.81	0.786	0.794	0.812	0.828
			209	467	864	4659	294	452	1442	4707
		2016	0.821	0.856	0.817	0.745	0.864	0.868	0.806	0.749
			289	588	1617	5138	514	507	3078	4465
	Rent	2012	0.172	0.176	0.109	0.12	0.15	0.179	0.111	0.098
			10	113	16	578	16	93	33	399
		2014	0.149	0.165	0.093	0.109	0.158	0.148	0.11	0.095
			39	98	97	625	59	84	195	541
		2016	0.139	0.119	0.069	0.116	0.104	0.104	0.094	0.112
			49	82	137	802	62	61	359	670
	Free	2012	0.086	0.054	0.034	0.086	0.037	0.052	0.101	0.085
			5	35	5	416	4	27	30	345
		2014	0.053	0.049	0.074	0.081	0.056	0.068	0.078	0.077
			14	29	77	468	21	33	138	436
		2016	0.04	0.025	0.114	0.139	0.032	0.027	0.099	0.139
			14	17	225	961	19	16	381	830
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Basic Insurance:										
	Yes	2012	0.264	0.159	0.137	0.071	0.394	0.166	0.204	0.069
			14	97	20	340	39	84	60	279
		2014	0.043	0.05	0.006	0.02	0.05	0.041	0.016	0.021
			11	29	6	116	18	23	28	121
		2016	0.187	0.259	0.076	0.131	0.189	0.249	0.082	0.118
			64	176	149	905	109	143	309	705
	No	2012	0.736	0.841	0.863	0.929	0.606	0.834	0.796	0.931
			39	513	126	4418	60	421	234	3745
		2014	0.957	0.95	0.994	0.98	0.95	0.959	0.984	0.979
			244	549	1023	5615	341	536	1732	5543
		2016	0.813	0.741	0.924	0.869	0.811	0.751	0.918	0.882
			279	504	1805	5991	469	431	3470	5259
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Commercial insurance:										
	Yes	2012	0.075	0.066	0.007	0.031	0.051	0.067	0.034	0.031
			4	40	1	148	5	33	10	125
		2014	0.261	0.269	0.1	0.14	0.272	0.235	0.099	0.119
			67	157	103	802	99	132	174	677
		2016	0.058	0.068	0.016	0.028	0.076	0.053	0.023	0.035
			20	46	32	195	44	30	85	209
	No	2012	0.925	0.934	0.993	0.969	0.949	0.933	0.966	0.969
			49	565	144	4622	93	461	283	3898
		2014	0.739	0.731	0.9	0.86	0.728	0.765	0.901	0.881
			190	427	926	4929	265	429	1590	4993
		2016	0.942	0.932	0.984	0.972	0.924	0.947	0.977	0.965
			326	629	1919	6694	533	539	3687	5748
	Total size	2012	58	643	147	4816	107	520	298	4066
			701		4963		627		4364	
		2014	262	594	1038	5752	374	569	1775	5684
			856		6790		943		7459	
		2016	351	687	1984	6971	594	583	3836	6012
			1038		8955		1177		9848	

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Familyincome:										
		2012	1.627	1.814	1.35	1.028	2.032	1.728	1.459	0.986
			56	617	141	4530	97	487	286	3774
		2014	8.862	9.254	7.605	8.532	8.491	9.499	7.095	8.921
			251	570	933	5487	336	549	1621	5420
		2016	11.159	11.174	10.261	10.404	11.217	11.18	10.367	10.402
			321	657	1872	6761	552	570	3659	5823
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

			Female				Male			
			Treated		Control		Treated		Control	
			Retired	Non-retired	Retired	Non-retired	Retired	Non-retired	Retired	Non-retired
Retirementincome:										
		2012	8.251	9.151	7.789	8.176	8.594	9.671	8.369	8.228
			56	100	129	490	102	85	278	381
		2014	9.654	9.865	9.074	9.104	9.779	9.959	8.819	9.29
			91	154	248	905	153	138	400	965
		2016	10.642	10.144	10.138	9.616	10.483	10.132	10.128	9.604
			124	159	478	838	238	119	906	680
	Total size	2012	58	643	147	4816	107	520	298	4066
				701		4963		627		4364
		2014	262	594	1038	5752	374	569	1775	5684
				856		6790		943		7459
		2016	351	687	1984	6971	594	583	3836	6012
				1038		8955		1177		9848

Appendix Table 1 explains all variables shown above.

For each year of each category, the top row is its coefficient, and the bottom row is the number of corresponding observations.

VIF multi-collinearity Test

Variable	VIF	1/VIF
Education level	1.59	0.627389
Health condition	1.12	0.894526
Age	1.40	0.716074
Household Type	1.39	0.718765
House Type	1.02	0.980579
Basic Insurance	1.10	0.909856
Commercial Insurance	1.07	0.930784
Family Income	1.21	0.828139
Retirement Income	1.23	0.810966
Mean VIF	1.24	

4.4 PSM and DID Model Results

4.4.1 Propensity score matching estimates

Firstly, the validity of propensity score estimation should be based on common support and conditional independence. If these two hypotheses are not satisfied, it indicates that there are some problems in the matching process, such as matching variables, improper selection of matching methods, etc., then the effectiveness of the estimation results will not be guaranteed. Therefore, the matching results must be tested before estimation. According to Smith & Todd (2005), the balance test is based on the standard deviation of each variable before and after matching. Specifically, if the absolute value of the standard deviation of the matched variable is greater than 20, the matching effect is not good, and the matching method or matching variable needs to be changed. The smaller the standard deviation is, the better the matching effect is. The specific results are shown in Table 5.

The results show that, compared with before matching, after matching, the absolute value of the standard deviation of matching variables has been basically reduced to different degrees. Additionally, the absolute value of standard deviation of each variable after matching was kept below 20, which indicated that there was no significant difference between the treatment group and the control group, and the matching result was effective.

Table 5 Balancing test

year	variable	biased unmatched (standard deviation)	biased matched (standard deviation)
2012	gender	2.5	9.7
	edu	3.8	9.1
	health	4.3	0.4
	age	22.5	3.1
	age square	26.9	4.2
	household	3.9	15.3
	housetype	-5.1	2.3
	InFamilyincome	47.1	-3.4
	InRetirementincome	23.8	-3.8
	Basicinsurance	-41.4	2.5
	Commercial	-19.3	-12.3
2014	gender	-1.0	14
	edu	10.3	4.4
	health	6.1	2.1
	age	16.7	-4.0
	age square	19.5	-4.1
	household	7.4	5.2
	housetype	-1.0	4.0
	InFamilyincome	19.1	6.9
	InRetirementincome	34.9	8.3
	Basicinsurance	-17.2	19.0
	Commercial	-34.9	-3.5
2016	gender	2.6	1.4
	edu	10.8	-1.2
	health	-2.5	6.4
	age	3.3	1.8
	age square	1.5	1.0
	household	-16.6	5.8
	housetype	13.6	-3.5
	InFamilyincome	48.7	8.9
	InRetirementincome	40.0	0.8
	Basicinsurance	-19.3	0.4
	Commercial	-10.6	-7.9

Appendix Table 1 explains all variables shown above.

biased unmatched, biased matched shows the absolute value of the standard deviation

We also report the associated covariate balancing tests with figures. Figure. 2, Figure. 3 and Figure. 4 are the line chart forms of the above-mentioned balance test, respectively showing the balance test results in 2012, 2014 and 2016. These figures show that we achieve levels of the standardized bias which are well under the threshold considered as acceptable by Rosenbaum and Rubin (1985) for the matching.

Figure 2: Testing the common support condition, matching 2012 and 2014

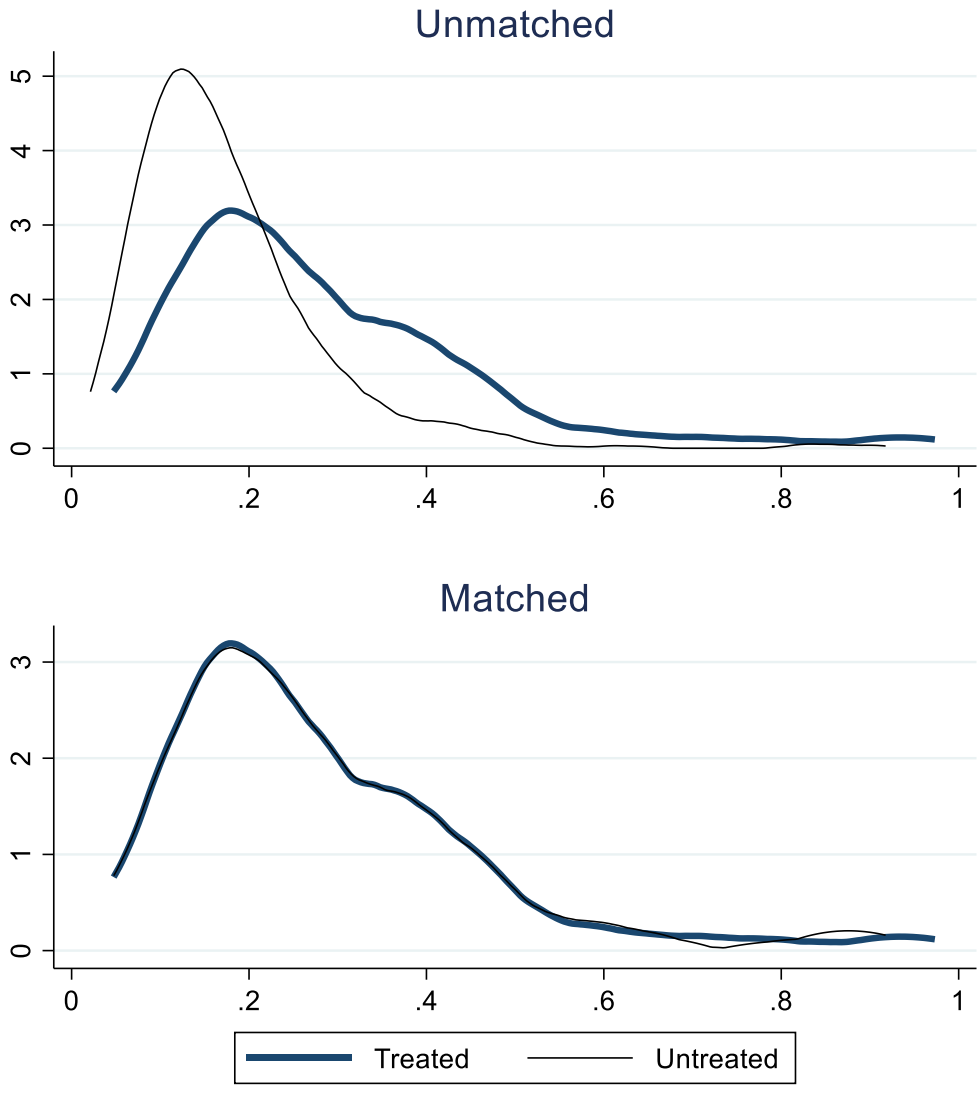


Figure 3: Testing the common support condition, matching 2012 and 2016

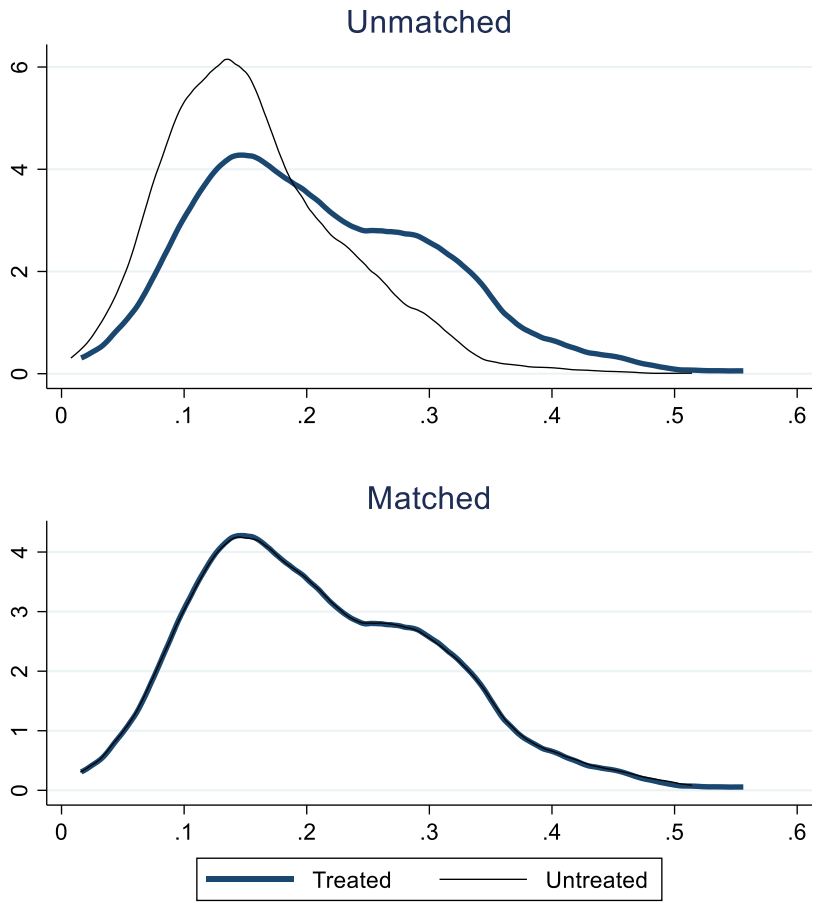
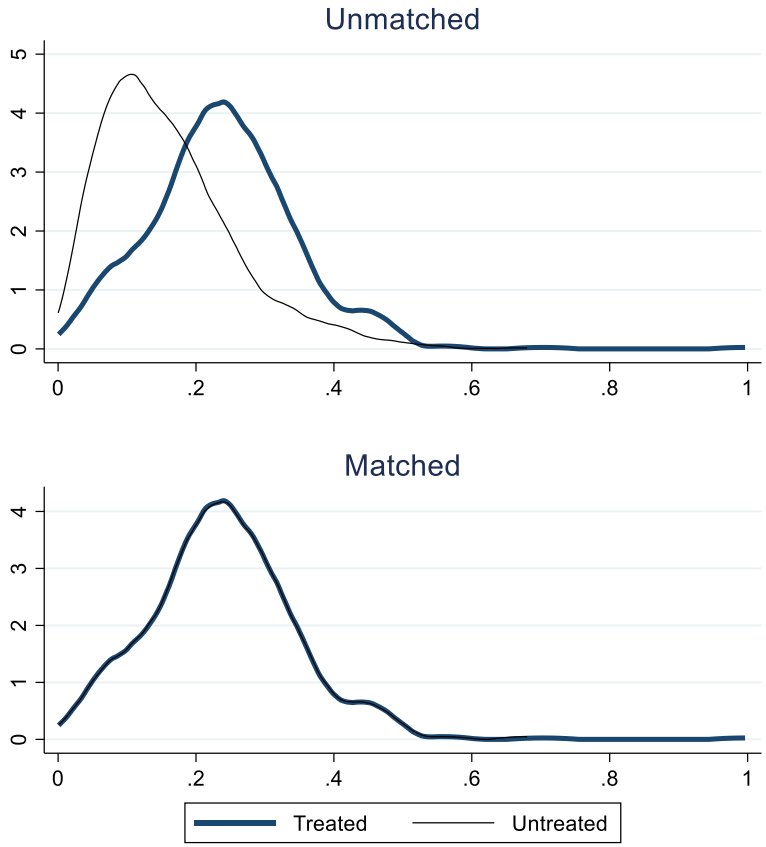


Figure 4: Testing the common support condition, matching 2014 and 2016



According to the research needs, since the reverse mortgage policy was implemented in 2013, 2012, 2014 and 2016 were selected as comparison categories. In the process of matching the treatment group and the control group, based on the existing literature review, this part selects gender, education level, health status, age, household registration, property type, owned endowment insurance, family income and retirement income as matching variables. The detailed introduction of matching variables is shown in Appendix Table 1. Using a probit model to estimate the respondents' groups in these three years to get the propensity score.

From Table 6, it shows the impact of classification variables of each variable on retirement behaviour. First of all, in the classification of education level, female workers show no statistically significant effect on retirement behaviour in most of the classification, while in contrast, male workers show a statistically significant positive effect in most of the classification. Secondly, for both male and female workers, health status shows a statistically significant effect on retirement behaviour, except for the better health status of female workers in 2012 and 2014, the normal health status of male workers in 2016 and the good health status of female workers in 2014. In addition, the three categorical variables of urban household, urban resident basic pension insurance and commercial insurance, all show that there is a statistically significant negative relationship among retirement behaviour and them. However, the classification variables of present residence types in Table 6 show very different results. From Table 6, it shows that the rental type has a statistically significant positive effect in three years for both male and female, while the free type has no significant effect in three years except for males in 2012. Additionally, for both male and female respondents, age has a statistically significant negative impact on retirement behaviour in 2012 and 2014, while retirement income and household income have a statistically significant positive impact on retirement behaviour in these three years.

Table 6 The separated PSM estimates of the effect of different factors on retirement behaviour.

	male			female		
	2012	2014	2016	2012	2014	2016
edu						
low	0.185*	-0.124*	-0.250*	0.471*	-0.020	-0.006
	(0.090)	(0.067)	(0.122)	(0.224)	(0.180)	(0.289)
middle	0.140*	0.001	-0.258	0.283*	-0.108*	-0.082
	(0.049)	(0.144)	(0.154)	(0.113)	(0.032)	(0.280)
high	0.215*	0.154*	0.116	0.132	-0.120*	-0.144*
	(0.101)	(0.054)	(0.170)	(0.238)	(0.054)	(0.070)
higher	0.605*	0.516*	0.220*	0.146	-0.007	-0.051
	(0.248)	(0.181)	(0.104)	(0.257)	(0.199)	(0.294)
health						
normal	0.262*	0.292*	0.086	-0.478*	-0.105*	-0.153*
	(0.111)	(0.140)	(0.123)	(0.211)	(0.039)	(0.045)
good	0.220	0.264*	0.097*	-0.517*	-0.062	-0.130*
	(0.209)	(0.121)	(0.034)	(0.214)	(0.150)	(0.021)
better	0.479*	0.486*	-0.113*	0.029	0.046	-0.286*
	(0.242)	(0.165)	(0.052)	(0.247)	(0.172)	(0.133)
age	-0.129*	-0.065*	0.007	-0.070*	-0.027	0.016
	(0.033)	(0.019)	(0.018)	(0.286)	(0.017)	(0.018)
age square	0.002*	0.001*	0.000	0.001*	0.000*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
household						
city	-0.494*	-0.436*	-0.655*	-0.299*	-0.217*	-0.768*
	(0.154)	(0.106)	(0.098)	(0.146)	(0.107)	(0.104)
housetype						
rent	0.448*	0.442*	0.659*	0.632*	0.493*	0.661*
	(0.170)	(0.125)	(0.145)	(0.178)	(0.135)	(0.159)
free	-0.565*	-0.203	0.122	-0.249	-0.334	0.105
	(0.239)	(0.158)	(0.216)	(0.242)	(0.187)	(0.261)
InFamilyincome	0.197*	0.019	0.223*	0.264*	0.040*	0.315*
	(0.037)	(0.012)	(0.041)	(0.048)	(0.014)	(0.054)
InRetirementincome	0.040*	0.097*	0.175*	0.042*	0.074*	0.238*
	(0.018)	(0.023)	(0.037)	(0.018)	(0.024)	(0.043)
Basicinsurance						
without	-0.808*	-0.446*	-0.174*	-0.531*	-0.645*	-0.264*
	(0.138)	(0.210)	(0.083)	(0.142)	(0.213)	(0.091)
Commercial						
without	-0.321	-0.463*	-0.045	-0.852*	-0.383*	-0.269
	(0.264)	(0.094)	(0.151)	(0.280)	(0.098)	(0.167)

Where Inference: *** p<0.01; ** p<0.05; * p<0.1 The content in brackets indicates standard error.

Appendix table 1 explained all variables showed in this table.

4.4.2 Difference in differences

Bertrand (2004) pointed out that one of the preconditions for the validity of difference in differences estimation is that the treatment group and the control group meet the common trend hypothesis before being treated. Therefore, in order to verify the appropriateness of the DID model in this paper, the common trend test was carried out for the treatment group and the control group. Figure 5 shows that before the implementation of reverse mortgage, the retirement behaviour of the treatment group and the control group generally maintained the same downward trend, while after the implementation of reverse mortgage, the treatment group and the control group first decreased by a small margin and then showed a statistically significant growth trend. Therefore, this chapter uses the DID model to test the impact of reverse mortgage on retirement behaviour, which is the premise of the common trend hypothesis.

Figure 5: Testing for common trends in retirement behaviour for treated and control group. From 2012 to 2016.

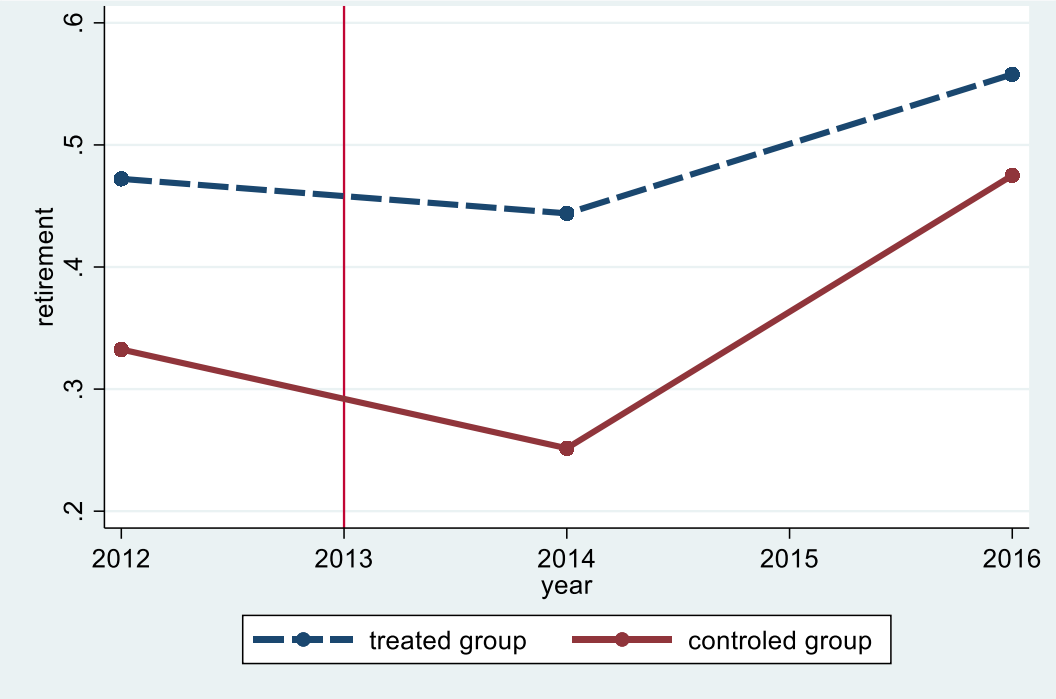


Table 7 shows the result of DID model after matching. From table 7, it is easy to find that reverse mortgages have a far greater impact on the retirement behaviour of working men than women. First of all, between 2012 and 2014, for both men and women, reverse mortgage has a statistically significant positive effect on retirement behaviour, and the effect on men is much greater than that on women. Between 2012 and 2016, however, reverse mortgages still have a statistically positive effect on retirement behaviour for both men and women, but the results are not significant. As for the comparison between 2014 and 2016, table 6 shows that reverse mortgage has a statistically significant negative effect on the retirement behaviour of male respondents, while it also has a statistically negative effect on female respondents, but this effect is not significant. Therefore, overall, when the reverse mortgage is just implemented, it has a statistically positive effect on the respondents' retirement behaviour, and after the implementation of the reverse mortgage for two years, this effect gradually changes from a statistically significant positive effect to a statistically significant negative effect, which may be caused by the respondents' negative views on the reverse mortgage.

Table 7: The DID estimated of the effect of RMLs on retirement behaviour

male

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2014	1.392	1.180	0.212*** (0.029)	1545
2012	1.099	0.997	0.102*** (0.039)	750
DID			0.111** (0.048)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	0.000	-0.108	0.108*** (0.026)	1827
2012	-0.447	-0.345	0.102*** (0.039)	750
DID			0.006 (0.047)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	1.077	1.197	0.119*** (0.027)	1827
2014	0.751	0.963	0.211*** (0.030)	1545
DID			-0.092** (0.040)	

female

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2014	1.050	1.200	0.149*** (0.029)	1309
2012	0.867	0.961	0.094** (0.037)	699
DID			0.056* (0.026)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	0.610	0.760	0.149*** (0.030)	1501
2012	0.185	0.282	0.097** (0.042)	699
DID			0.052 (0.051)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	1.056	1.183	0.127*** (0.029)	1501
2014	0.868	1.014	0.146*** (0.023)	1309
DID			-0.018 (0.020)	

* Means and Standard Errors are estimated by linear regression

**Inference: *** p<0.01; ** p<0.05; * p<0.1

4.5 City effects

4.5.1 Introduction

As we investigate reverse mortgage loans based on different cities, we inevitably need to consider the role of city effects in our research process. As a developing country with vast territory and unbalanced development, China has obvious differences in urban development (Zhang, he & MA, 2014). For example, the Chinese Urban Competitiveness Report 2016 showed that the top ten cities with comprehensive competitiveness were mainly concentrated in the Pearl River Delta, Yangtze River Delta, Bohai rim, Hong Kong, Macao and Taiwan, while none of the central and western regions were selected. According to China's 2015 GDP report, it could be found that with the rapid development of insurance business income and total assets of the insurance industry, the regional imbalance of insurance development was increasingly apparent. In 2015, the province with the highest per capita GDP (Tianjin, 109000 yuan) was 4.1 times of the province with the lowest per capita GDP (Gansu, 26600 yuan). In 2015, the insurance density of provinces with higher degree of development, such as Beijing, was 6638 yuan / person, and the insurance depth (insurance income/GDP) was 6.58%; In provinces with relatively backward insurance development, such as Tibet, the insurance density was only 578 yuan per person, and the insurance depth is 1.88%. In contrast, the insurance depth of Beijing was 11 times that of Tibet, and the insurance density is 3.5 times that of Tibet. It showed that the per capita premium (insurance density) is a greater multiple than the per capita GDP difference, which indicated that the inter provincial difference of China's insurance development was far greater than the difference of economic development level.

At the same time, it is also easy to find that the provinces with rapid development of China's insurance industry are mostly close in geography, and the provinces with high degree of insurance development are mostly concentrated in the eastern coastal areas. The provinces with slow development are also close to the geographical provinces, and the provinces with low insurance development are mainly concentrated in the northwest inland areas. However, some scholars believe that the regional development of China's insurance industry is generally balanced (Zheng & Liu, 2008). They think that whether the regional development of the insurance industry is balanced is not only the amount of

the total, but also whether the development level is in line with the local economic and social development. Additionally, based on the unbalanced development of China's insurance regions, some researchers prefer to further explore whether the regional differences are gradually expanding or narrowing. For this research question, there are two different views. The first view (Xiao, 2009; Liu & Xu， 2012； Tian, Jin & Hu, 2014) think that the regional difference of China's insurance industry is divergent. The second view (Wu, 2009; Wu & Zhao， 2011； Wan & Li, 2014) thinks that the development difference of China's insurance industry has a convergence trend. The divergence or convergence of regional differences in the development of insurance industry is closely related to the selection of research objects, research methods and research period. In general, the development differences of China's insurance industry showed a trend of expansion in the first 10 years of this century, while the regional differences after 2010 were gradually narrowing (Dong, 2014).

As the reverse mortgage is also a kind of commercial insurance, in this chapter, we want to explore the impact of reverse mortgage on retirement behaviour in four pilot cities we selected, and deeply analyse the reasons for these differences. Based on the matching database in the previous chapter, we select Beijing, Shanghai, Nanjing and Hangzhou as the treated group in our DID model, and other cities as the controlled group. For example, during once DID analyses, we used Nanjing as treated group while other cities as controlled group. At the meantime, we dropped Beijing, Hangzhou and Shanghai from database. It is worth mentioning that different from the DID model in the previous chapter, we did not use retired people as treated group and unretired people as controlled group in this model because of the number of observations. we expect to compare several cities through DID analyses, so as to explore the different roles of reverse mortgage in different pilot cities.

4.5.2 Descriptive Statistics

Table 8: descriptive statistics table

Year 2012 Cities	Retired	Unretired	Total
Beijing+Hangzhou	106	540	646
Shanghai	51	130	181
Nanjing	8	493	501
Beijing	94	101	195
Hangzhou	12	439	451

Year 2014 Cities	Retired	Unretired	Total
Beijing+Hangzhou	365	535	900
Shanghai	101	128	229
Nanjing	170	500	670
Beijing	132	107	239
Hangzhou	233	428	661

Year 2016 Cities	Retired	Unretired	Total
Beijing+Hangzhou	539	672	1211
Shanghai	100	63	163
Nanjing	308	536	844
Beijing	181	135	316
Hangzhou	358	537	895

Table 9: RML policy

	Requirement						
City	Age	Property area	RML Money	How to deal with property	Institution(P/G)	Ownership of the property	Family Member
Beijing	60	No requirement	Nursing home fees	Rent	Elderly service center+ Real estate company	Owned	No requirement
Shanghai	65	No requirement	Property rental fees	Sell	Provident fund management center	No	No children
Nanjing	60	At least 60 ㎡	All nursing home fees	Mortgage	Government	-	No family members
Hangzhou	No requirement	No requirement	Nursing home fees or Rental fees	Rent	Insurance company + Real estate company	Owned	No requirement

Table notes:

1. Age means minimum age required to purchase the product.
2. Property area means minimum property area required to purchase the product.
3. RML money means where will rest of money be spent in addition to the money that can be obtained each month.
4. How to deal with property means how the insurance company or the government will deal with your mortgage.
5. Institution (P/G) means what kind of institution will be responsible for this product.
6. Ownership of the property means the ownership of the property you mortgaged after you buy the product.
7. Family member means family composition required to purchase this product.

First of all, it can be seen from table 8 that we have integrated the data of Beijing and Hangzhou before our DID model. This is because the number of the overall observations of the four cities is not enough. Thus, we expect to improve the number of observations through the way of merging in order to improve the accuracy of our model. From table 9, it shows that the reverse mortgage requirements of Beijing and Hangzhou are almost the same. Therefore, from the perspective of reverse mortgage, we choose to merge the data of Beijing and Hangzhou and regard them as one city. In other cities, due to the great differences in reverse mortgage requirements, even if the amount of data is not too high, we cannot carry out more merging operations. Secondly, through table 8, it shows that in 2012, ten digit or even single digit data appeared in the four cities we selected, which indicates that the number of data volume in 2012 may be not enough to support our accurate DID model research. The first reason for this low number may be that in China,

reverse mortgage loan was only implemented in these four pilot cities since 2013, so people prefer to continue to work rather than choose to retire early. The second reason has to do with pension policy. Based on 2012 Nanjing Pension Policy and compared to other years, we found that there was no change in the 2012 policy. In other words, there are no increases or decreases in pensions, so we think people are more likely to work through their mandatory retirement years and then retire normally. Although the lack of sample data may lead to the insignificance of the results, the influence between cities is our main research question in this part, so we believe that the results can still be obtained by using this data.

From table 8, it is easy to find that in Beijing, Hangzhou and Nanjing, the number of retirees is increasing year by year, and the proportion of retirees is always less than that of non-retirees. However, the difference is that the number of retirees in Shanghai has remained unchanged in the past three years, and the ratio of retirees to non-retirees has also changed from 101:128 to 100:63, which has become a completely reversed ratio. In addition, Beijing also achieved this reversed ratio in 2016. Secondly, from table 8, it shows that the number of retirees in Nanjing and Hangzhou is far more than that in Beijing and Shanghai, and the total number of retirees after matching is far more than that in these two cities. Overall, in 2014, the number of retirees was Hangzhou, Nanjing, Beijing and Shanghai in descending order, while the number of non-retirees was Nanjing, Hangzhou, Shanghai and Beijing in descending order. In 2016, the number of retirees from high to low was Hangzhou, Nanjing, Beijing and Shanghai, while the number of non-retirees from high to low was the same as that of retirees.

4.5.3 DID analyses

From table 10, first of all, it is clear that, between 2012 and 2014, reverse mortgage loans in four cities had a positive effect on people's retirement choices. However, Nanjing showed a statistically significant positive effect, while the other three cities did not. Among Beijing, Hangzhou and Shanghai, the influence of reverse mortgage in Shanghai is greater than that in Beijing and Hangzhou. Then, between 2012 and 2016, it can be found that the results have changed slightly. The results of Beijing and Hangzhou showed

statistically insignificant negative effects, while Shanghai still showed statistically insignificant positive effects. Although reverse mortgage products still show a statistically significant positive impact in Nanjing, it is easy to find that this influence is gradually declining compared with the results in 2014. On the contrary, the influence of reverse mortgage in Shanghai is showing a rising trend, although it is still not significant. These can be found in the comparison between 2014 and 2016. For Beijing and Hangzhou, in the comparison between 2014 and 2016, reverse mortgage has a statistically significant negative effect on retirement behaviour. At the same time, Nanjing also showed a statistically similar significant negative effect. However, for Shanghai, the impact of reverse mortgage in this city is still positive, although the impact is not significant. Therefore, to sum up, we believe that reverse mortgage has different influence in different cities. Among them, Nanjing has been showing a statistically significant positive role, but this influence is gradually declining. Beijing and Hangzhou firstly showed a positive role, and then showed a negative role, although this influence has not been significant. For Shanghai, the influence of reverse mortgage has not been significant positive, but the impact is increasing year by year.

Overall, from table 10, it can be seen that Beijing, Hangzhou and Nanjing all show statistically significant negative effects, although Beijing and Hangzhou are in the 10% confidence interval while Nanjing is in the 5% confidence interval. At the same time, Shanghai showed a positive effect, although in Nanjing, reverse mortgage did not show a statistically significant effect. In other words, comparing the retirees and non-retirees in 2014 and 2016, it showed that reverse mortgage did not promote our interviewees to choose to retire in Beijing, Hangzhou and Nanjing. On the contrary, it reduced the retirement rate in these three cities. Secondly, it is clear to find that the negative impact of reverse mortgage in Beijing and Hangzhou (- 0.074) is lower than that in Nanjing (- 0.115). It means that through the analyses of DID, it is easy to find that the respondents in Nanjing are more inclined to continue to work than to retire. Thirdly, from table 10, although Shanghai has shown the positive effect of reverse mortgage, this effect is not significant. Combined with table 8, we temporarily speculate that this result may be caused by the insufficient number of observations in the database itself.

Table 10 Difference in differences 4 cities

Table 3.1: Beijing and Hangzhou

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2014	1.081	0.875	0.206***	2621
			(0.028)	
2012	0.869	0.678	0.191***	1310
			(0.035)	
DID			0.015	
			(0.044)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	0.010	-0.120	0.131***	3100
			(0.025)	
2012	-0.370	-0.529	0.159***	1310
			(0.038)	
DID			-0.029	
			(0.045)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	0.957	0.827	0.130***	3100
			(0.024)	
2014	0.764	0.560	0.204***	2621
			(0.029)	
DID			-0.074*	
			(0.038)	

Table 3.2: Shanghai

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2014	1.103	0.944	0.159***	2510
			(0.037)	
2012	0.856	0.748	0.108**	1246
			(0.046)	
DID			0.051	
			(0.058)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	-0.073	-0.243	0.170***	2842
			(0.046)	
2012	-0.492	-0.571	0.079	1246
			(0.049)	
DID			0.090	
			(0.066)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	1.053	0.822	0.231***	3100
			(0.045)	
2014	0.712	0.556	0.156***	2621
			(0.039)	
DID			0.076	
			(0.059)	

Table 3.3: Nanjing

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2014	1.112	0.949	0.163***	2485
			(0.040)	
2012	0.596	0.744	-0.148***	1215
			(0.056)	
DID			0.310***	
			(0.068)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	-0.143	-0.250	0.107***	2884
			(0.039)	
2012	-0.585	-0.570	-0.015	1215
			(0.061)	
DID			0.123*	
			(0.071)	

	Treated (s.e.)	Controls (s.e.)	Difference (s.e.)	N
2016	0.873	0.825	0.048	2884
			(0.038)	
2014	0.722	0.559	0.162***	2485
			(0.043)	
DID			-0.115**	
			(0.057)	

4.5.4 Analysis of the results

Based on the above tables and analyses, we can draw the following conclusions: in the part of city effects, we find that reverse mortgage has a statistically significant negative impact in Beijing, Hangzhou and Nanjing, and the impact of Nanjing is higher than that of Beijing and Hangzhou. At the same time, reverse mortgage did not show a statistically significant positive effect we expected in Shanghai. In other words, the trial implementation of reverse mortgage has made residents in Beijing, Hangzhou and Nanjing more inclined to continue working, and the tendency of Nanjing residents is higher. On the contrary, reverse mortgage makes Shanghai residents more inclined to retire, although the result is insignificant. Overall, from the perspective of city effect, Beijing, Hangzhou and Nanjing play a more important role in our thesis of the impact of reverse mortgage, while Shanghai has no statistically significant influence.

I think that we can analyse the reasons from three aspects: the localization requirements of reverse mortgage loan, the employment policy or retirement policy implemented in cities at that time, and the data selection. First of all, from table 9, there are significant differences in reverse mortgage requirements between different cities. The first difference between Shanghai and the other three cities is that they have different requirements on age. Only Shanghai requires that the age must be 65 to buy reverse mortgage products, while the other three cities only need to be 60. In addition, the change of housing ownership is also the reason for the difference between Shanghai and the other three cities. It is easy to find that what Shanghai requires is to sell the owner's house, while the other three cities require mortgage or rent, which means that the buyer of reverse mortgage products still owns the owner's house. And these obvious differences also lead to the different urban effects of the selected cities. At the same time, it can also be seen that there are some differences in the requirements between Beijing, Hangzhou and Nanjing, which can also explain why reverse mortgage has different influence in them. From table 9, Nanjing has the minimum housing area requirement. Compared with other cities without the area requirement, we believe that the influence of Nanjing is slightly inferior to that of Beijing and Hangzhou. In the case of the same choice result, people are more willing to believe in the choice without various requirements (alenljung & Persson, 2008). In

addition, we find that the reverse mortgage loan in Nanjing is mortgage housing, while Beijing and Hangzhou need to rent housing. The former may make the owner lose the ownership, while the latter will not. Then, we believe that reverse mortgage loans, which still have the ownership of houses, will have a stronger impact. One last point, the requirement of reverse mortgage in Nanjing is that there are no family members, while there are no corresponding requirements in Beijing and Hangzhou. After all, the choice under mandatory requirements is different from that under voluntary and free requirements, and the attraction of the former is far less than that of the latter (Boyle, 2007).

Secondly, when we focus on the development of reverse mortgage loan from 2014 to 2016, we really need to consider whether there is a difference between the employment policy and retirement policy at that time, which may also lead to people's attitude towards reverse mortgage loan products. First of all, we need to focus on the retirement policies in Beijing and Hangzhou. According to the retirement policy of Beijing issued by the human resources department of the government from 2014 to 2016, we can find that Beijing maintains the policy of increasing pension by 50 yuan per person per month every year. At the same time, it is easy to find that in the 2016 report, if the basic pension per person per month is less than 3355 yuan, it will be increased by 75 yuan per person per month; If the monthly pension is 3355 yuan or above, but less than 4855 yuan, it will be increased by 65 yuan per person per month; If the monthly pension is 4855 yuan or more, each person will be increased by 55 yuan per month. This also explains why reverse mortgage products show a statistically significant negative effect in Beijing. The increase of basic pension will affect people's views on reverse mortgage products, which may not be enough to become a decisive factor in their retirement choice, resulting in people more inclined to continue to work until the legal retirement age. For Hangzhou, although it also presents a statistically significant negative impact, the policy reasons are not the same as Beijing. According to the 2016-2017 Hangzhou retirement policy, Hangzhou is preparing to try out the gradual delayed retirement policy. For example, if a person retires at the age of 60 after five years, then the person retires at the age of 60 and three months after the implementation of the policy. From this policy, the legal retirement age is gradually rising, and this will also lead to people's continuing work behaviour. After all, the amount of basic pension is related to the legal retirement age. Based on this gradual policy of delaying retirement, we believe that reverse mortgage will encourage people to continue to work because

it is a supplement to the basic pension rather than a substitute. Although reverse mortgage products and basic pension have the same or similar functions, the former is not enough to meet the pension needs of retirees (shocker et al., 2004).

For Nanjing, the biggest change in the retirement policy in 2016 is the adjustment of the calculation method of pension. According to the report of Nanjing Human Resources and Social Security Bureau in 2016, the enterprise retirement pension in Nanjing can increase by 6.5% on average in 2016. According to the per capita pension of 2659 yuan per month in Nanjing in 2015, it can increase by about 173 yuan. Such a substantial increase will certainly lead to people's choice to continue to work rather than retire, because the pension requires a minimum payment period and an optional payment level. Therefore, it is not difficult to find that reverse mortgage under this policy will not cause people to choose to retire, but will make people more inclined to choose to work. This is also a natural conclusion after comparing reverse mortgage and basic pension. For Shanghai, according to the comparison of the retirement policies from 2014 to 2016, we found that Shanghai did not introduce the relevant retirement policy adjustment in 2016, and still followed the previous retirement policy, but introduced the pension adjustment policy in 2017-2018. Therefore, in Shanghai in 2016, reverse mortgage products have a positive effect, because when reverse mortgage can meet people's pension needs, it will naturally promote people's more inclined to choose retirement behaviour when it is similar to the basic pension function (shocker et al., 2004), although this result is not significant from the perspective of data analyses. Of course, this is also the third aspect that we need to discuss, the limitation of the amount of data. we can find that one of the important reasons why the results of Shanghai show statistically insignificant positive effect is that the amount of data in the database itself is not enough. After matching, there are only 100-200 observations related to Shanghai.

4.6 Conclusion

This is the first time use of the CLDS database to conduct an empirical analysis of the impact of Reverse Mortgage Loans on retirement behaviour. Specifically, we also explore the actual

influence of the factors mentioned in the previous literature, including gender, age, education level, health condition, family income and retirement income. In addition, we also explore the actual influence of some factors not covered by the previous literature, including the household registration system with Chinese characteristics, the type of property in the current residence, basic endowment insurance for urban residents and commercial insurance.

In this chapter, PSM and DID are combined to build the model. The results show that there is no significant effect of gender on retirement behaviour in China, which is inconsistent with the expectation in our literature reviews. This may be because, on the one hand, there are differences in the retirement age of men and women in China, on the other hand, the retirement concepts of men and women in China tend to be similar, and they all follow the same retirement law. For the education level, it is consistent with our hypothesis and previous research, showing a statistically significant positive effect on retirement behaviour. Although primary and middle school level workers showed a statistically significant negative effect in the next two years, from the overall point of view, the level of education is still positively related to retirement behaviour. The state of health is not entirely consistent with our hypothesis. From the results of probit regression, health status has a statistically significant inverted U-shaped impact on retirement behaviour. That is to say, in 2012 and 2014, health status has a statistically significant positive effect on retirement behaviour, but in 2016, health status has a statistically significant negative effect on retirement behaviour. This may be due to the development of social welfare and the emergence of reverse mortgage, which guarantees the basic medical care of workers after retirement, thus leading to the change of their concept. For age, family income and retirement income, they all meet our expected hypotheses, which means that they have statistically significant positive effects on retirement behaviour. Although for the age factor, it no longer has a statistically significant effect in 2016, which slightly deviates from our hypothesis.

For the four factors not covered by the previous literature, it is clear to find from the research results that the household registration system with Chinese characteristics and commercial insurance fully conform to our expected hypotheses, that is, they have positive and negative effects on retirement behaviour respectively. However, for the type of property in the current

residence, the results are quite different from the expected hypothesis. The results show that the current residential property type in 2012 and 2014 does not have a significant role, but only in 2016 has a statistically significant positive role. This may be because in 2016, with the development of China's economy, the residents paid more attention to the value of real estate and promoted the type of residential real estate to play a more important role. In addition, the basic pension insurance of urban residents presents a completely opposite result to the expected hypothesis, that is, it has a statistically significant negative effect on retirement behaviour.

Finally, through the model of PSM and DID, we find that our hypothesis of reverse mortgage loan deviates from the actual result. The results show that the influence of reverse mortgage loans on retirement behaviour shows an inverted U-shaped curve, that is to say, in the early stage of policy trial, reverse mortgage has a statistically significant positive impact on retirement behaviour, but after a period of trial, reverse mortgage has a negative impact on retirement behaviour. In our analyses, this may be because in the early stage of reverse mortgage trial, people think that it can fully supplement the pension after retirement, which has a positive impact on retirement behaviour. However, after a period of time, people find that due to the value of the property owned by individuals, reverse mortgage may not be able to fully supplement the pension, so people's concept of reverse mortgage changes, which has a negative impact on retirement behaviour.

Based on above-mentioned conclusions, this chapter of China's labour market not only conforms to the general findings in the literature review, but also has key findings with Chinese characteristics that do not conform to the general findings in the literature review. Through this chapter, it can more fully supplement the literature on retirement behaviour and reverse mortgage loans in China. At the same time, following the results of our inverted u-shaped curve, the retirement policy makers can be helped to adjust the corresponding retirement policies more comprehensively and more in line with the needs of the people, and truly in line with the interests of the public. For example, in order to implement a policy of delaying retirement, policy makers can push reverse mortgages more aggressively to reduce the probability that people want to retire. Although retirement rates tend to rise in the early days of reverse mortgages, they tend to fall over time.

Additionally, after combining city effects with reverse mortgage loans, we find that reverse mortgage products play an important role in Beijing, Hangzhou and Nanjing, and the significant negative effect of reverse mortgage products in Nanjing is greater than that in Beijing and Hangzhou. In other words, the reverse mortgage products in Nanjing have more influence on people's choice to continue to work rather than retire. For Shanghai, limited by the amount of data in the database itself, although it shows a positive impact, the result is not significant. Through the overall analyses, we find that the change of policy does affect the actual effect of reverse mortgage products, and the positive and negative effects of reverse mortgage products also conform to the changes of local retirement policies. Therefore, we can also trust that the local retirement policy and the localization requirements of reverse mortgage products are also important factors that affect the degree of reverse mortgage products.

However, although we find out the above conclusion by using PSM and DID methods, and introduce the city effect to further explain the impact of reverse mortgage loans on retirement behaviour, there are still some variables inconsistent with our expectations. In addition, there are limitations on the sample size of the database. Therefore, we will introduce qualitative methods in the next chapter to further explore and verify our quantitative research results. This not only adds credibility to our quantitative findings, but also explores in more details why individuals choose reverse mortgage loans with qualitative perspective.

Chapter V The effect of RMLs on Retirement Behaviour – Qualitative method

5.1 Introduction

China has entered an aging society. According to the results of the sixth national census, China's population aged 60 and above accounted for 13.26%, an increase of 2.93 percentage points over the 2000 census. Among them, the population aged 65 and above accounted for 8.87%, an increase of 1.91 percentage points over the 2000 census. However, different from the developed countries, China is getting old before getting rich, which means that China has entered into aging at the initial stage of industrialization and the per capita income level is low, and the economic strength to cope with the aging is still relatively weak. According to the general idea of basic pension insurance system, the main purpose of basic pension is to protect the basic life of retirees in their old age. However, although the coverage of this system is very wide, the degree of protection is relatively low. At the same time, the miniaturization of family structure and the increase of “empty nest family” lead to the weakening of traditional family pension function and the increase of pension pressure. As a kind of financial innovation, housing reverse mortgage can activate the fixed assets of the elderly, increase pension income, improve the quality of life of the elderly after retirement, so as to drive economic growth, relieve the pension pressure of social security system, and promote the construction of a harmonious socialist society with Chinese characteristics. Therefore, housing reverse mortgage has great potential for relieving the pressure of the elderly in China, and it is also an effective way for China's insurance industry to integrate into the overall economic and social development and serve the social construction.

Combined with the quantitative research in the previous chapter, this chapter will use the qualitative research method to further study the factors affecting reverse mortgage and the views of the middle-aged and elderly people on "pension with housing" and "supporting children for the aged". This chapter will use the methodology of thematic analyses and the theory of decision making to help us better study retirement behaviour, and explore the importance of reverse mortgage in it. Using qualitative research to supplement the results of quantitative research to study reverse mortgage can not only help us enrich the relevant theories

of social pension security, but also deepen and integrate the theories of real estate, finance, insurance and institutional economics. Secondly, the research on this model can also promote the development of financial innovation. Reverse mortgage loan product is a new product formed after integrating finance, insurance and related financial products, which will play a very important role in the development of pension finance and credit products in China.

From the perspective of practical significance, qualitative research can help us formulate reasonable strategies to solve the serious pension problem. Reverse mortgage not only innovates the pension mode in China, but also complements the existing family pension and social pension model in China. It can make the retired elderly give consideration to their self-care while living at home, optimize the existing family assets, improve their living standards in their old age and realize their self-worth. In addition, the implementation of housing reverse mortgage can also reduce the pressure of China's social security system and the heavy burden of children supporting the elderly, which is of great significance to social stability and building a harmonious society. From the results of qualitative research, we can analyse how to formulate the corresponding reverse mortgage policy and product design, so as to make this strategy beneficial to China's social security system more smoothly. Therefore, the analyses of housing reverse mortgage loan pension mode in this chapter aims to provide certain experience for the development of this business in China. It hopes to promote the development of housing reverse mortgage pension mode in China. At the same time, it explores the influence of Chinese traditional concept on people's retirement behaviour, so as to provide more design ideas for the development of reverse mortgage.

5.2 Marketing theory & Consumer behaviour theory---- The consumer decision making theory

The consumer or buyer decision making theory refers to the process in which consumers carefully evaluate the attributes of a certain product, brand or service, and then select and purchase products that can meet a specific need. It derives from market theory and consumer behaviour theory. It can also be seen as a particular form of a cost–benefit analyses in the presence of multiple alternatives (Engel et al, 1968). In a broad sense, consumer decision

making theory includes the process of analysing, evaluating, selecting and implementing the best purchase plan and post-purchase evaluation among two or more purchase plans available for consumers to meet a certain demand and under the control of a certain purchase motivation (Dewey, 2007). In 1910, Dewey first introduced this consumer decision making theory in five stages: Problem Recognition, Information search, Evaluation of Alternatives, Purchase Decision, Post Purchase Behaviour. These five stages are a framework to evaluate customers' buying decision process. While many consumers pass through these stages in a fixed, linear sequence, some stages such as evaluation of alternatives may occur throughout the purchase decision (Rossiter & Bellman, 2005).

Figure 6: The consumer decision making process (Professional Academy 2021)

The first stage is problem recognition. The aim of this process is working out what exactly the customer needs. From consumer behaviour perspective, consumers begin the decision-making process when they realize that they have a need, which may be caused by internal physiological activities or by some external stimulation (Kotler et al, 2009). From marketing perspective, this stage means that the customer feels like something is missing and needs to address it to get back to feeling normal (Baker, 1991). If manager can determine when consumer's target demographic develops these needs or wants, it would be an ideal time to advertise to them.

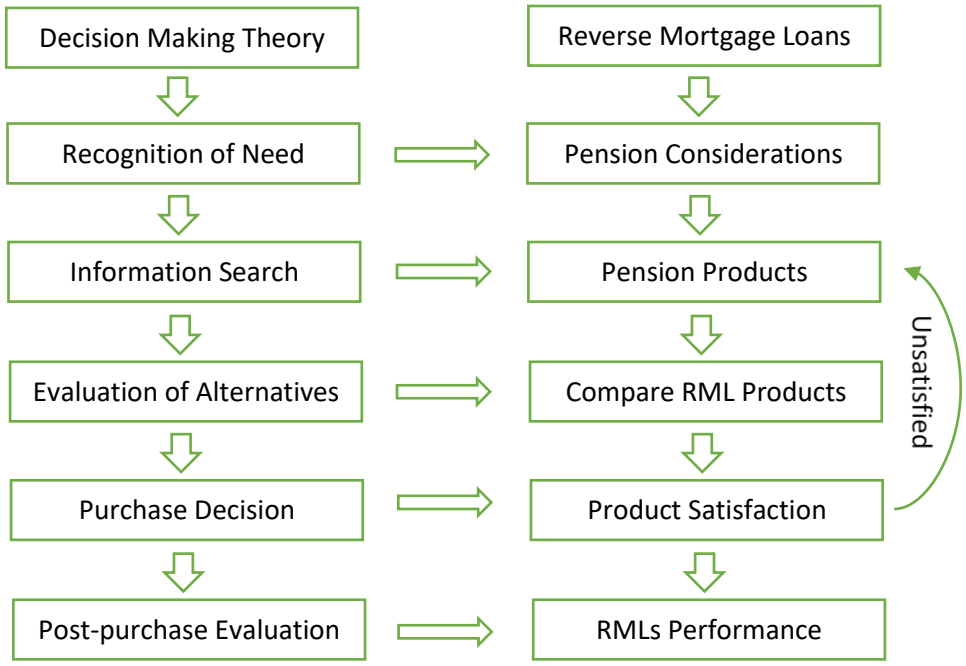
The second stage is information search. In this stage, both consumer behaviour theory and marketing theory hold the same concerns, which means that these two theories focus on information role. Kline and Wagner (1994) claimed that there were four main sources of information: personal sources, commercial sources, public sources and experience sources. They emphasized that information was not only gathered about stuff and on things but from people via recommendations and through previous experiences we might have had with various products. In this stage a customer is beginning to think about risk management. A customer might make a pro's vs. con's list to help make their decision. People often do not want to regret making a decision so extra time being put into managing risk may be worth it (Ellis et al, 2010). Additionally, emotions also influence the depth of information processing related to decision making. Schwarz and Bless (1991) believed that if the mood have played an important role in adaptation, which to some signals, need extra attention when negative emotions should be a threat signals, thus increase vigilance and processing of the system, and positive emotions should suggest a safe environment and leads to more heuristic processing. In fact, many studies have shown that people in a positive (negative) emotional state are influenced more (and less) by heuristic cues, such as the expertise, attractiveness or likeability of the source of the information, as well as the length of the information rather than its quality, which means that they also rely more on stereotypes (Bless et al. 1996, Bodenhausen et al. 1994a).

The next stage is evaluation of alternatives, which means that consumers need to analyse, evaluate and select product information, because the information they get may be repetitive or even contradictory. From consumer behaviour theory perspective, consumers evaluate different products/brands on the basis of varying product attributes, and whether these can deliver the benefits that the customers are seeking (Kotler et al, 2009). This is the time when questions start being asked. For example, the question like "Is this really the right product for me do?" or "Do we need a different product?" will come up. If the answers are either "No it's not right" or "yes, we need a different product" then stage 2 may recommence. The stage 3 to 2 transition may happen several times before stage 4 has been reached. From marketing theory perspective, managers need to understand this process and accurately determine from market research which attributes customers place first, such as price or quality or brand. For product managers, what they need is to assess the degree to which different attributes of a product affect consumers in this stage (Murray, 1991).

The fourth stage is purchasing decision. According to Kotler, Keller, Koshy, and Jha (2009), after the comparison and selection of commodity information, consumers have formed the purchase intention. However, from the purchase intention to the decision to purchase, there are still two factors affecting the purchase intention. The first one is attitudes of others. The stronger the opposition, or the closer the relationship between the objector and the purchaser, the more likely it is to modify the purchase intention. Another factor is unexpected situation. If something unexpected happens - unemployment, urgent need, price increase, etc. - it is likely to change the purchase intention. At this stage, from both the perspective of consumer behaviour theory and the perspective of marketing theory, it focuses on the transformation of consumers from purchase intention to purchase decision.

The final stage is post-purchase behaviour, which includes post-purchase satisfaction and post-purchase activities. The review stage is a key stage for the company and for the customer likewise. From consumer behaviour theory, it focuses on the comparison between the expected performance of a product by consumers and the actual performance of a product in use (Blythe, 2008). The degree of satisfaction after purchase determines the post-purchase activities of consumers, determines whether consumers repeatedly buy the product, determines the attitude of consumers towards the brand, and also affects other consumers, forming a chain effect. From marketing theory, this stage focuses on whether the sales volume and after-sales evaluation of the products meet the company's expectations (Burger & Cann, 1995). If companies find that their products meet expectations, they will consider continuing to manufacture and upgrade the products. However, if it doesn't meet expectations, they may consider stopping the product or making adjustments based on reviews (Saleh, 2012).

Figure 7: A decision making theory flowchart



Within the framework of this five-stage consumer decision making theory, we can attribute people's awareness of their pension considerations to the first stage of this theory, which is the stage of problem or need recognition. In the context of the aging population, the childless old people will face the related problems due to the conflict between the insufficient pension and the rapid increase in the price of daily necessities. Given this need, they realized that they needed to start looking for products to solve their problems. Then turn to the second stage, these potential consumers begin to search information about pension products. The field of information has come a long way in the last forty years, and has enabled easier and faster information discovery. Thus, these consumers can rely on print, visual, and/or voice media for getting information. After they get information of different products, they start to compare reverse mortgage loans products with other pension products. Consumers compare reverse mortgage products with other pension products in terms of scope of application, actual income, convenience, etc. At the same time, they verify the collected information and consult insurance companies to ensure that the actual effect of reverse mortgage products can meet their expectations. If customers are satisfied with the reverse mortgage products, it will enter the stage four – purchase stage. To the exclusion of others' opinions and unexpected situations, they will become users of reverse mortgage products. However, if customers are not satisfied with the reverse mortgages, they will go back to the second stage and choose a new pension

product. Finally, after purchasing a reverse mortgage product, these consumers will compare the expected performance of the product with the actual performance of the product in use, thus determining consumers' attitude towards the brand and affecting other consumers.

Overall, from previous literatures, we can find that the lack of studies investigating reverse mortgage loans with qualitative methods and the lack of studies that have focused on exploring the relationship between consumer purchase theories and reverse mortgage loans. In this chapter, our data collection (interviews) will focus on the second, third and fifth stages. we expect that in the framework of consumers' purchase decision theory, we can explore the following research questions: what information people gathered when considering a reverse mortgage product; what attributes of the product people considered; why people decided to buy or are considering buying the product; what the impact of this RML products on consumers' lives is.

5.3 Methods

5.3.1 Thematic analyses

Thematic analyses (TA) is one of the most common forms of analyses in qualitative research. It is a straightforward way of conducting hermeneutic content analyses which is from a group of analyses that are designed for non-numerical data. It is a form of pattern recognition used in content analyses whereby themes (or codes) that emerge from the data become the categories for analyses. Holloway and Todres (2003) claimed that thematic analyses should be seen as a foundational method for qualitative analyses. It is the first qualitative analyses method that researchers should learn because it provides some core skills and is very useful for many other forms of qualitative analyses. In fact, Holloway and Todres (2003) identified "thematic meaning" as one of the few common skills in quality analyses. In addition, Boyatzis (1998) described it as a tool for different qualitative research methods rather than a specific method. Similarly, Ryan and Bernard (2000) regarded thematic coding as a process performed in qualitative analyses rather than a specific method of its own.

One of the benefits of thematic analyses is its flexibility. Qualitative analyses method can be divided into two parts. In the first part, some of them are related to or derived from specific theoretical or epistemological positions, such as conversational analyses (Hutchby & Wooffitt, 1998) and interpretative phenomenological analyses (Smith & Osborn, 2003). Within this framework, the application of the method has relatively limited variability. In the second part, some methods are essentially independent of theory and epistemology and can be applied to a series of theories and epistemological methods. Although thematic analyses is generally regarded as a realistic / empirical approach (Roulston, 2001), it belongs to the second part and is compatible with essentialism and constructivism paradigm in psychology. Through its theoretical degree of freedom, thematic analyse provides a flexible and useful research tool, which can potentially provide a rich and detailed but complex data account.

When using thematic analyses to conduct research, it is usually divided into six stages, namely, getting familiar with the collected data, establishing the initial code, finding the theme, reviewing the theme, defining and naming the theme, and summarizing the report.

Figure 8: Thematic analyses (Szedlak et al. 2015)

Phase	Examples of procedure for each step
1. Familiarising oneself with the data	Transcribing data; reading and re-reading; noting down initial codes
2. Generating initial codes	Coding interesting features of the data in a systematic fashion across the data-set, collating data relevant to each code
3. Searching for the themes	Collating codes into potential themes, gathering all data relevant to each potential theme
4. Involved reviewing the themes	Checking if the themes work in relation to the coded extracts and the entire data-set; generate a thematic 'map'
5. Defining and naming themes	Ongoing analysis to refine the specifics of each theme; generation of clear names for each theme
6. Producing the report	Final opportunity for analysis selecting appropriate extracts; discussion of the analysis; relate back to research question or literature; produce report

Firstly, most of the qualitative analyses' methods start with the determination of the analyses theme. On this basis, the data were labeled, classified and compared (Atkinson & heritage, 1984). The premise of determining the analyses' theme is that the researchers are familiar with the data. In the data familiarization stage, due to time constraints, researchers can carefully select part of the data instead of all the data to read (Hutchby & Wooffitt, 1998). This choice

often needs to be combined with the research plan, especially the research purpose. After the analyst has a comprehensive understanding of the details and characteristics of the data, the process of data familiarity can be completed. When researchers use verbal data, such as interviews, TV programs, or political speeches, they need to be transcribed into written form for thematic analyses. The process of transcription, although it may be seen as time-consuming, frustrating, and sometimes boring, can be a good way to get familiar with your own data (Riessman, 1993). In addition, some researchers even believe that this should be regarded as "a key stage of data analyses in interpretative qualitative methodology" (Bird, 2005) and regarded as an interpretative behaviour. The data of our qualitative research part is also collected by interview, so we have completed the stage of getting familiar with the data in the process of transcription.

Secondly, when researchers read and become familiar with the data, they produce a preliminary list of ideas about what is in the data and what is interesting. This stage then needs to generate the initial code from the data. Code identifies data features (semantic content or potential features) of interest to analysts (Boyatzis, 1998). The coding process is part of the analyses (Miles & Huberman, 1994), because you are transforming data into meaningful groups (Tuckett, 2005). However, coding data is different from the analyses theme, which is more extensive. Coding depends in part on whether the theme is more "data-driven" or "theory driven" - in the former, the theme will depend on the data, but in the latter case, you may be dealing with the data with specific issues that you want to code. It also depends on whether you plan to encode the contents of the entire dataset, or whether you are encoding to identify specific features of the dataset. Our research will focus more on "data driven" coding, so we will code as many potential themes as possible. At the same time, we need to note that according to Bryman (2001), we do not need to eliminate or ignore the contradictions and inconsistencies within and between data items when coding. It is important to keep accounts that are different from the leading story in the analyses.

For the stage three and four, we need to search for themes and review themes. Searching for themes begins when all the data has been initially encoded and organized, and a long list is created of the different codes that we identify in the dataset. This phase focuses the analyses

on the broader theme level rather than on the code. It involves classifying different codes into potential themes and sorting out all relevant coding data summaries in the identified themes (Braun & Wilkinson, 2003). Basically, the researchers began to analyse the code and consider how to combine different codes to form an overall theme. In addition, some of the initial code may continue to form a main theme, while others may form a subtheme, while others may still be discarded. In our research, we will use a collection of candidate themes and subthemes, as well as extracts of all data related to these themes. we are not going to give up anything at this stage, because if we do not look at all the results carefully, we are not sure whether the themes remain the same or whether some themes need to be merged, refined and separated, or discarded.

When we have completed a set of candidate themes, the reviewing theme stage begins, which involves refinement of these themes. At this stage, some of the candidate themes are not real themes (if there is not enough data to support them, or the data is too diverse), while others may fold over each other (two distinctly different topics may form a theme) (Patton, 1990). In this stage, we not only need to review at the level of coding data extraction, but also consider the validity of various themes related to the dataset, and whether the candidate thematic graph "accurately" reflects the obvious meaning of the entire dataset. Reviewing at the level of coding data extraction means that researchers need to read all the organized abstracts of each topic and consider whether they form a coherent pattern. In our research, at the end of this phase, we should have a fairly good understanding of the themes of reverse mortgage, including how these themes come together and the whole story they tell about data.

Finally, we will define and further refine the analyses' themes which we will present to others and analyse the data in them. "Defining and refining" refers to determining the "essence" of each theme (and overall theme) and determining which aspects of the data each theme captures (Braun & Wilkinson, 2003). It is important not to try to make a theme too much, or too diverse and complex. In addition, you should not only explain the content of the data summaries presented, but also determine what is interesting and why! For each individual theme, researchers need to conduct a detailed analysis. In addition to identifying the "story" that each theme tells, it is important to consider how it matches the broader overall "story" associated

with reverse mortgage data to ensure that there is not too much overlap between the themes. Thus, researchers need to consider the relationship between one theme and others. More importantly, at the end of this phase, we can clearly define what my themes are and what they are not. The test is whether we can use a few words to describe the scope and content of each reverse mortgage related theme. If this is not possible, the theme may need to be further refined. At the same time, the name of each theme needs to be concise, powerful, and give the reader a sense of the theme immediately.

5.3.2 Epistemology

Epistemology can also be regarded as the individual's view of knowledge, that is, the beliefs held by individuals on knowledge and knowledge acquisition, mainly including the beliefs about knowledge structure and nature, knowledge sources and knowledge judgment, and the regulation and influence of these beliefs in the process of individual knowledge construction and knowledge acquisition, which has been the core issue of philosophical research for a long time. In addition, epistemology has two different standpoints that concern two different philosophical issues, namely positivism and interpretivism (Saunders et al., 2012).

Interpretivism is an epistemological position that contrasts positivism. As Bryman and Bell (2011) states interpretivism is a term for writers that “share a view that the subject matter of the social sciences – people and their institutions – is fundamentally different from that of natural sciences”. This position holds the view that research strategies are required to include differences between people. As such it is required that the scientist understands the subjectiveness of social action. Thus, we will choose interpretivism as my main epistemological stance. As the research is not based on existing theory or any numerical data, as well as the fact that the aim is to look into causes and consequences rather than to reject or accept hypotheses, we believe that interpretivism is a more fitting epistemological standpoint. In addition, as interpretivism is concerned with the study of human beings and psychology, we deemed it more useful when conducting this research due to the relationship among banks, insurance companies and the elderly.

5.3.3 Ontology

Ontology studies the problem of social entity, and it is a philosophical theory that explores the origin or matrix of the world. It describes the formation of social entities and the actors in them. These actors are called social actors. In short, it deals with issues such as entities and whether they exist. Bryman and bell (2011) defined ontology as "the question of whether social entities can and should be considered objective entities that have a reality external to social actors, or whether they can and should be considered social construction built up from the perceptions and actions of social actors". It shows us two different positions of ontology: objectivism and constructivism.

Constructivism is basically a theory -- based on observation and scientific study -- about how people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences (Bryman & Bell, 2011). Thus, we will choose constructivism as ontological stance for this research. As the aim of this research is to look in depth at the issue of implementing reverse mortgages in China and its causes and consequences, having a position that acknowledges the state of change of social institutions is important. Moreover, as it is necessary to study the details of a situation in order to understand what is happening (or to understand the real cause behind it), we believe this is the most fitting ontological stance for this research. This is due to the fact that reasons and consequences are to be revealed, rather than rejecting or accepting hypotheses. Another point of interest is the fact that the social actors present in this research (banks and insurance companies, as well as the elderly) may view situations differently, and thus act differently to it by being subjective. It is therefore the role of the researchers to understand the subjective reality of the social actors involved.

5.4 Data Collection

Based on above-mentioned method, we finally select 25 reverse mortgage related customers as our interview resources. Twenty of them are from Beijing, Shanghai and Hangzhou, while the remaining five are from Nanjing. Through the table of reverse mortgage loans in different cities,

it can be known that in Beijing, Shanghai and Hangzhou, reverse mortgage loans are sold by insurance company we interviewed. At the same time, reverse mortgage loans in Nanjing are sold by government departments. In addition, five interviewees in Nanjing are all customers who have purchased reverse mortgage products, while 12 of the remaining 20 interviewees have participated in reverse mortgage products, and 8 of them are those who intend to purchase or have consulted this product.

Although, since our number of interviews is 25, we have basically reached what we consider the saturation point of interviews. The saturation point in qualitative research refers to the fact that the amount of information obtained in the study is large enough that more tests will not bring more information. If there is enough time, we will consider expanding the number of interviews to 30-35. This quantity is sufficient to ensure that our research data reaches the saturation point, and to ensure that the sample is representative, and the sample size is large enough. After all, the goal of qualitative research is to understand the details of a user's experience, not to determine how many people have a particular experience problem or need.

Table 11: Interviewee basic informatin

Name (fake)	Gender	Age	Education Level	Health Status	Marriage	Number of children	Current House (rent/owned/free)	Type of Household (agriculture or city)	Basic Insurance (owned or not)	Retirement (retired or not)
Xin	Male	52	Bachelor/University	good	married	2	owned	city	yes	no
Le	Male	49	bachelor	good	divorce	0	owned	city	yes	no
Ming 1	Female	53	bachelor	good	married	2	owned	city	yes	no
Ting	Male	55	High school	good	married	1	owned	city	yes	no
Hao 1	Male	57	Master/Msc	good	divorce	1	owned	city	yes	no
Ling	Male	55	bachelor	good	married	0	owned	city	yes	no
Li 1	Male	58	bachelor	good	divorce	0	owned	city	yes	no
Tian	Male	61	bachelor	good	married	1	owned	city	yes	yes
Lan	Female	54	master	good	married	1	owned	city	yes	no
Tang	Male	59	bachelor	good	divorce	0	owned	city	yes	no
Kan	Male	58	bachelor	good	married	1	owned	city	yes	no
Mei	Female	50	bachelor	good	married	2	owned	city	yes	no
Guan	Female	52	bachelor	good	married	0	owned	city	yes	no
Lie	Male	57	master	good	single	0	owned	city	yes	no
Jing	Male	55	bachelor	normal	married	0	owned	city	yes	no
Ai	Female	56	master	good	married	0	owned	city	yes	yes
Ming 2	Male	61	master	good	divorce	0	owned	city	yes	yes
Mao	Male	61	bachelor	good	married	0	owned	city	yes	yes
Jin	Female	57	master	good	married	1	owned	city	yes	yes
Liu	Male	62	bachelor	normal	divorce	0	owned	city	yes	yes
Hao 2	Male	60	bachelor	good	divorce	0	owned	city	yes	yes
Kai	Male	61	bachelor	good	divorce	0	owned	city	yes	yes
Li 2	Male	60	bachelor	good	divorce	0	owned	city	yes	yes
Li 3	Male	62	master	good	divorce	0	owned	city	yes	yes
Niu	Female	56	bachelor	good	married	0	owned	city	yes	yes

5.5 Data analyses

Table 12 Themes and sub-themes (details in appendix table 2)

Theme	Sub-Theme
Understanding of RMLs	RMLs operator
	RMLs features
	Views on government operator
	Official distributor effect
	Views on commercial operator
Factors affect customers' RML choice	Advantages of RMLs
	Disadvantages of RMLs
	Reasons why choose RML or not
Retirement choice	Old age retirement choice
	Reasons why current retirement choice
Insurance influence	Commercial insurance effects
	Commercial insurance affect retirement behaviour
	RMLs affect retirement behaviour or not
Old age care	Old-age care method
	Compare two old-age care methods
	Conflicts between RML and "raising children for old age"
Retirement policy	Statutory Retirement Policy
	Reasons of policy change
	Influence of RML on retirement policy

Table 12 showed that we sorted the collected data into six themes for analyses, and further classified each theme according to different codes. Next step, we will conduct detailed data analyses according to the themes in Table 12.

5.5.1 Understanding of RML

Table 13 Understanding of RMLs

Number of interviewee	Codes	Sub-Theme	Theme
5	Official committee	RMLs operator	Understanding of RMLs
25	Distributor		
18	Ping An Insurance Company		
25	Unique product	RML features	
20	Propaganda		
19	Good impression		
25	Insurance product		
25	Rent house		
20	Nursing home		
25	Fixed monthly money		
25	House ownership		
23	Product target		
5	High Credibility	Views on government operator	
5	Easy to purchase		
2	Lots of requirements		
5	Official distributor effect	Official distributor effect	
5	High credibility		
4	Stable		
1	Low income/profit		
5	Government strengthen credibility		
11	High profits	Views on commercial operator	
18	Lots of requirements		
19	Famous		
6	High risks		

From table 13, we first need to analyse the "Understanding of RML" theme. First of all, it can be found that different operators have a certain degree of influence on whether people choose reverse mortgage loans. In the three cities in charge of commercial insurance companies, interviewees' evaluation of reverse mortgage is mixed. In other words, the number of people who expressed positive and negative comments on reverse mortgage loan is similar, and even

six interviewees think that reverse mortgage loans in commercial insurance companies may have high risk hazards. Examples are shown below:

Although we can sign the contract in advance, we still want to wait and see. After all, it involves the property right of the house. we think the most attractive thing is that this product can greatly increase my disposable income after retirement. Unlike ordinary retired employees, they can only get a little pension. (No.14 Part 1 Q5)

Actually, we didn't consider this product at the time, we think it's not right for me. Although the possibility of increasing the wealth income after retirement is very attractive to me, this is to take the house as the exchange. we think it is not good. (No.11 Part 1 Q5)

On the contrary, in Nanjing, where the government department is in charge, five interviewees expressed positive comments on the reverse mortgage products and chose to buy it. Although there were still two interviewees who complained lots of conditions are needed to get this product, they finally chose to buy this product. Examples of responses from the interview data that indicated this notion are:

I thought about it at that time, because although it seems to belong to insurance, it is introduced by the government. If it is purchased through the government, we think the credibility is very high. Thus, it is a product that we can trust. And this product can really increase my retirement income and make me more comfortable in my old age. (No.22 Part 1 Q6)

By the way, the government department is responsible for this product is also one of the reasons we choose it. we think the government can give me more trust. (No.23 Part 1 Q10)

Therefore, we think that the number of purchase restrictions has no significant impact on whether people choose to buy reverse mortgage products. To sum up, we find that government departments with a higher degree of trust can more easily push potential customers of reverse mortgages to make the final purchase, while the commercial insurance companies with higher reputation and higher profit will make the potential customers of reverse mortgage have a certain sense of uncertainty, which leads to the lack of firm determination to buy this product.

Secondly, through the analyses of the related themes of "RML features", it shows that these 25 interviewees think that reverse mortgage is a unique product, and all of them have a comprehensive understanding of the relevant information of reverse mortgage products, which can concisely summarize the basic content of reverse mortgage products. Of the 25 interviewees, 19 expressed a good impression of the reverse mortgage product, while the remaining six thought the product was not suitable for them and made it clear that they would not buy it. From the theme of advantages and disadvantages of reverse mortgage, 19 interviewees' good impression of reverse mortgage mainly comes from the fact that reverse mortgage products can increase their wealth and income, improve their quality of life and reduce the time spent in daily trifles. Examples of responses from the interview data that indicated this notion are:

The feeling they introduced to me was very good, which made me feel that this product could make me feel at ease and guarantee my retirement life. And you think ah, this is in the government department to promote the product, we think should not be bad. The most attractive aspect of this product to me is to increase my retirement income. After all, we bought this product because we thought it could increase my wealth, and we didn't think much about anything else. (No.23 Part 1 Q6)

I thought about it at the time, so we asked them for their contact information, and then consulted them a little bit before we made up my mind. What attracts me most about this product is that it can increase a lot of retirement income, and there is no loss when you still have a place to live, so it is quite a good product. (No.24 Part 1 Q6)

At the meantime, the other six interviewees' refusal to reverse mortgage loans mainly comes from the fact that reverse mortgage loans will cause them to lose the ownership of their houses, and if they want to participate in reverse mortgage loan, their houses also have the minimum area and other restrictions. Samples of responses from the participants are given below to highlight this point:

I thought about it at that time, but we didn't choose to buy it. After all, we didn't meet the requirements of the purchase. Although we can sign the contract in advance, we still want to wait and see. After all, it involves the property right of the house. (No.14 Part 1 Q6)

The most important thing is the increase in monthly income. At that time, we took into consideration the problem of income and the ultimate attribution of the house. After all, the house is also a very high value of property and cannot be easily traded like this. (No.25 Part 1 Q7)

Therefore, we can conclude that the characteristics of reverse mortgage products can increase family income and improve the quality of life, which can make the interviewees start to consider whether to choose reverse mortgage products. At the same time, the characteristics of reverse mortgage products that cause people to lose the ownership of their houses and the characteristics of many restrictions on their purchase will affect the interviewees' hesitation whether they need to buy reverse mortgage products.

5.5.2 Factors affect customers' RML choices

Table 14 Factors affect customers' RML choices

Number of interviewee	Codes	Sub-Theme	Theme
25	Increase income	Advantages of RMLs	
25	Increase wealth		
21	Life quality		
19	Less time on trivial affairs		
15	House ownership loss	Disadvantages of RMLs	
4	Age restrictions when purchase		
2	House restrictions when purchase		
22	Family members	Reasons why choose RML or not	Factors affect customers' RML choice
19	Live alone		
10	Legacy		
25	Matching degree		
16	Life quality		
17	Enjoy life		
25	Increase income/wealth		
19	Family status (married/dirvorce)		
25	Family income		
21	Health status		
20	House ownership		
9	Family income guaranteed		

A very important point is about the theme of "factors affect customers' RML choices". Among them, 25 people mentioned family income, while more than 20 people mentioned family members, health and housing ownership. Firstly, no matter whether 25 interviewees purchase or not, they all think that family income is the most important factor for them to choose reverse mortgage products, because reverse mortgage can greatly increase their monthly income after retirement. The following extracts are examples of the participants statements with regard to this point:

I think the key point of this product is to increase the income in my old age. we think we haven't considered other factors besides these factors. (No.22 Part 1 Q10)

After all, if the reverse mortgage could not boost my post-retirement income, we wouldn't have searched for it. (No.14 Part 1 Q10)

Whether it's health or income, we think it's all based on family factors or my wife's factors. we think we haven't considered other factors besides these factors. (No.15 Part 1 Q10)

Secondly, 21 interviewees mentioned the health status factor. They think that when they buy reverse mortgage products, a healthier body can get more benefits from this product, because the longer they live, the more times they can get money each month. If they are not healthy enough, they think it's better to choose to sell the house instead of reverse mortgages. Excerpt from these participants is quoted below:

After all, I'm not in good health. I'm worried that if we have an accident, my wife will not be able to maintain the current living standard. (No.15 Part 1 Q9 Line 4)

Oh, no, there may be health factors, right? we don't think we would consider this product if we was in poor physical condition. Please think of such situation, if you are not healthy, you may die at any time. (No.22 Part 1 Q10)

In addition, we also thought about my health after retirement. This is one of the reasons why we choose this product. After all, if the health is good, this kind of product is good, but if the health is not good, it will feel worse. (No.1 Part 1 Q1)

Thirdly, 19 interviewees mentioned the reasons for living alone, and they all chose to buy reverse mortgage loans or people with purchase tendency. This factor is similar to that of family members factor, both of which are influenced by family members. Because people living alone have no interference from family members, they are more likely to make a choice that is more in line with their own interests, that is, they choose to buy reverse mortgage products to increase their income after retirement by themselves. The following are sampled responses that identified these codes:

I didn't think about it. Anyway, I'm living alone now, and we have to take care of the elderly. we certainly need a complete pension. (No.14 Part 2 Q1)

In fact, we have considered the family factor, because we are living alone now. we don't need to consider the thoughts of family members. we can do everything by myself. (No.22 Part 1 Q7)

In addition, we live alone. we don't need to consider too many factors. (No.14 Part 1 Q6 Line 3)

Fourth, similarly, the 19 interviewees also mentioned their marital status. They were all divorced or widowed and had no children to accompany them. They believe that it is this marital status that leads them to live alone, which makes it easier for them to make their own choices without considering other family members. This view was captured by the participants in the following samples:

I am the only member of my family now. There are no family members who we need to consider leave property. (No.22 Part 1 Q9 Line 3)

Because now I'm the only one left at home, there's nothing else to think about. You know, we are divorced now. When we were introduced to this product at that time, we only considered the increase of income and the situation of supporting the aged. (No.8 Part 1 Q10 Line2)

My initial idea of buying this product was that the house wouldn't be useful to me because we didn't have the kids and, you know, my wife was gone. (No.6 Part 1 Q10 Line 3)

Fifth, the pursuit of quality of life and enjoyment of life is also the reason why most people choose reverse mortgage products. we think that their views come from their attitudes towards life. They prefer rich material life, so they choose reverse mortgage products which can increase a lot of retirement income. Examples of responses from the interview data that indicated this notion are:

Secondly, this product can facilitate my post-retirement life, increase my pension and improve the quality of my retirement life, so that we don't need to think about too many daily chores. (No.14 Part 1 Q9 Line 4)

In addition, this product really enriched a lot of my old age wealth, so that we can be more comfortable in daily life. (No.22 Part 1 Q7 Line 4)

I don't think the business insurance will affect my retirement decision, because the income brought by the salary can make my family live a happier life, not a poor life. (No.1 Part 2 Q8 Line 3)

Sixth, there are 10 other people who have mentioned the issue of inheritance. Among them, 6 people refuse to buy reverse mortgage products and 4 people are hesitant. They are more inclined to leave their houses to their children or relatives. It is worth mentioning that the six interviewees who refused to buy were all married and had children, while the four who hesitated were all divorced but still kept in touch with their children. Supporting these codes, the following samples show that:

And we didn't use the house as a legacy, so we was more inclined to think about this product at that time. You know, we have no child now. (No.22 Part 1 Q7 Line 3)

But we think this product is a poor match for me, because we still prefer to leave the property to my children. After all, as a valuable immovable property, we think it would be better to leave it to my family. (No.4 Part 1 Q9 Line 2)

After all, we don't have kids and my wife is gone, so there's no use in keeping the house, which would be a great option for a reverse mortgage. (No.6 Part 1 Q9 Line 4)

To sum up, we find that family income and health factors have a significant effect on whether the interviewees choose reverse mortgage, which are the first and second factors to be considered when the interviewees consider purchasing reverse mortgage. Interviewees with less family income and healthier health are more likely to buy reverse mortgage products, and vice versa. At the same time, family members and marital status also have a certain impact on people's choice of reverse mortgage products. In other words, interviewees with fewer family members are more likely to buy reverse mortgage products, while interviewees with divorced marital status are more likely to buy reverse mortgage products than those with married status. In addition, although few people mentioned the legacy factor, the interviewees who refused to buy all mentioned it. Therefore, inheritance of legacy also has an important impact on people's choice of reverse mortgage products. This factor can also be used as a supplement to the family member factor.

5.5.3 Retirement choice

Table 15 Retirement choice

Number of interviewee	Codes	Sub-Theme	Theme
25	No continue to work	Old age retirement choice	Retirement choice
25	Legal retirement age		
25	Statutory retirement age		
25	No early or delayed retirement		
25	Mandatory retirement age	Reasons why current retirement choice	
25	Income influence		
20	Health influence		
25	Income effect		
10	Family difficulties		
23	Attitude towards life		

For retirement behaviour, our 25 interviewees hold the same view, that is, to retire normally after working to the statutory retirement age. They are unwilling to continue working or choose to retire early. Of the 25 interviewees, 11 have retired. They all retired directly at the statutory retirement age, while the remaining 14 said they would stick to the statutory retirement age and

would not continue to work after 60. When we analyse this situation, we find that the main reason why these 25 interviewees choose such a retirement strategy is that it will affect their retirement income. They all said that if they retire early, it will greatly affect their retirement income. Excerpt from the interview revealed the following views:

I didn't think about it. After all, my salary is still the main source of our family's income. It is not realistic to retire early. After all, there will be no source of income. (No.15 Part 2 Q1)

The main problem is the source of income or income. Because if we want to support the daily expenses of our family, early retirement is certainly impossible, which affects the amount of pension. we don't think we can stick to it because I'm not very healthy now, so I'd better retire on time. (No.15 Part 2 Q2)

I didn't think about it. Because early retirement will reduce the income after retirement. In other words, we are almost 60 and there is no need to retire early. As for delayed retirement, we didn't consider delaying retirement because we participated in reverse mortgage products at that time. we had enough income to support my retirement life. (No.22 Part 2 Q1)

At the meantime, 20 interviewees mentioned health factors. They said that if their health conditions did not allow, they would retire early to recover their health. After all, they were all at the age of retiring or already retiring. An example is shown below:

Oh, by the way, there are also health factors. we think this is also very important. If my physical condition is unable to support me to continue working, we will not insist on it. we will choose to retire directly to take good care of my illness or enjoy the rest of my time. (No.15 Part 2 Q3)

In addition, 23 interviewees said that they were unwilling to delay retirement because they wanted to enjoy life and thought they should not work all the time. Excerpt from the interview revealed the following view:

I think it's just personal thinking. After all, who would want to continue working if they could afford to live on a monthly basis? we really wanted to retire to square dancing with my sisters, so we didn't think about delaying retirement. (No.25 Part 2 Q2)

Moreover, 10 of them said that they would not consider delaying retirement unless their families were in great difficulties and needed a lot of money to support them. Extracts from the participants' statements would reveal their general view on the questions:

The main problem is the source of income or income. Because if we want to support the daily expenses of our family, early retirement is certainly impossible, which affects the amount of pension. we don't think we can stick to it because I'm not very healthy now, so I'd better retire on time. (No.15 Part 2 Q2)

I hadn't really thought about that. If we have to say, we think it might be family difficulties. If the home economic conditions are very difficult, it is to continue to work, relying on pension is unable to solve economic problems. So, we think family difficulties are a factor? (No.11 Part 2 Q3)

Therefore, after summing up the data we collected, we can discover that retirement income is the most important factor affecting people's retirement behaviour, and early retirement will reduce the retirement income, which will lead people not to choose early retirement. Similarly, the higher the degree of income decline caused by family difficulties; the more likely people are to choose to delay retirement in order to expect more salaries. Health is also an important factor influencing interviewees' retirement behaviour. It is easy to find that the healthier people are, the more likely they are to retire legally, while the less healthy people are, the more likely they are to choose early retirement. In addition, life attitude is also an essential factor that determines people's retirement behaviour. Our data shows that interviewees who prefer to enjoy life and pursue quality of life are more likely to choose to retire immediately after reaching the statutory retirement age, rather than early or delayed retirement.

5.5.4 Insurance influence

Table 16 Insurance influence

Number of interviewee	Codes	Sub-Theme	Theme
23	Prevent accident	Commercial insurance effects	Insurance influence
25	Prevent wealth loss		
16	Protect property		
20	Secure feeling		
25	Insurance weak influence	Commercial insurance affect retirement behaviour	
20	Increase life security		
25	Protect wealth loss		
25	Family income		
23	Retirement income loss		
21	Health status		
20	Influence on delayed retirement		
23	High retirement income stops continuing working	RMLs affect retirement behaviour or not	
15	RML promotes normal retirement		
12	Some influence on interviewee		
13	Less influence on interviewee		

One of the most important questions in our research is the relationship between reverse mortgage and retirement behaviour. First of all, reverse mortgage, as a kind of commercial insurance, is quite different from general commercial insurance. All of the 25 interviewees in this interview have participated in commercial insurance, and all think that commercial insurance can protect their property and reduce their losses caused by accidents. Especially, 20 of them believed that commercial insurance could improve their sense of security in life. Examples of this view as expressed by the interview participants are:

I think commercial insurance can protect me. If we have an accident, my father still has enough money to support his life, instead of being old and homeless. Thus, we think that commercial insurance should bring me a sense of security. we feel that with the protection of commercial insurance, my father and we can live smoothly no matter what kind of accident they encounter. (No.14 Part 2 Q8)

First of all, this product can increase our family's income after retirement. This is my original intention to buy this product, in order to protect our life. (No.15 Part 1 Q9)

I think the main purpose of insurance is to prevent accidents. Basically, all of my commercial insurance is to prevent major financial losses caused by accidents, except for this reverse mortgage loan. This product is really different from other insurance products. It pays more attention to the income in old age. It is a product to protect the life after retirement. Unlike other commercial insurance, it is to prevent income. (No.22 Part 2 Q8)

However, when they talk about reverse mortgage, they present many different views. 12 interviewees believe that reverse mortgage has a certain impact on retirement behaviour, while the remaining 13 interviewees believe that reverse mortgage has no or only a weak impact on retirement behaviour. A set of examples expressing this the opposite view is shown below:
I don't think it will have a great impact. After all, it is only regarded as a supplement to the pension. It can't all rely on this kind of income to support myself after retirement. we still need to rely on the pension. And early retirement is bound to affect the amount of pension, and also adhere to a few years then we can retire. Thus, there is no need to retire in advance, which will affect family income after retirement. And we think most people will not retire early, unless they are physically unable to support or meet some accident, or they will insist on normal retirement like me. (No.14 Part 2 Q9)

People who own a reverse mortgage product would certainly be in a better position to retire directly, whereas those who don't might have to think about a lot of things. Thus, reverse mortgages do affect our retirement decisions. Of course, it's my personal opinion. (No.24 Part 2 Q9 Line 3)

It is clear to find that 20 interviewees have talked about the impact of reverse mortgage products on delaying retirement. They generally believe that higher retirement income will lead to workers' refusal to continue working. In addition, 15 interviewees believed that reverse mortgage loan promoted the normal retirement behaviour of workers, but did not promote the occurrence of early retirement or delayed retirement. These views were captured by the following content:
it's hard to say. After all, we don't think reverse mortgage is an insurance product, so the impact of reverse mortgage is quite different from that of commercial insurance. we feel that this product

should not affect us to make early retirement decision, but it will affect us not to delay retirement. Indeed, if the income after retirement increases a lot, no one will choose to continue working. Thus, we think it should be that reverse mortgage will make us retire normally after the legal age, rather than making other retirement decisions. (No.15 Part 2 Q9)

As far as my personal experience is concerned, we feel that this product will not affect our decision of early retirement, but it will affect us not to delay retirement. After all, if the income after retirement increases a lot, no one will choose to continue working. Thus, we think reverse mortgage will encourage us to retire normally after the legal age, instead of making other retirement decisions. (No.22 Part 2 Q9)

In addition to these views, almost all of our 25 interviewees talked about other factors that affect retirement behaviour, such as family income and health status. However, for the 25 interviewees, 12 interviewees who think that reverse mortgage loan has a certain impact on retirement behaviour regard these factors as the same status, that is to say, they are all important factors influencing workers' retirement decision-making. Examples of this view as expressed by the interview participants are:

I think besides the income, we think it is the physical health condition, right? we thought about it for a while. If we were seriously ill, we might consider taking early retirement. After all, the loss of pension may be relatively small compared with the hospital expenses. But even if we were in perfect health, we probably wouldn't consider postponing retirement, since I've bought a reverse mortgage. (No.25 Part 2 Q3)

I think it is the actual income of the family, right? The only thing that affects me is that my retirement income is not enough to support the overall expenditure, so we should consider delaying my retirement, otherwise we can't continue to live. Oh, by the way, there are also health factors. we think this is also very important. (No.22 Part 2 Q3)

For the remaining 13 interviewees, they believed that factors such as family income and health status played a more important role. They refuse to regard the impact of reverse mortgages as comparable to those mentioned. The interview participants' views on these factors are highlighted in the following excerpts:

I think it is the income problem or the family financial source that has affected my retirement choice. After all, if we still want to support the lives of my wife and I, early retirement will not be considered. (No.15 Part 2 Q3)

I didn't think about other factors. If we have to make assumptions, then we think it is a matter of health, right? After all, we am 57 years old now. If we suffer from any illness, we can't expect my father in his 80s to come to the hospital to take care of me. we will certainly apply for early retirement, although it may affect the amount of pension. (No.14 Part 2 Q3)

Therefore, through the summary of the qualitative data, we can initially put forward the following views: reverse mortgage has a certain degree of influence on retirement behaviour, but this influence is not comprehensive. In other words, reverse mortgage can reduce the tendency of workers to delay retirement. But reverse mortgage has no significant effect on early retirement and normal retirement. Other factors such as family income and health status have more significant impact on early retirement and normal retirement behaviour than reverse mortgage. we can even say that reverse mortgage has no impact on early retirement and normal retirement behaviour.

5.5.5 Old age care

Table 17 Old age care

Number of interviewee	Codes	Sub-Theme	Theme
25	Old-age care method	Old-age care method	Old age care
25	Chinese traditional culture		
25	Reverse mortgage loans		
25	raising children for old age		
19	Good feeling on "raising children for old age"	Compare two old-age care methods	
11	Uncertainty monthly income		
25	Fixed monthly money		
13	Conflicts		
12	No conflicts		
25	Different method's requirements		
25	Income provider		
12	Different product target		
16	Different nursing people		
13	Hard to estimate monthly income		
17	Different financial freedom		
23	Each has its own advantages		
13	Conflicts	Conflicts between RML and "raising children for old age"	
12	No conflicts		
5	Uncertainty (mood when answering)		
20	House ownership		
22	Family members		
19	Family status (Married/divorce)		
10	Product target Legacy		

With more in-depth exploration, we also hope that through this data collection, we can find the relationship between reverse mortgage and traditional Chinese concepts and retirement policies, so that we can create new ways to optimize retirement policies through reverse mortgage. From table 17, it shows that whether it is reverse mortgage or "raising children for old age", our interviewees all think that they are a good way to provide for the aged, but the difference lies in the different emphasis of the two ways, such as the monthly income and the people who provide income. From the interview content, 13 interviewees believe that there is a

contradiction between reverse mortgage products and "raising children for old age". They believe that children, house ownership and legacy will lead to the impossible of coexistence of the two ways of providing for the aged, which will hinder the smooth development of each other. Examples of responses from the interview data that indicated this notion are:

I think there must be conflicts. After all, "raising children for the aged" focuses on inheritance, so it must involve property. The reverse mortgage does require housing transactions, and housing accounts for a very large proportion of the property. Children certainly want to get their parents' house. You see, not many families have this kind of dispute about who inherits the house and who inherits what. (No.14 Part 3 Q2)

I really haven't thought about it. we feel that there may be conflicts. After all, the reverse mortgage products need to be exchanged with real estate, but the family with the concept of "raising children and protecting the elderly" will not choose to trade real estate. They prefer to pass on the real estate to their children. Thus, we feel that from the premise of trading, they are conflicting and difficult to coexist. (No.15 Part 3 Q2)

I think there is a conflict between "raising children for old age" and reverse mortgage products. After all, most families are more willing to leave their houses to their children. If there is a family with the concept of "raising children and protecting the elderly", it is necessary for them to leave their houses to their children. This situation just does not meet the requirements of reverse mortgage, so we think there is a conflict between the two. (No.22 Part 3 Q2)

However, the remaining 12 interviewees believe that there is no contradiction between reverse mortgage products and "raising children for old age". They firmly believe that as long as their children are excellent enough, they do not need to consider leaving the house to their children. In other words, children's education level determines the contradiction between reverse mortgage and "raising children for old age" to a certain extent. And they think that reverse mortgage products and "raising children for old age" have different service objectives. The former focuses on the elderly, while the latter focuses on most normal families in the society. Samples of responses from the participants are given below to highlight this point:

Well, for me, we don't think there's much conflict. Because even though a reverse mortgage requires the property as collateral, my children don't care about my property and don't think it's a big deal to inherit my house. Therefore, we think it will not cause any conflicts between my family members after

we participate in this product, and on the contrary, it can relieve some of their economic pressure for my retirement, which we think is quite good. (No.12 Part 3 Q2)

I don't think there's any conflict. After all, reverse mortgage can also relieve the pressure of children's retirement, after all, you can receive a lot more income every month, but the house ownership cannot be inherited in the end. But we think that families who can "support their children for old age" either have transferred the house to their children before they retire, or their children don't like their parents' house at all, so they don't need these gifts from their parents. So, we don't think there is much conflict, nor will it hinder its implementation. (No.24 Part 3 Q2)

I don't think there was much conflict. No, there was some conflict. Because when we buy this reverse mortgage, the ownership of my house will go to the government, so we can't leave it as an inheritance to my children. Maybe there will be some contradictions on the issue of housing. we think the ownership of housing will have a negative effect on the promotion of reverse mortgage products to some extent. (No.25 Part 3 Q2)

Therefore, summing up the above-mentioned views, it is easy to find that the concept of "raising children for old age" has indeed affected the development of reverse mortgage to a certain extent, because the problems mentioned above, such as children, house ownership and legacy, are unavoidable. And the premise of 12 interviewees who hold no contradictory views is that their children are excellent enough and rich enough, which is a very harsh premise. Although we can discuss reverse mortgage and "raising children for old age" separately based on different service objectives, we still preliminarily believe that the concept of "raising children for old age" has indeed hindered the development of reverse mortgage to a certain extent.

5.5.6 Retirement policy

Table 18 Retirement policy

Number of interviewee	Codes	Sub-Theme	Theme
25	Policy change	Statutory Retirement Policy	Retirement policy
25	Disagree on policy		
25	Legal retirement age		
25	Balance of financial	Reasons of policy change	
24	Decrease pension pressure		
6	Live longer		
3	Uncertainty		
18	Population aging		
11	Uncertainty	Influence of RML on retirement policy	
12	Hinder policy		
14	Hinder postpone retirement		
12	Understanding of delaying retirement		
11	Strong influence on statutory retirement		
12	Target groups		
11	Strong influence on delayed retirement		
2	Less/no influence		

Finally, we need to deal with the relationship between reverse mortgage and China's retirement policy. First of all, all of 25 interviewees disagree with the policy on delaying the statutory retirement age under discussion. All interviewees agreed that retirement under the current statutory retirement age is more in line with expectations, rather than retiring after working for another five years. They think it will reduce their time to enjoy life. Although most of them know that the government wants to postpone the statutory retirement age for five years because of the financial pension pressure and the aging population, they still have no interest in working for another five years. Excerpts from these participants are quoted below:

Well, we don't really support such a policy. After all, we all want to retire at the age of 60. If they suddenly want to raise the retirement age, we feel that we can't accept it. After all, we still have to take care of the elderly. If we work a few more years, we guess we can only hire a nanny to take care of me and my father. (No.14 Part 3 Q5)

Ah, raise the retirement age? If we died in my 60s, we won't get any pension. It would be a loss. we don't think this policy is very good. we feel that the retirement age of 60 is already very good. If it is raised again, we think it will be difficult to adhere to it. (No.15 Part 3 Q5)

Ah, raise the retirement age? Fortunately, I'm 61 now, ha ha. we think raising the retirement age may not be so popular with everyone. After all, 60 is a very old age. If it is raised to 65, it is really a lifetime of work, think about it is a bit uncomfortable. (No.22 Part 3 Q5)

Secondly, from the related theme of "interviewees' views on the relationship between reverse mortgage and policy", except for 11 interviewees who hold uncertain attitude and 2 interviewees who think it has no influence, the rest of the interviewees think that reverse mortgage products hinder the implementation of government policies to a certain extent. An example is shown below:

I don't think there must be a conflict between these two ways. You see, reverse mortgage is for people who own houses but live alone or have no children. And this kind of family is a minority group in our country? And raising the statutory retirement age is made for most groups. Thus, we think this should be regarded as two same target approaches by the government to ease the pressure on the elderly? Then, we think that there may not be any promotion or hindrance between the two. They are a way to promote each other and achieve a goal. (No.14 Part 3 Q7)

The statutory retirement policy is for all citizens, and the target group of reverse mortgage loans is included in all citizens. Interviewees believe that delaying the legal retirement age is equivalent to delaying retirement, and reverse mortgage has a significant negative effect on delaying retirement. The following are sampled responses that identified these codes:

I think it will hinder the policy. After all, as we said before, reverse mortgage would make us not choose to postpone retirement, but more likely to retire at legal age. Now raising the retirement age is equivalent to delaying retirement, which will certainly hinder the promotion of this policy. But we don't like this policy either. we hope it will not be implemented. (No.15 Part 3 Q7)

As we said before, we think it's because people we are facing are different, so there should be no big contradiction. Raising the retirement age is for the whole society, while reverse mortgage is only for the elderly who are lonely and widowed. we think there may not be any contradiction in terms of people we are facing. (No.22 Part 3 Q8)

Therefore, they believe that reverse mortgage also has a significant negative effect on delaying the legal retirement age. To sum up, we get the conclusion through qualitative data that although reverse mortgage products can alleviate the financial pressure of the government for the elderly to a certain extent, it also makes people more reluctant to extend the legal retirement age. Therefore, we need to consider limiting the number of reverse mortgage loans when discussing the new retirement policy, but we cannot cancel the reverse mortgage products. In other words, we need to measure the relationship between finance and public opinion.

5.6 Discussion

Similar to our expected results, we can explain the research questions we want to explore from the obtained codes and themes: the factors that affect people's choice of reverse mortgage products; Factors affecting people's retirement; The relationship between policy and reverse mortgage.

5.6.1 Factors affect people's choice of reverse mortgage products

Firstly, all interviewees think that retirement income is one of the factors that affect their choice of reverse mortgage, and most of them think that the quality of life after retirement is also a very important factor. These findings aligned to the previous literature where demand for reverse mortgage was found to be correlated with the amount of cash (Mohammed & Sulaiman, 2018). From the interview content, the lack of sufficient retirement income is the factor that prompted the respondents to ask for reverse mortgage. Similarly, the analyses shows that reverse mortgage may be equally attractive to high-income people, who may need reverse mortgage to provide money for leisure at retirement age. Thus, we think that retirement income has a significant effect on the possibility of choosing reverse mortgage, and the less retirement income, the easier people choose reverse mortgage products. Secondly, almost all of the

interviewees mentioned the health factor. Healthy interviewees think they can get the benefits of reverse mortgage to a greater extent, while a small number of unhealthy interviewees think reverse mortgage can make up for their medical expenses. This is similar to the relationship between health and finance mentioned in the previous literature, that is, when the health crisis leads to financial difficulties, participants consider reverse mortgage (Keene, Sarnak & Coyle, 2019). Thus, we think that health has a significant effect on the possibility of choosing reverse mortgage. Thirdly, we also find that the ownership of housing property is also a very important factor. From the content of the interview, it is clear to know that the interviewees in Shanghai tend to consider or not enough to buy reverse mortgage, while the interviewees in Beijing, Hangzhou and Nanjing are more likely to buy or intend to buy reverse mortgage products. we think this is due to the different requirements of reverse mortgage products in different cities. For example, reverse mortgage products in Shanghai will cause buyers to lose the ownership of the house ahead of time, while buyers in Beijing and Hangzhou will keep the ownership of the house until they die. Therefore, we believe that housing ownership also has a significant impact on the choice of reverse mortgage, and products that will not lose housing ownership are more likely to attract potential customers.

5.6.2 Factors affecting people's retirement

From codes and themes, when we talk about retirement related considerations, interviewees pay more attention to three aspects, namely economic factors, personal factors and policy factors. First of all, all the interviewees talked about the income related considerations, and they all think that the income factor is an important factor to determine whether they retire early or not. The income factor is the starting point of individual flexible retirement decision-making, and the income factor before and after retirement is the most important factor to consider before flexible retirement decision-making, and the level of income is often closely related to individual pressure (Ding, 2013). From the content of the interview, it is easy to know that the interviewees who think they have a better income before retirement are more likely to delay retirement, because the income gap before and after retirement is larger. For other respondents who have a small income gap before and after retirement, they are more likely to retire early or normally. Therefore, we think that the income gap before and after retirement has a significant impact on people's retirement choice, that is to say, the greater the income gap before and after retirement, the more people tend to delay retirement.

Secondly, as for personal factors, we found that when interviewees discussed whether to retire or not, individual health factors were more concerned, while other factors such as family members were not mentioned much. Our interviewees generally believe that they are more likely to expect normal retirement or delayed retirement when they are in good health, while they are more likely to expect early retirement when they are in poor health. They also mentioned that health factors are the objective factors that affect their retirement choices, rather than the subjective factors that they can decide. This result is consistent with the relationship between health and retirement choice mentioned in our previous literature (Kuhn, wrzaczek, prskawtz & Feichtinger, 2015). Therefore, we believe that personal health factors have a significant impact on whether people choose to retire or not, and the healthier people are, the more likely they are to retire normally or delay retirement.

Thirdly, in our interview, all the interviewees mentioned the retirement policy. However, they all said that even if they think the change of retirement age is not in line with their wishes, they can only follow the requirements of the policy. Unless something unexpected happens that prevents them from working. From this point, we can find that the retirement policy will affect people's daily life, but it does not seem to have much impact on people's retirement choices. Therefore, we think that the impact of retirement policy on people's retirement choice is not significant.

5.6.3 The relationship between policy and reverse mortgage

This research question is not mentioned in the previous literatures, and our interviewees also gave different answers to this question. First of all, it can be found that 19 respondents hold the traditional concept of "raising children for old age", and they believe that choosing reverse mortgage products is a passive choice. Their acceptance of reverse mortgage products would not be high if family factors did not prevent them from supporting their children in old age. Based on this idea, we find that the number of people who think that reverse mortgage products hinder the implementation of the new retirement policy is almost equal to the number who hold the opposite view. Interviewees who think that reverse mortgage hinders the implementation of the policy almost hold the same view, that is, the increase of retirement income leads to the

narrowing of the income gap before and after retirement, which makes people with reverse mortgage products more inclined to retire early. At the same time, people who think that reverse mortgage does not hinder the implementation of the policy not only explain it from the perspective of products and policy target groups, but also split the retirement behaviour. They think that reverse mortgage loan will have a certain impact on delayed retirement and normal retirement behaviour, but it has no impact on early retirement behaviour. In general, by summarizing the ideas of the actual participants of reverse mortgage products, we believe that reverse mortgage loans have a significant impact on retirement policy, that is, reverse mortgage owners will be more inclined to change the plan of delayed retirement or normal retirement, but reverse mortgage has no significant effect on people who are planning to retire early.

Chapter VI Findings

This research used a mixed research method to explore the relationship between reverse mortgage and retirement behaviour, and tries to explore the rationality and feasibility of China's current and future policies by studying their relationship. In my research, we not only use the quantitative research method to investigate the impact of housing reverse mortgage on the retirement behaviour of the middle-aged and elderly in China, but also use the qualitative research method to investigate the causes of this phenomenon. That is, my research refined and explained our quantitative results by using qualitative tools to explore the participants' views more deeply.

6.1 Quantitative Research Contribution

Firstly, there are some validations of the results in the previous literature in quantitative research. From the analyses of the results of quantitative research, we can find that gender has no statistically significant impact on China's retirement behaviour, which is inconsistent with the expectations in our literature review. On the contrary, education has a statistically significant positive impact on retirement behaviour, which is consistent with our hypothesis and previous studies. The most special is health condition. From the probit regression results, health status has a statistically significant inverted U-shaped impact on retirement behaviour. In other words, in 2012 and 2014, health status had a statistically significant positive impact on retirement behaviour, while in 2016, health status had a statistically significant negative impact on retirement behaviour. In addition, the effects of factors of age, family income and retirement income mentioned in the previous literature are consistent with my hypothesis, that is, they have a statistically significant positive impact on retirement behaviour. Although, for the age factor, it will no longer have a statistically significant impact in 2016, which is slightly deviated from our assumptions.

Secondly, what we need to summarize are four factors that have not been mentioned in previous literature, namely China's registered residence system, the current type of housing, the basic old-age insurance for urban residents and the commercial insurance. This is the second contribution of quantitative research, which is a supplement to the factors not mentioned in the

previous literature. From the results, we can see that the registered residence system and commercial insurance with China's characteristics are in line with my expectations and have positive and negative effects on retirement behaviour respectively. However, for the current type of housing, my results are very different from the expected hypothesis. The results show that the current residential property types do not have a statistically significant positive effect in 2012 and 2014, but only in 2016. In addition, the result of basic old-age insurance for urban residents is completely opposite to the expected hypothesis, that is, it has a statistically significant negative impact on retirement behaviour.

The third contribution of quantitative research is the main topic of my research, that is, the relationship between reverse mortgage and retirement behaviour in China. Through the PSM and DID models, we found that our hypothesis about reverse mortgages deviated from the actual results. My research results indicate that the reverse mortgage loan for retirement behaviour shows the influence of the inverted u-shaped curve, that is to say, in the early period of reverse mortgage loan, it has a great positive impact on the retirement behaviour, but after a period of trial, the reverse mortgage loan has negative impact on the retirement behaviour.

The final contribution of quantitative research is the impact of different reverse mortgage strategies in different cities on people's retirement behaviour. Through DID model, we finally found that reverse mortgage products played an important role in Beijing, Hangzhou and Nanjing, and the significant negative effect of Nanjing was greater than that of Beijing and Hangzhou. In other words, the reverse mortgage products in Nanjing had a bigger impact on people choosing to stay in work rather than retire. In contrast, for Shanghai, limited by the amount of data in the database itself, although it showed a positive impact, the result was not significant. From the perspective of policy, we believe that reverse mortgage strategies in different cities have a statistically significant impact on people's retirement behaviour, and show positive and negative effects respectively according to different strategies.

6.2 Qualitative Research Contribution

First of all, echoing the first contribution of quantitative research, in qualitative research, we also found that health condition, family members, income factors, age and retirement policies have a certain degree of influence on people's retirement behaviour. Slightly different from the quantitative study, respondents generally agreed that people in good health were more likely to expect normal or delayed retirement, and those in poor health were more likely to expect early retirement. In other words, in the qualitative study, we found that health factors had a significant positive effect on retirement behaviour, but not the result in the quantitative study. At the same time, when discussing income factors with interviewees, they pay more attention to the income gap before and after retirement rather than the amount of income after retirement, which is different from the variable selection in our quantitative research. In addition, the factors of age and family members are not mentioned too much, so we think it is impossible to obtain the results that have a significant impact on retirement behaviour in this research. we also think that policy factors have no significant influence, but this is because, although all interviewees mentioned the retirement policy, they all said that they could only follow the requirements of the policy even if they thought the change of retirement age was not in line with their own wishes.

The second contribution of qualitative research is a supplement to quantitative research, that is, the factors influencing people's choice of reverse mortgage products. Similar to the first point, respondents also mentioned income and health, but there was also the question of home ownership. we found that retirement income had a significant effect on the likelihood of reverse mortgage choice, and the less retirement income people had, the more likely they were to choose a reverse mortgage product. At the same time, it can be concluded from the research results that health factors have a great impact on people's choice of reverse mortgage products. That is, healthy respondents thought they could get the benefits from a reverse mortgage to a greater extent, while a minority of unhealthy respondents thought a reverse mortgage would cover their medical expenses. Housing ownership is a factor not mentioned in the previous literature, which is a supplement to the previous literature. I've found that home ownership also has a big impact on reverse mortgage options, with products that don't lose home ownership more likely to attract potential customers.

The third contribution of qualitative research is also one of the most important topics of my research, namely the relationship between reverse mortgage and retirement behaviour and the relationship between policy and reverse mortgage. This is a research problem that has not been mentioned in previous literature. Firstly, the traditional concept of "raising children for old age" in China has an obstacle effect on people's choice of reverse mortgage products, but this effect is limited by the actual family status of interviewees. Secondly, we find that reverse mortgage products have a significant impact on retirement policies, that is, reverse mortgage products have a significant effect on those who have delayed retirement or normal retirement plans, but reverse mortgage has no significant effect on those who plan to retire early. Therefore, we believe that reverse mortgage products have a certain degree of influence on people's retirement behaviour, and the degree of influence depends on people's retirement plan.

6.3 Mixed Research Contribution

Combining qualitative research and quantitative research, we can summarize several factors mentioned. First of all, as for the factors affecting people's retirement behaviour, we can find that in China, both qualitative and quantitative studies show that gender has no significant influence. At the same time, health factors and family income have a significant impact, although qualitative and quantitative studies show different directions of influence. On the contrary, the age factor presents contradictory phenomena in the results of qualitative and quantitative research. From the results, it can be found that the quantitative chapter considers that age has a statistically significant positive effect, while the qualitative chapter considers that age has no significant effect.

The second is the relationship between reverse mortgages and retirement behaviour. Through the results of quantitative and qualitative research, it can be found that reverse mortgage products have a certain degree of influence on people's retirement behaviour, but this influence will change with the difference of year, region or retirement policy. It also helps me to think about the current and future retirement policy in China.

The third contribution is the policy impact. Combining quantitative and qualitative research, we can find that reverse mortgage policies of different cities have a certain degree of influence on people's retirement behaviour and their choice of reverse mortgage products. Among them, Nanjing, which is controlled by the government, has a higher impact than other cities' reverse mortgage products operated by insurance companies, which means that reverse mortgage products without losing the ownership of the house have a higher impact than other products with losing the ownership of the house. This helped me to think about the Chinese approach to reverse mortgage products.

Chapter VII Conclusion

7.1 Summary

My research is carried out under the background of the increasingly serious aging situation in China. The gradual aggravation of population aging, and the gradual disappearance of demographic dividend reveal the necessity and urgency of how to better solve the problem of providing for the aged in China. Therefore, we hope to explore solutions applicable to China's own basic situation through this research. The purpose of this thesis is to reveal the relationship between reverse mortgage loan and retirement behaviour in China. It is hoped that this thesis will improve China's old-age security system and promote retirement policies more in line with the expectations of the labour market and ordinary citizens.

Firstly, this thesis aims to use China Labour-force Dynamic Survey find out factors which have influence on the choice of reverse mortgage loans in China in order to help banks and commercial insurance companies launch reverse mortgage products more suitable for China's national conditions. Additionally, we hope this thesis is able to enrich the ‘factors which affect retirement choice in China’ by exploring the influence of RMLs on retirement behaviour in China labour market, and clarify the effect of RMLs on workers’ retirement choice from different groups (classify based on different factors). As for the qualitative part, this research is going to collect data by interview, so as to supplement and prove the above-mentioned goals by analysing the users and makers of this commercial insurance separately. Finally, during the process of the research, we can compare the results with other capitalist countries to verify whether the impact of factors (especially RMLs) on retirement behaviour is consistent, and also verify whether the impact of factors on the choice of Reverse Mortgage Loans is consistent. Through the results, we can conclude whether the Chinese special socialist system will affect reverse mortgage loans.

Based on above-mentioned purposes, we put forward the following research questions in order to accomplish my research objectives more clearly:

(1) Investigate the influence of the introduction of the housing reverse mortgage market on the retirement behaviour of the middle-aged and old people in China. Additionally, it is important to investigate causes of this relationship between reverse mortgage loans and retirement behaviour.

(2) In viewing existing literature and specific conditions in China, it is necessary to analyse what factors affect reverse mortgage loans and retirement behaviour, and enrich the factors which are not mentioned in previous literatures.

(3) we hope to refine and explain our quantitative results by exploring participants' views in more depth using qualitative tools. For example, we intend to explore the views of middle-aged and elderly people on "raising children for old age" and "using property for old age", and to find out the deep reasons that influence their views on reverse mortgage loans.

(4) By comparing the results of qualitative research and quantitative research, we hope to provide deep insights into effects of reverse mortgage loans on retirement behaviour, and we decide to use qualitative results to assist in the interpretation of our quantitative findings.

First of all, after summarizing the previous literature and comparing the studies on reverse mortgage loans in China and other countries, we found that several special influencing factors should be taken into account in the research on China: house ownership, household registration and basic endowment insurance. Based on these influential factors, we first conducted quantitative research analyses under the guidance of Sequential Design with a mixed research method. Through the model establishment and analyses of PSM and DID in CLDS databases in 2012, 2014 and 2016, we found that the effects of many influential factors in China were not consistent with expectations, which also showed that China's traditional culture and basic national conditions were influential. Although the effects of education, age, family income and retirement income were consistent with my hypothesis, we found that the effects of gender and health in China were inconsistent with our hypothesis. we find that gender has no significant

effect on retirement behaviour in China, while health status has a significant inverted U-shaped effect on retirement behaviour. At the same time, the four influencing factors with Chinese characteristics we chose also showed surprising results. Although the household registration system and commercial insurance with Chinese characteristics meet my expectation and have a positive and negative impact on retirement behaviour respectively, the impact of basic insurance for urban residents is completely opposite to my expected hypothesis, that is, it has a significant negative impact on retirement behaviour. Moreover, as for the influencing factor of the current housing type, we find that it has no significant positive impact.

Finally, after integrating the above factors through PSM and DID model, we found that there was a deviation between my hypothesis about reverse mortgage and the actual result. The results of quantitative research show that reverse mortgage has an inverted U-shaped effect on retirement behaviour, that is, in the early stage of reverse mortgage, it has a great positive effect on retirement behaviour, but after a period of trial, reverse mortgage has a negative effect on retirement behaviour. This result answers my first and second research questions. Meanwhile, in the research process, we also found that different policies in different cities also have a certain influence on reverse mortgage loans. From the perspective of policy, we believe that reverse mortgage strategies in different cities have a significant impact on people's retirement behaviour, and show positive and negative effects according to different strategies.

Then we collected data for qualitative research by interviewing 25 participants of reverse mortgage products. Under the guidance of consumer decision theory, the collected data are analysed. Through data analyses, we found that the factors mentioned by respondents included health status, family members, income, age and retirement policies. Then, we summarized and sorted the codes related to these factors from three levels of economic factors, personal factors and policy factors. In this process, we first studied the factors that influence people's retirement behaviour. we found that health factors had a significant positive impact on retirement behaviour, but factors such as age and family members were not mentioned much. Thus, we believe age and family members cannot be considered significant influences. More specifically, when discussing income factors with respondents, they focused more on the income gap before

and after retirement, rather than the amount of income after retirement. we found that people who had a smaller gap in income before and after retirement were more likely to retire early.

In addition, in the qualitative research, we also pay attention to the factors that affect people's choice of reverse mortgage products. Similar to the above-mentioned factors, interviewees paid more attention to income, health and home ownership. The results show that retirement income has a significant impact on the likelihood of reverse mortgage choice, and people with less retirement income are more likely to choose reverse mortgage products. Health factors also have a strong influence on people's choice of reverse mortgage products, but it is difficult to define whether it is positive or negative. At the same time, we found that home ownership also has significant impact on the choice of reverse mortgage, with products that do not lose home ownership more likely to attract potential customers.

In the final step of qualitative research, through thematic analyses, we found the relationship among policies, traditional concepts and reverse mortgage loans. we find that the traditional Chinese concept of "raising children for old age" has an obstacle effect on people's choice of reverse mortgage products, but this effect is limited by the actual family status of interviewees. In addition, reverse mortgage has a significant effect on retirement policy, that is, reverse mortgage owners are more inclined to change their plans for delayed retirement or normal retirement, while reverse mortgage has no significant effect on those who plan to retire early.

Finally, through the method of mixed research, we compared, summarized and concluded the results of qualitative research and quantitative research and basically solved the four research questions we proposed. Firstly, as for the factors that influence people's retirement behaviour, we find that gender has no significant influence in both qualitative and quantitative studies in China. Although health factors and family income also have significant effects, qualitative and quantitative studies show different directions of influence. For the age factor, qualitative and quantitative studies show very different results. we have found that age has a significant positive influence in PSM and DID models, while thematic analyses has shown a non-significant influence. Secondly, factors that do not exist in quantitative and qualitative research

are complementary to each other. Household registration system, commercial insurance, basic insurance for urban residents and current housing type in quantitative study and house ownership in qualitative research are all conform to this complementary relationship, and help to enrich the corresponding literature in the field of reverse mortgage loan. In addition, in combination with the results of quantitative research on city effect and qualitative research on retirement policies, we find that reverse mortgage policies in different cities have a certain impact on people's retirement behaviour and the choice of reverse mortgage products. Among them, the influence of government-controlled reverse mortgage products in Nanjing is greater than that of insurance companies in other cities.

Overall, after summarizing all the above qualitative and quantitative research results, we found that we not only supplemented and amended the previous literatures, but also proposed new reverse mortgage related contents. we not only verified the factors mentioned in previous literatures in qualitative and quantitative studies in China, but also proposed five influencing factors based on China's basic national conditions. These are the supplement and amendment to the previous literature. More importantly, we successfully demonstrated the core topic of my research: the relationship between reverse mortgages and retirement behaviour. After summarizing two different research types, we found that reverse mortgage products have a significant impact on people's retirement behaviour, but the impact will vary with the year, region or retirement policy. That is, different regions may show significant positive or negative effects in different years due to different local policies and cultures.

7.2 Practical Implications

China has been facing a conflict between an increasingly aging population and an inadequate old-age security system. Since the implementation of the one-child policy, the growth rate of population has slowed down, but it has also led to the emergence of typical "421" families (4 old people, 2 adults and 1 child) and the gradual increase of empty nesters (Zhang, 2016). Family size is shrinking, and family pension function is gradually weakening. With the gradual liberation of China's economic development and ideology, the elderly's consumption concept and pension concept have begun to change. Instead of sticking to the traditional way of "raising children for old age", self-pension has been favoured by more and more elderly people (Wen

and Bi, 2016). As a supplement to the current pension system, housing reverse mortgage can reduce the economic burden of the pension and improve the living standards of the elderly. On the other hand, it also provides a new reform aspect for China's financial policy and new retirement policy.

However, in the actual pilot promotion process, there are not many applicants for reverse mortgage, which exposes the deficiencies of the current policy. Based on the above analyses of the influencing factors of reverse mortgage and its relationship with retirement behaviour, we think the following five suggestions can be made.

7.2.1 China's reverse mortgage pension market needs more pilot exploration

The rapidly growing elderly population and relatively low cash income provide a potential and broad market for reverse mortgage loan to sprout and develop in China. However, we should also be aware that business development is not plain sailing. As can be seen from the four pilot cities in my research, the results presented in different cities may even be completely opposite, which also represents that the region with regional policies will affect people's views on reverse mortgage products. According to the current results, most respondents generally believe that reverse mortgage cannot replace other pension modes. Therefore, we need to continue to select the right timing and city pilot, and adjust the reverse mortgage strategy in different regions to achieve our goal of gradual promotion.

7.2.2 Insurance companies and the government should harmonize

Housing reverse mortgage is an annuity product in essence, and insurance companies have more advantages in developing and maintaining it than banks and governments. However, due to the difference in public trust between the government and insurance companies, people are more inclined to buy government-led pension products. In addition, as reverse mortgage is a quasi-public goods product, it must be supported or subsidized by the government to stimulate the enthusiasm of the providers. For example, the essence of HECM program in the United States is that the government provides insurance for both parties, which really promotes the development of this business. At present, we think it is necessary to step up the formulation of

performance obligations for both suppliers while the government can provide preferential policies of tax reduction and exemption for relevant insurance products. we think as long as the insurance company and the local government reach an agreement, then reverse mortgage products can be promoted and improved more quickly.

7.2.3 Establish a comprehensive platform for reverse mortgage loans

The principle of reverse mortgage determines that it is a financial business involving social security institutions, banks, insurance companies, appraisal agencies, real estate developers and other aspects. However, China implements a separate operation system, and each financial institution carries out its own business. Each institution has its own advantages in carrying out reverse mortgage business, but also has its own disadvantages. For example, different institutions have different degrees of trust. If we can form an integrated platform that can cooperate with each other and share risks, integrate the strengths of banks, insurance companies and the government, and supplement it with other intermediaries, it will certainly be beneficial to optimize the design and risk prevention and control of reverse mortgage loans, and make them more in line with the expectations of more people. In addition, regulatory barriers were broken in 2018 when China's banking and insurance supervision merged to form the China Banking and Insurance Regulatory Commission. This provides a good opportunity for us to build the expected integrated reverse mortgage loan platform in the future.

7.2.4 Strengthen publicity, change the traditional old age concept

From the results of qualitative and quantitative research, we can find that most of those who choose reverse mortgage products have bachelor's degree or above, and most of them live alone after divorce or have no children. Therefore, in my opinion, when promoting reverse mortgage products, we can select such groups with high potential demand for publicity, so that the final number of people who choose reverse mortgage products will be higher. Take specific groups as the breakthrough point, increase the public's understanding and recognition of housing reverse mortgage loan, and then explore its expansion and development space.

When reforming and improving pension policies, the government should guide the elderly from different backgrounds and at different levels to gradually change their pension concept and publicize the benefits of self-pension. Under the background of deepening pension pressure and continuous innovation of financial instruments, simple basic pension insurance and bank savings have been unable to meet people's demand for pension investment. Financial institutions should also actively develop innovative pension tools to provide more pension insurance options for the elderly. When promoting reverse mortgage products, we think both the government and insurance companies should focus on the transformation from "raising children for old age" to "self-pension", emphasize that this is a supplement rather than a substitute of pension policy, and actively analyse the risks and benefits involved, so as to win more support.

7.2.5 The improvement and perfection of retirement policy

From the results of qualitative research, it can be found that most people do not support the new retirement policy that raises the retirement age. As an important reason to increase the retirement age is to relieve the country's pension pressure. Reverse mortgage products, as a supplement of the pension policy, can exactly relieve the country's pension pressure. Therefore, we think it is possible to slow down the increase in the retirement age and accelerate the pilot of reverse mortgage products. In other words, we think the retirement age can be gradually increased year by year, and the pilot implementation of reverse mortgage and other pension products can be accelerated at the same time. When the financial pressure of pension and a variety of new pension products balance, we think we can determine the actual retirement age of the current retirement policy. After all, we can find from the survey that the vast majority of respondents do not want the retirement age to continue to rise.

7.3 Limitations

In this research process, it is inevitable that there will be deviations in the research results due to some reasons. Firstly, for quantitative research, we used the CLDS database of three years to build the model. However, due to the lack of data, some results may not represent all regions of China. The database of CLDS was started in 2012, although from the perspective of the year, it just meets our research demand for reverse mortgage, because the pilot project of reverse

mortgage in China started in 2013. However, from the perspective of quantitative research, the CLDS database still has the problem of insufficient years. In addition, after matching, the sample size of the CLDS database appears to have fewer observations. This small sample size can lead to false negative or false positive results, which can reduce the accuracy of our study. In order to solve the problem of fewer observations in the database, we chose to merge observations in similar areas in the database in order to reduce the possible deviation of results caused by insufficient data. Although this measure reduces the possible deviation to some extent, on the other hand, the merger process will inevitably produce a certain degree of result deviation. After all, we merged similar regions instead of the same regions.

Secondly, for qualitative research, we collected data through interviewing. However, the interviews we did while collecting the data were not face-to-face interviews. Due to the impact of COVID-19, we were unable to return to China for face-to-face interviews, so we chose video interviews through Wechat. Because the interview is not face-to-face, the answers of the interviewees may not be spontaneous responses, which also means that we cannot effectively eliminate the vigilance of the interviewees by some interview skills. Meanwhile, information outside the interview, such as attitude, physical behaviour and dress and appearance, cannot be used as a reference for the study. All of these lead to the incomplete information collection method of interview, which may lead to the deviation of my conclusions. In addition, since reverse mortgage products have not been promoted in China, there are not many people who actually own them. Therefore, the interviewees we interviewed this time include both those who have already bought them and those who want to buy them. This may also cause the deviation of my research results to some extent.

7.4 Suggestions for further research

Therefore, based on the consideration of the above limitations, we put forward the corresponding path for the following research. For quantitative part, we think the subsequent research can be continued with the CLDS database in the new year, and also with other Chinese databases with more data volumes for comparative research, so as to get more representative results of all regions in China. we can not only use the CLDS database, but also try other databases such as CHARls. In the future, we expect to find more databases suitable for the

study of reverse mortgage in China, and hope to establish a professional reverse mortgage database in China. For qualitative research, we think we can continue to collect data from respondents who have participated in reverse mortgage products. Since there are few applicants for reverse mortgage products in China, my research objects this time are a mixture of respondents who have actually bought reverse mortgage products and those who want to buy related products. It is better for us to increase the number of interviewees to 30-35 and replace previous interviewees from “wanted” to “purchase”. Thus, we think one way to solve the limitations of my research is to interview people who have already bought reverse mortgage products and conduct face-to-face interviews.

As for the future research direction, we think we can explore the comprehensive database of reverse mortgage loans and the establishment of a platform. Unlike other countries, China does not have a database related to reverse mortgage loan and there is no platform for reverse mortgage products to be traded. Therefore, we think we can further explore the potential of reverse mortgage loan from the perspective of database and comprehensive platform. When there is a convenient platform to inquire about related products, we think it is also a promotion of such products. As can be seen from China's current policy to encourage fertility, modern youth groups are not inclined to fertility, so reverse mortgage products have more potential.

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Appendix

Table 1 Variable explanation

Name	Variable	Variable Lables
province_new	Reverse Mortgage Loans	without RMLs=0 with RMLs=1
retirement	Retirement or not	unretirement=0 retirement=1
I_gender	Gender	female=1 male=2
I_edu	Education Level	never=0 primary=1 middle school=2 high school=3 colleges or university=4
I_health	Health Condition	bad=1 normal=2 good=3 very good=4
I_age	Age	
F_household	Household registration type	agriculture=1 non-agriculture=2
F_housetype	Type of current residence	owned=1 rent=2 free=3
InFamilyincome	Log Family Income	
InRetirementincome	Log Retirement Income	
Basicinsurance	Urban Resident Basic Pension Insurance	with insurance=1 without insurance=2
Commercial	Commercial Pension Insurance	with insurance=1 without insurance=2

Table 2: Codes and themes

Number of interviewee	Codes	Sub-Theme	Theme
5	Official committee	RMLs operator	Understanding of RMLs
25	Distributor		
18	Ping An Insurance Company		
25	Unique product	RML features	
20	Propaganda		
19	Good impression		
25	Insurance product		
25	Rent house		
20	Nursing home		
25	Fixed monthly money		
25	House ownership		
23	Product target		
5	High Credibility	Views on government operator	
5	Easy to purchase		
2	Lots of requirements		
5	Official distributor effect	Official distributor effect	
5	High credibility		
4	Stable		

Number of interviewee	Codes	Sub-Theme	Theme
1	Low income		
5	Government strengthen credibility		
11	High profits	Views on commercial operator	
18	Lots of requirements		
19	Famous		
6	High risks		
25	Increase income	Advantages of RMLs	Factors affect customers' RML choice
25	Increase wealth		
21	Life quality		
19	Less time on trivial affairs		
15	House ownership loss	Disadvantages of RMLs	
4	Age restrictions when purchase		
2	House restrictions when purchase		
22	Family members	Reasons why choose RML or not	
19	Live alone		
10	Legacy		
25	Matching degree		
16	Life quality		

Number of interviewee	Codes	Sub-Theme	Theme
17	Enjoy life		
25	Increase income/wealth		
19	Family status (married/dirvorce)		
25	Family income		
21	Health status		
20	House ownership		
9	Family income guaranteed		
25	No continue to work	Old age retirement choice	Retirement choice
25	Legal retirement age		
25	Statutory retirement age		
25	No early or delayed retirement		
25	Mandatory retirement age		
25	Income influence	Reasons why current retirement choice	
20	Health influence		
25	Income effect		
10	Family difficulties		
23	Attitude towards life		
23	Prevent accident	Commercial insurance effects	Insurance influence
25	Prevent wealth loss		

Number of interviewee	Codes	Sub-Theme	Theme
16	Protect property	Commercial insurance affect retirement behaviour	
20	Secure feeling		
25	Insurance weak influence		
20	Increase life security		
25	Protect wealth loss		
25	Family income	RMLs affect retirement behaviour or not	
23	Retirement income loss		
21	Health status		
20	Influence on delayed retirement		
23	High retirement income stops continuing working		
15	RML promotes normal retirement		
12	Some influence on interviewee		
13	Less influence on interviewee		
25	Old-age care method	Old-age care method	Old age care
25	Chinese traditional culture		
25	Reverse mortgage loans		
25	raising children for old age		

Number of interviewee	Codes	Sub-Theme	Theme
19	Good feeling on "raising children for old age"	Compare two old-age care methods	
11	Uncertainty monthly income		
25	Fixed monthly money		
13	Conflicts		
12	No conflicts		
25	Different method's requirements		
25	Income provider		
12	Different product target		
16	Different nursing people		
13	Hard to estimate monthly income		
17	Different financial freedom		
23	Each has its own advantages		
13	Conflicts	Conflicts between RML and "raising children for old age"	
12	No conflicts		
5	Uncertainty (mood when answering)		
20	House ownership		
22	Family members		
19	Family status (Married/divorce)		
	Product target		
10	Legacy		
25	Policy change	Statutory Retirement Policy	Retirement policy
25	Disagree on policy		

Number of interviewee	Codes	Sub-Theme	Theme
25	Legal retirement age		
25	Balance of financial	Reasons of policy change	
24	Decrease pension pressure		
6	Live longer		
3	Uncertainty		
18	Population aging		
11	Uncertainty	Influence of RML on retirement policy	
12	Hinder policy		
14	Hinder postpone retirement		
12	Understanding of delaying retirement		
11	Strong influence on statutory retirement		
12	Target groups		
11	Strong influence on delayed retirement		
2	Less/no influence		