Feasibility Study of Reverse Mortgages for Pension
——A Case of Hangzhou, China

Peng Wang

CONTENTS

Acknowledgement

This paper would not have been possible without the guidance and the help of several individuals who in one way or another contributed and extended their valuable assistance in the preparation and completion of this study. Foremost, I would like to express my sincere gratitude to my supervisor Lars Harrysson for the continuous support of my study, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. My sincere thanks also goes to those friends who help me with the questionnaire distribution, and my girl friend Shubo Jia, for her encouragement and helps. Last but not the least, I would like to thank my family supporting me spiritually throughout my life.

Peng Wang
May, 2011

Lund University, Global Studies Programme

SIMT08 Major in Social Work Final Thesis

Peng Wang

Abstract

Since the aging problem became increasingly serious all around the world, the solution of aged care turns to an important issue which received wide concerning. As China own the one fifth population of the world, a well formed aged care system is urgently needed. The aim of this paper is to explore a possible form to relieve the more and more severe aged care pressure by taking Hangzhou as an empirical case and extent to the whole area of China. According to the life cycle hypothesis and international experiences, the reverse mortgages could be regarded as a new form for pension when considering the situation of Hangzhou. The main subjects of reverse mortgages programme are those society members who are "rich in asserts, poor in cash" and to improve their life quality by transforming the assets into cash. Thus, this paper will be designed as a case study for testing the feasibility of carrying out reverse mortgages programme in Hangzhou by considering theoretical assumption (individual choice, structure choice and political consideration) and the empirical date (capacity of markets, funds of the operation and social and cultural acceptability).

Keywords: Life Cycle Hypothesis, Reverse Mortgage, Feasibility Study, Hangzhou, China.

Introduction

The unprecedented aging of populations come to be one of the striking issue in both the developing and developed countries. Global Aging Report (2009) reports that, one fourth of the population in many nations will be over 60 by the year of 2020, and only 30 years later, every fifth person on the planet will be over 60 [1]. Issues of the increasingly serious aging of populations are even worse in China, the country shares one fifth of world's population, by the year of 2008, the number of population which upper than 60 years old in China had reached 153 million, 11.6% of the whole population; the population which over 65 years old is 106 million share 8.1% of the

---

[1] International Longevity Center Global Alliance. Global aging report (2009)
http://www.ilcjapan.org/alliance/doc/Global_Aging_Report_090212.pdf

whole[2]. Since the one-child policy carried out from the year of 1979, it is reported that the policy has prevented between 250 and 300 million births from its implementation to 2000 and 400 million births from 1979 to 2010[3] which structurally accelerated the aging problem.

Traditionally, the responsibilities of aged care including economic responsibilities, nursing responsibilities, should be taken by adult children in China. The changing pattern of China's population leads to a "four-two-one" problem. As the first generation of law-enforced only children came of age for becoming parents themselves, one adult child was left with having to provide support for his or her two parents and four grandparents. In this respect, it makes endowment increasingly unrealistic to rely on their children. Besides, the social welfare system for aged care still has its limitations, for example, the coverage of pension delivery is only for the people who had paid for endowment insurance, the pension amounts depend on how much people had paid, and alms from social welfare agency are not much for elderly. According to the China's Fifth National Census survey in 2005 , 72% of urban house-owning families have rightful properties. Another remarkable feature of China's population is "getting old before being rich". The year that China came to the "old man's club" is 1999 with a GDP per capital less than 1,000 dollars while the number of developed countries normally are more than 10,000 dollars. The fundamental bottleneck factor that constrains the senior citizens to spend the remaining years in comfort is the lack of stable economic foundation. With self-pension being weak, family pension functions degenerating, during the transition period that the social security is continuous improved, the burden of individuals, families and the state's has been increased caused by accelerated aging population. All those factors make the possibility for the application of reverse mortgage in China.

The aim of reverse mortgage in China is to make up the shortage of pension and improve the retiring life. This paper is designed as a case study which will mainly

[2] National Bureau of Statistics of China Population and Its Composition.

http://www.stats.gov.cn/tjsj/ndsj/2009/indexeh.htm   accessed date 20110422

[3] BBC: China steps up "one-child policy". http://news.bbc.co.uk/2/hi/asia-pacific/941511.stm

accessed date 20100405

focus on the feasibility of applying reverse mortgage for pension in the case of Hangzhou city in China. The following issues will be discussed, firstly, the concept of reverse mortgage for pension and introduce what is reverse mortgage and how it works; the background of the case Hangzhou and international reverse mortgages experience is introduced; secondly, the life cycle hypothesis is used as the framework of reverse mortgages studies; thirdly, it followed by the methodology section which introduces case study, text analysis and the design of questionnaire as the research methods in this paper; fourthly, it turns to data collection and feasibility analysis. Finally followed the suggestions and conclusion. The innovation of this paper is the combination of reverse mortgage's theories and experiences both in China and abroad, making research assumption, getting result by practical questionnaire and data analysis, according to feasibility studies giving the possible suggestions. Also this paper will combine the practical situation of Hangzhou city to do an application research by examples and data.

Research Questions

This paper will be well grounded by solving the research question that *Is it feasible to apply reverse mortgages for pension in Hangzhou of China*? The research question will be answered by several steps followed. What is reverse mortgage? How reverse mortgage works for pension? Why use reverse mortgage programme in this case? What is the background/context in Hangzhou of China? How to make a feasibility study on this case? What are the risks and prevention strategies?

Background

Reverse Mortgage

The ideas about reverse mortgage also known as lifetime mortgage results of innovative endowment system in USA. Reverse mortgage is a financial product which is intended for the elderly homeowners to improve the quality of their lives. Without the interruption to the operation of house consumption, the estate will be transferred into money to improve the quality of the elders' life[4]. In the long run, it has developed

---

[4] Chen, Jin et al (2008) Innovation of Finance: the Application of Reverse Mortgage in China. 2008 International Seminar on Business and Information Management

into a kind of new endowment way, including reverse mortgages, sale-endowment, rent-endowment, bequests-endowment, and so on. In some developed countries, reverse mortgage has been established as a formal system. Several possible advantages of adopting reverse mortgage in China have been stated by Chen et al. as flowing, parents would have the right possession arranged for expenditures in senior years if there are no worries for their pension; reverse mortgages also has the function of stimulating the real estate market, it can meet the increasing demands in the secondary housing market; this program could help with the development of the consumer's market for the elderly[5]. It is indeed that reverse mortgage would be helpful for people making their life plan since if they do not need to concern for pension and once the elderly in a good financial condition it will stimulate elderly consumption.

However, there still lots of resistances for applying reverse mortgage in China. Since the reverse mortgage involve with house property and trade. Such problem as the fluctuation of the housing prices which mentioned by Zheng & Chen[6]. Their ideas are to catch the annuity pricing model by the using of the insurance actuarial and on the forecast of the value of the real estate. Also there will be some other problems when carry out reverse mortgage, traditional culture of filial piety, conservative minds of elderly people and so on.

In the reverse mortgage program, the subjects are elderly people and one of the most important factors they would care about is the payments. According to the study made by Sally et al[7], payment amounts in a reverse mortgage program depend on the following household and market characteristics: a) Higher home equity. b) Older households experience the most beneficial impacts because the potential payments are

---

[5] ibid

[6] Zheng, Bowen & Chen, Jin (2009) The Research on Reverse Mortgage Based on the Fluctuation of Housing Prices , Journal: ETP International Conference on Future Computer and Communication Year: 2009 Pages: 3-7

[7] Merrill, Sally R. ; Finkel, Meryl ; Kutty , Nandinee K. (1994)Potential Beneficiaries from Reverse Mortgage Products for Elderly Homeowners: An Analysis of American Housing Survey Data, Journal: Real Estate Economics ISSN: 10808620 Year: 1994 Volume: 22 Issue: 2 Pages: 257-299

higher due to shorter life expectancy. c) A higher expected house price appreciation rate. d) Lower interest rates increase the amount per payment because the cumulative interest to be repaid from the remaining equity is lower. The characteristic of the elderly beneficiaries in this program are also quite important because of the great number of elderly population in China. Based on sally et al's research, the beneficiaries of reverse mortgage in USA The household most likely to want and to benefit from a reverse mortgage is an older, low-income, single person who wants to stay in his or her house for life, has a substantial amount of equity in the house and lives in a time of appreciating house values[8]. These could be references for applying reverse mortgage in China. If we regard reverse mortgage as a financial product the payments would be lower and the limits of beneficiaries would be less. Or if we consider reverse mortgage as a social welfare product and the aim is succor, then the payments should be higher but there will be more limits for beneficiaries. These will be well grounded in later part of this paper.

International Experience of Reverse Mortgages

Reverse mortgages in USA

In the year of 1981, the National Centre for Home Equity Conversion (NCHEC) was set up in American and its main function is publicity and education of the reverse mortgages. In 1987, according to the National Housing Act, Home Equity Conversion Mortgage (HECM) was built up by the American congress and charged by the Federal Housing Administration (FHA). FHA provide the grantee of loans from the lending institution who was approved which effectively eliminate the institution's risk of loans. The Federal National Mortgage Association (FNMA), also known as Fannie Mae, was founded in 1938 during the Great Depression as part of the New Deal and its purpose is purpose is to expand the secondary mortgage market by securitizing mortgages in the form of mortgage-backed securities, allowing lenders to reinvest their assets into more lending and in effect increasing the number of lenders in the mortgage market by reducing the reliance on thrifts[9]. In 1989, Fannie Mae started to

---

[8] ibid

[9] Fabozzi, Frank J.; Modigliani, Franco (1992), Mortgage and Mortgage-backed Securities Markets, Harvard Business School Press, p. 2,

provide the loans for the qualified reverse mortgages contracts and a secondary market for the loans of reverse mortgages was constructed. After that, the reverse mortgages programme developed rapidly in the United States. In 1995, Fannie Mae launched its own reverse mortgages programme – Home Keeper, which is another big promotion for the participation of reverse mortgages programme.

Nowadays, there are mainly 3 types of reverse mortgages programme in the United States, HECM, Home Keeper and Financial Freedom.

HECM

The HECM programme is the main programme in the US reverse mortgage market (more than 90% of total) and has expanded rapidly over the last decade. The volume of HECM loans in 1990 was 157. By 1999, the volume was 50 times higher at 7,982 loans. Between 1999 and 2006, the volume of HECM loans increased ten-fold to 76,351[10]. The HECM programme is supported by U.S. Department of Housing and Urban Development(HUD) and FHA. HECM has the insurance guarantee from federal government which means the borrower could get all the funds in advance as the programme committed and the funds could be used for any purpose. FHA guarantees the compensation when the recovery of loans exceed of the house value and is responsible for accidental damage, also it charges the authorizing of loan providers, mortgage insurance and management of funds. HUD is responsible for the design and improvement of the insurance projects.

It should be noted that, HUD and FHA are not providing the loans for reverse mortgages. The providers of HECM are banks, mortgages companies and some other private financial agencies. However those providers actually sell all the loans to the Fannie Mae. Thus, Fannie Mae plays a very important role in the operation of reverse mortgages programme. It is the only buyer in the secondary mortgages market of HECM and it is functioning the improvement of demonstration projects in HECM. Besides, it is in charge of the standard and principle design in reverse mortgages

---

[10] Foote, B. E. (2007) Reverse Mortgages: Background and Issues, CRS Report for Congress, 26 January, Washington, DC Congressional Research Service.

programme. For example, Fannie Mae prohibit the use of bridge loan for financing the funds which beyond the amount of the programme allowed; it asks for the borrowers who ever arrears of property taxes or insurance premiums to reserved part of the loan in case of recurrence.

HECM programme enables the elderly households to withdraw some of the equity in their home and at the mean while without moving out of their houses. The borrowers can choose how they want to withdraw their funds, whether in a fixed monthly amount or a line of credit or a combination of both.

The borrower requirements[11] of HECM programme are:

- Be 62 years of age or older

- Own the property outright or have a small mortgage balance

- Occupy the property as your principal residence

- Not be delinquent on any federal debt

- Participate in a consumer information session given by an approved HECM counselor

Mortgage Amount Based On[12]:

- Age of the youngest borrower

- Current interest rate

- Lesser of appraised value or the HECM FHA mortgage limit or the sales price

- Initial Mortgage Insurance Premium (MIP)--your choices are HECM Standard or HECM SAVER initial MIP

---

[11] FHA Reverse Mortgages (HECMs) for Consumers.

http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/hecmabou accessed 20110426

[12] ibid

Financial Requirements[13]:

- No income or employment qualifications are required of the borrower

- No repayment as long as the property is your principal residence and the obligations of the mortgage are met

- Closing costs may be financed in the mortgage

Home keeper

The Home Keeper programme is provided by Fannie Mae, which is a conventional market alternative of the HECM product. Its mechanism is quite similar with HECM, the borrower can receive the payment monthly for life as long as the borrower occupies the house as his or her residence, or the borrower could get a line of credit, or any combination of monthly payments or a line of credit. The interest rate on the Home Keeper mortgage is determined as a spread above an index rate—the current weekly average of the 1-month secondary market CD rate, which is published by the Federal Reserve. The rate on the Fannie Mae Home Keeper mortgages adjusts monthly. As to the requirements, all of the mentioned items in HECM programme are suitable for the Home Keeper program, but moreover, the household in trust are qualified if they conform to standard guidelines of Fannie Mae and attorney is allowed if it conforms to the guidelines of Fannie Mae.

However, the Home Keeper programme can be applied in a wider array of alternatives, contains condominiums which are without the approve of FHA and new houses purchases. Whereas the HECM programme requires that the borrower has been in his or her house for at least one year. Where we could assume a 75 years old man wants to sell his home in Philadelphia, with a value of $150,000, and buy a $200,000 home in Florida. To avoid a mortgage payment on the new home (as the borrower's income is very limited), the borrower would have to use the entire $150,000 proceeds from the sale of the Philadelphia home, plus another $50,000 in savings. If the borrower

---

[13] FHA Reverse Mortgages (HECMs) for Consumers.

http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/hecmabou accessed 20110426

does not have the $50,000, he could not buy the new home (unless he qualifies for and is able to obtain a regular mortgage). But the borrower could seek an FMHK reverse mortgage, which can be used to bridge the $50,000 difference[14]. The Home Keeper programme would be more flexible at certain level.

Another issue should be noted is that although the loan limits are higher in the Home Keeper programme than the HECM programme, the amount that can be drawn out in the Home Keeper Programme is usually less than the amount that can be drawn out in the HECM programme, which is illustrated in Table 1. A 65 years old borrower with house value worth $250,000 could draw out $116,568 in the HECM program, while the Fannie Mae Home Keeper would only allow $42,817. In this respect, the loan condition of HECM seems more favorable than the Home Keeper, which also make the HECM programme much more popular in United State.

Table 1.[15] A comparison among HECM, Home Keeper and Financial Freedom

	Home Value: Birth Year Age	$ 250,000 1941 65			$ 250,000 1921 85		
		FHA/HUD Monthly	Fannie Mae HomeKeeper	Proprietary Reverse Mortgage Program	FHA/HUD Monthly	Fannie Mae HomeKeeper	Proprietary Reverse Mortgage Program
1	Cash Available	116,568	42,817	42,709	174,894	136,990	115,734
	Loan-to-Value	46.6%	17.1%	17.1%	70.0%	54.8%	46.3%
2	Monthly Income Available	744	336	N/A	1,568	1,334	N/A
3	Line of Credit:						
	Creditline Available	116,568	42,817	42,709	174,894	136,990	115,734
	Annualized Growth Rate	7.22%	N/A	5.00%	7.22%	N/A	5.00%
	Creditline Value In 5 Years	165,168	42,817	54,508	247,811	136,990	147,709
	Creditline Value In 10 Years	234,030	42,817	69,568	351,129	136,990	188,518

	Home Value: Birth Year Age	$1,000,000 1941 65			$1,000,000 1921 85		
		FHA/HUD Monthly	Fannie Mae HomeKeeper	Proprietary Reverse Mortgage Program	FHA/HUD Monthly	Fannie Mae HomeKeeper	Proprietary Reverse Mortgage Program
1	Cash Available	172,286	74,901	178,134	256,216	231,524	470,234
	Loan-to-Value	17.2%	7.5%	17.8%	25.6%	23.2%	47.0%
2	Monthly Income Available	1,100	587	N/A	2,297	2,255	N/A
3	Line of Credit:						
	Creditline Available	172,286	74,901	178,134	256,216	231,524	470,234
	Annualized Growth Rate	7.22%	N/A	5.00%	7.22%	N/A	5.00%
	Creditline Value In 5 Years	244,116	74,901	227,349	363,037	231,524	600,151
	Creditline Value In 10 Years	345,893	74,901	290,161	514,395	231,524	765,961

absorb the risk that the borrower will live long enough that total payments may be

---

[14] An overview of Reverse Mortgages. UBS Mortgage Strategist. June 6, 2006. P.8-15

[15] Calculation made by https://www.benefits-mortgage.com/calculator/entry.do?linkType=mps accessed date 20110427

higher than the value of the house. Second, the growth rate on the line of credit may be freely altered by the lender[16]. These protections are important to the investor, as there is no government guarantee on these loans.

Standing at the position of the borrower, the pros of the proprietary products is that there is not a loan limitation. Therefore, when a house is with a high appraised value, the borrower is usually better off with a proprietary product, which shows in Table 1, which compares the HECM product with a proprietary reverse mortgage offering from Financial Freedom. Financial Freedom is another major originator of reverse mortgages. What should be mentioned is that for a house valued at $250,000, the HECM programme provides the borrower (regardless of age) a much higher line of credit than the proprietary programme offered by Financial Freedom. For a home valued at $1,000,000, a 65 year old borrower can have a marginally larger line of credit by using the proprietary product ($178,134 versus $172,286). An 85 year old borrower would have a huge advantage using a proprietary product versus a HECM ($470,234 versus $256,216).

Reverse Mortgages in Canada

The reverse mortgages programme in Canada is offered by Canadian Home Income Plan (CHIP) which was founded in 1986. After the research on reverse mortgages programme in United State and United Kingdom, CHIP started to started the services of reverse mortgages programme. It is currently the only company which reverse mortgages to households and it is experiencing unprecedented growth, as more and more seniors across Canada are embracing the concept of using a reverse mortgage to improve their retirement lifestyle. During the second quarter in 2010, origination volume of $59 million exceeded second quarter of 2009 by 160%, again setting a new all time record[17]. The reverse mortgage business launched mainly through some the network of some large financial institutions and the authorized mortgage brokers and qualified insurance institutions provide loans advice to borrowers.

---

[16] An overview of Reverse Mortgages. UBS Mortgage Strategist. June 6, 2006. P.8-15

[17] Reverse Mortgages in Canada – Now Considered a Mainstream Solution. August 6th, 2010
http://www.reversemortgageadvantage.ca/reverse-mortgage-canada-news/ accessed 20100428

In contrast with the HECM programme in United States, the reverse mortgages programme in Canada is completely tax-free, and unlike a traditional mortgage or line of credit, there are no monthly payments. Instead, a reverse mortgage allows borrowers to convert existing equity into cash, either as a lump sum or as consistent, additional income[18].

The qualifications and requirements of reverse mortgages in Canada:

• Currently on title

• 60 years of age and over

• Property is in Canada

As far as the restrictions they are as follows:

• Property is principal residence

• All existing debts and charges against title cannot exceed 40% of the current market value of the property. 40% is the maximum mortgage amount that can be lent and will vary depending on such things as age of clients, property location and value.

• Minimum mortgage amount is $20,000.00

• At least one of the owners must occupy the property[19]

The reverse mortgages in Canada is regarded as good quality and more preferential when compared with some other countries, the funds that borrowers received is tax-free and the minimum qualifying age for a reverse mortgage is 60. The size of population would be an important reason, the elderly population older than 60 years old is around 7 million out of a total population of 33 million, which is about one-tenth the size of the U.S.

Viager in France

---

[18] Reverse Mortgages for Canadians. http://www.unlockequity.ca/ accessed date 20100428

[19] Canadian Reverse Mortgage Rules. http://www.unlockequity.ca/qualify.php   accessed date 20100428

A Viager is a well established equity release scheme in France, and broadly speaking, allows the release of cash to a property owner in return for an interest in the property on the owner's death. (It is more common for property owners over the age of 70, to consider such a transaction.) On the flip side, the Viager is also advantageous to a buyer who wishes to purchase investment property rather than to purchase a home for himself[20].

A Viager loan, in its most basic form, allows a buyer to purchase a property, or an interest in that property, while the seller receives a sum of money (an annuity) yet retains the right to live in the property for the remainder of his or her life. The property then passes fully to the buyer on the death of the seller[21]. When compared other reverse mortgages programmes in other countries, Viager is speculative and it is tend to a kind of financial products which is using for investment.

Study Region: Hangzhou

This paper is designed as a case study. The chosen study region is Hangzhou, one of the highest aging cities of China. Hangzhou is located in southeastern coast of China, a famous national tourist city with cultural civilization and history. It is the capital of Zhejiang province and it is also the center of politics, culture and as well as the economic development hub in the southern flank of Yangtze River Delta.

Under the jurisdiction of Hangzhou are the 8 main districts of Shangcheng, Xiacheng, Jianggan, Gongshu, Xihu, Binjiang, Xiaoshan and Yuhang, and there are 200 villages and towns(districts) with a total area of 16,596 square kilometers, including the urban area of 3,068 square kilometers[22].

Population

---

[20] Viager and Property in France. http://www.frenchpropertylinks.com/essential/viager.html accessed date 20110429

[21] ibid

[22] Administrative Districts of Hangzhou.
http://www.hangzhou.gov.cn/main/zpd/English/AboutHangZhou/T326170.shtml accessed date 20110422

According to the 5‰ population sampling survey in 2009, the population of long-term residents reached 8.1 million, up by 1.7% over previous of the 5.6 million in urban district, accounted for 69.5% of long-term residents. The city's population density is 488 people per square kilometer. The total number of registered households was 2,152,800 and registered population was 6,833,800. The birth rate of population was 9.18‰ , the death rate was of population was 5.75‰ and the natural growth rate was 3.42‰[23]. When compared with the world average population growth rate, the CIA World Factbook gives the world annual birth rate, mortality rate, and growth rate as 19.15‰, 8.12‰, and 10.92‰ respectively[24], which means the natural growth rate of population is quite low in Hangzhou almost close to some developed countries. Since the high growth rate (average rate is above 30‰[25]) from 1950s to 1970s which leads to the "four-two-one" problem. As the first generation of law-enforced only children came of age for becoming parents themselves, one adult child was left with having to provide support for his or her two parents and four grandparents.

By the end of 2008, the resident population aged over 65 in Hangzhou was 86.83 million, accounting for 10.90% of total which is more than the standard of aging society 7%. In the year of 2009, the average life expectancy was 80.26 years old of residents in Hangzhou (77.98 years old of men and 82.67 years old of women), which was equivalent to the level of developed countries ahead of time. The ageing problem is increasingly serious and a prediction made by statistic bureau of Hangzhou shows the population over 60 will reach 880million with a proportion at 20% of total population in Zhejiang province. In this respect, the burden of aged care in Hangzhou became more and more heavier.

Income and expenditure

---

[23] Statistic Bureau of Hangzhou. General situation.

http://www.hzstats.gov.cn/web/shownews.aspx?id=UqUHIhAFC%2BY= accessed date 20110422

[24] World Factbook. https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html accessed date 20110422

[25] National Bureau of Statistics of China Population and Its Composition.

http://www.stats.gov.cn/tjsj/ndsj/2009/indexeh.htm accessed date 20110422

In 2009, the disposable income per capita for urban residents was 26,864 Yuan and the income per capita for rural residents in Hangzhou was 11,822 Yuan. By the end of the year, the balances of urban and rural residents' savings totaled 428.7 billion Yuan. The living expenditure per capita for urban residents was 18,595 Yuan and for rural residents was 9,065 Yuan. The average Engel's Coefficient was 35.8% [26]. Hangzhou is regarded as one of the most expensive cities for living in China. The expenditure is quite high when compared with the income of residents. There was fairly few (even lower for rural residents) money had been left for resident's savings which would be the backup for living because of the imperfect welfare system.

Housing price

According to the ranking list of Chinese cities' housing price[27], the average price per square meter for Hangzhou property hit 25,840 Yuan ($3,921), putting the city at the top of 110 Chinese cities in July of 2010. Based on the new policy[28] of Hangzhou government, the housing down payment is 30% of the total price of the house for the citizens who first time buy the house and 60% for the citizens buy their second house.

Social relief and pension

By the end of 2009, a total of 3.4224 million people participated in the basic pension programme, 2.9831 million people participated in the basic health insurance programme. The lowest living security issued is 400 Yuan per month in urban districts and 300 Yuan in rural areas. The average pension for enterprise retirees was 1,516 Yuan per month[29]. The amount of pension is barely enough for the residents in Hangzhou when compared with the expenditure level. Also there is bunch of citizens did not participate in the basic pension programme. Although the welfare system in

---

[26] Statistic Bureau of Hangzhou. People's living.

http://www.hzstats.gov.cn/web/shownews.aspx?id=MkkIjQuni9Y=   accessed date 20110422

[27] Lab of Elivecity. (2010) Ranking list of Chinese cities' housing price of July in 2010.

http://www.elivecity.cn/html/chengshifangjia/fangjiapaixing/256.Html accessed date 20110422

[28] Further Implementation of the real estate market advice - regulation and control by government of Hangzhou. http://www.hzfc.gov.cn/zwgk/zcfgxx.php?id=207078 accessed date 20110422

[29] Statistic Bureau of Hangzhou. Social security.

http://www.hzstats.gov.cn/web/shownews.aspx?id=tY7U9xcLE0c=   accessed date 20110424

China is improved gradually, as such a big country with the population at around 1.4 billion, it is still need decades for China to consummate her welfare services especially the coverage and quality of aged care. A new way of aged care is urgent needed to relief the pressure of aged care.

Literature Review

The research about reverse mortgages started from 1970s, along with reverse mortgage has been carried out in US. The studies about market demand of reverse mortgage was firstly brought by Jacobs (1986) who has analyzed the data of AHS (American Housing Survey) and made a conclusion that one fourth of the elderly upper than 65 years old whose income were lower than poverty line could use reverse mortgages program to make their life better.[30] Mayer and Simons (1994) used the SIPP (Survey of Income and Programme Participation)' data and stated that one-third of elderly home owners would increase their income by more than 20 percent with reverse mortgages in the US[31]. Merrill et al. (1994) also presented findings that there are only 800,000 out of 12 million households as being the prime target group to benefit from reverse mortgages[32].

The largest reverse mortgage market is currently in the US. Between 2001 and 2004, the number of reverse mortgages originated annually increased by over 500 percent, to 40,000 in the US. Reverse mortgages in countries such as Australia, Canada and the UK are smaller in comparison[33]. According to the research of Merrill et al, the demand of reverse mortgages are highly related to the value of the house. The benefits are limited for elderly households whose house value are lower than 100,000 dollars

[30] Jacobs B. (1986) The National Potential of Home Equity Conversion. The Gerontologist. V26, I5, pp. 496-504.

[31] Mayer, Christopher J. & Simons, Katerina V. (1994) Reverse Mortgages and the Liquidity of Housing Wealth. Journal of the American Real Estate and Urban Economics Association. 1994, V22, 2: pp. 235-255.

[32] Merrill, Sally R. ; Finkel, Meryl ; Kutty , Nandinee K. (1994)Potential Beneficiaries from Reverse Mortgage Products for Elderly Homeowners: An Analysis of American Housing Survey Data, Journal: Real Estate Economics ISSN: 10808620 Year: 1994 Volume: 22 Issue: 2 Pages: 257-299

[33] Creighton, A., Jin, H., Piggott, J. & Valdez, E.A. (2005) Longevity Insurance: A Missing Market, Paper presented at the Singapore Economic Review Conference, Singapore, 4–6August.

in this programme. Whereas, the elderly who own the house value more than 200,000 dollars do not need to release their whole property of the house because they owned some other property. Therefore, the characteristics of benefiters have been limited by Merrill et al as age upper than 70 years old, income less than 30,000 dollars, residence periods more than 10 years, house value between 100,000 and 200,000 dollars[34]. They have found there are around 800,000 elderly households fit the demand. Mitchell and Piggott (2004) noted that Japanese government have provided some policies support for the reverse mortgages programme, for example, reduce relevant tax, develop real estate market, enhance market communication, build insurance system for reverse mortgages and so on. Though the reverse mortgages market is still small in Japan, as a financial product reverse mortgage will be more and more popular in Japanese since the accrual declining and people's life span getting longer[35]. George Liondis (2005) found that in Australia there are plenty of elderly people age between 60 and 70 years old do not have enough money for pension because of home loan paying, and at the mean while those young people who will retire in the future would have a higher consumption expectation. Thus, as Liondis predicted, the foundation of reverse mortgage will increase from 1 billion to 7 billion dollar in few years later[36]. Shlomy Golovinski's research (2006) shows reverse mortgages are quite popular among elderly people age upper than 67 years old in Israel especially for the elderly people who dependent on alms support [37].

In the contrast, there are still lots of scholars doubt about the foreground of reverse mortgages. Weinrobe Maurice (1987) analyzed the samples of reverse mortgages in California and claimed that most elderly couples who have a good income, high house value, healthy, have adult children are not interesting in the reverse mortgages programme. Only who have lower income and lower house value, old and in a bad

---

[34] Merrill, Sally R.; Finkel, Meryl; Kutty, Nandinee K. (1994)Potential Beneficiaries from Reverse Mortgage Products for Elderly Homeowners: An Analysis of American Housing Survey Data, Journal: Real Estate Economics ISSN: 10808620 Year: 1994 Volume: 22 Issue: 2 Pages: 257-299

[35] Mitchell, Olivia & Piggot, John. (2004) Unlocking Housing Equity in Japan. National Bureau of Economic Research Working Paper No.10340. I March, 2004.

[36] Liondis, George. (2005) Mariner moves into reverse mortgages. Real Estate Economics

[37] Glovinski, Shlomy. (2006) Israel Reverse Mortgage. Real Estate Economics

health situation, without children would like to join reverse mortgages programme. Whereas, the target group do not have plenty number of population, meanwhile those people would have already participated in some other social welfare projects. If they join in the reverse mortgages programme, there would be some impacts on their social welfare income and this also would be negative for their participation in reverse mortgages programme[38]. The studies by Feinstein and McFadden (1989) also took a pessimistic attitude about reverse mortgages. They noted that lots of elderly people are unwilling to use the house property to increase their current income because of legacy motivation, uncertain life span, health situation and healthcare, deficiencies in insurance and reverse mortgages system. Therefore, they conclude that the demand of reverse mortgages is insufficient[39]. Venti and Wise (1991) find that on one hand, the median elderly home owner only benefits from a small percentage increase in income from reverse mortgages. On another hand they claimed the reverse mortgage programme is only "the last strategy" for elderly households because of the legacy motivation[40].

Reverse mortgages have a long loan period, lots of uncertain factors and risks, for example, life span risks, moral risks, rates wave, house value fluctuation. The main risks of reverse mortgages are the future house value would lower than summation of capital and accrual in reverse mortgages. Mayer and Simons(1994) also mentioned, among the barriers to acceptance so far have been the lack of consumer familiarity with the product, the high cost of originating these loans, the lack of liquidity and diversification for lenders, unfavorable required accounting treatment, regulatory and legal uncertainties and concerns over consumer protection[41]. Thomas Davidoff and

---

[38] Maurice, Weinrobe. (1987) An Analysis of Home Equity Conversion in the RAM Program. Real Estate Economics. Volume 15, Issue 2, June 1987, Pages: 65–78

[39] Feinstein, Jonathan & McFadden, Daniel (1989) The Dynamics of Housing Demand by the Elderly: Wealth, Cash Flow, and Demographic Effects. NBER Working Paper: 1989

[40] Venti, S.F. & Wise, D.A. (1991) Aging and the income value of housing wealth, Journal of Public Economics, 44, pp.371–397.

[41] Mayer, Christopher J. & Simons, Katerina V. (1994) Reverse Mortgages and the Liquidity of Housing Wealth. Journal of the American Real Estate and Urban Economics Association. 1994, V22, 2: pp. 235-255.

Gerd Welke (2007) present that the life span risks could be split by collecting plenty of reverse mortgages cases[42]. Shiller and Weiss (2000) stated that the moral risks could be prevented by combining some houses' future value with the house property index, because the households cannot control the house property index as their house price[43].

Reverse mortgage is new to China. Though there is detailed introduction about mortgages factors, types, market situation, risks and prevention of U.S's reverse mortgages there are still not many researches focus on this programme. According to the research by Chen et al (2008) who have analyzed the possible advantages of adopting reverse mortgage in China. Parents would have the right possession arranged for expenditures in senior years if there are no worries for their pension; reverse mortgages also has the function of stimulating the real estate market, it can meet the increasing demands in the secondary housing market; this program could help with the development of the consumer's market for the elderly[44]. The previous researches of reverse mortgages in China are mainly about the positive influence of reverse mortgage without enough consideration about the risks and blocks of carrying out this programme in China. In the risks and blocks researches, due to the lacking of practice of reverse mortgages, most researches maintain in theories assumptions and without enough quantitative research. Whereas, there are some reverse mortgage tests in few cities of China in recent years. Based on the practical cases, this paper will systematically discuss the feasibility of applying reverse mortgages in Hangzhou city of China practical questionnaire and data analysis.

Theory: Life Cycle Hypothesis

Background

---

[42] Daviddof, T. AND Welke, G. (2007) Selection and Moral Hazard in the Reverse Mortgage Market. Working Paper, Haas School of Business, UC Berkeley.

[43] Shiller, Robert & Weiss, Allan N. (2000) Moral Hazard in Home Equity Conversion. Real Estate Economics. 2000, Volume28, Issue1

[44] Chen, Jin et al (2008) Innovation of Finance: the Application of Reverse Mortgage in China. 2008 International Seminar on Business and Information Management

The life cycle hypothesis provides a clear linkage between the individual's income and his or her consumption plans as the individual passes from youth, working periods, retirement and eventual decease. When it comes to the studies about income and consumption we cannot miss to mention the Keynes' General Theory (The General Theory of Employment, Interest and Money) in 1936 which actually contributed to the analytical arsenal of modern economics. Keynes stated that real consumption is a function of real disposable income, total income net of taxes[45]. In Keynesian framework consumption is regarded as a linear function of income with a positive intercept, though Keynes did not impose restrictions on the functional form. According to Keynes' consumption function, the fraction of income saved increases with income which means the marginal propensity to consume (MPC) out of income decreases as income rises. In this respect, rich people could be expected to save proportionally more than poor people[46].

Further research had been made by post-Keynesians. In Kaldor's studies (1955), the individual's income is subdivided into earnings from labor and profits from general property[47]. Different propensities to consume out of income have been divided into two forms, the marginal propensity to consume out of profits and wages where the former is smaller than the latter. At the beginning, the result of both empirical and theoretical researches on cross section are well fit with Keynesian consumption function. According to the research of Friedman (1957), the individual's present consumption expenditure is highly related with his or her income. Besides, when compared both rich and poor households, the proportion of households' income part of saving increased along with income.

Nevertheless, research of consumption and saving behavior on time series data (American national consumption and income from 1869 to 1933) refuted Keynes'

---

[45] Keynes, J.M. (1936) The General Theory of Employment, Interest, and Money. New York: Harcourt, Brace, and Co.

[46] ibid.

[47] Kaldor, N. (1955 – 1956): "Alternative Theories of Distribution," Review of Economic Studies, Vol. 23, No. 2, 83 – 100.

prediction that there is a downward trend in the rate of consumption expenditure to income. Kuznets (1952) augured that the ratio of consumption to income remained more or less at the same level in the long run. Besides, this ratio did vary inversely with income in the short run, due to cyclical fluctuations in economic environment as Keynes postulated[48]. The research by Branson (1972) concluded that in contrast to expectations based on Keynesian theory private demand increased sharply after World War II[49]. In other words, consumers were forced to accumulate an excess stock of liquid assets during the war because of rationing. Along with other contradictory evidence this phenomenon shows that consumption is not only determined by current income, but also depends on assets or wealth as well.

The early studies on income and consumption were also made by Harrod (1948) with his theory of hump-saving[50]. However, a sharply defined hypothesis was brought forward by Modigliani & Brumberg (1954) who augured with well-specified tests for cross-section and time series evidence which referred to the life cycle hypothesis. According to their research, a propelling influence had been the debate about the explanatory power of the Keynesian consumption function for forecasting postwar consumption and income[51].

In the contrast of Keynes' hypothesis, the life cycle model made by Modigliani and Brumberg (1954) was based on microeconomic theory of consumer decision. They assumed that the expectancy decision of the individual include the whole life span rather than one period as in the static Keynesian model. The individual derives utility from his own total consumption presently and in the future. Therefore the decision

---

[48] Kuznets, S. (1952): "Proportion of Capital Formation to National Product," American Economic Review, Vol. 42, No. 2, Papers and Proceedings of the Sixty-fourth Annual Meeting of the American Economic Association, 507 – 526.

[49] Branson, W.H. (1972): Macroeconomic Theory and Policy. Harper and Row, Publishers, New York.

[50] Harrod, R. (1948): Towards a Dynamic Economics. London: Macmillan.

[51] Modigliani, F. & Brumberg, R. (1954): Utility analysis and the consumption function: An interpretation of cross-section data. In: Kurihara, K.K (ed.): *Post-Keynesian Economics*. New Brunswick, NJ: Rutgers University Press.

problem of the representative agent is to maximize the individual's utility of total resources in the life cycle.

Mechanism

The Life Cycle Hypothesis is focus on the pattern of consumption of individuals. The individual is then assumed to maximize his utility subject to the resources available to him, his resources being the sum of current and discounted future earnings over his lifetime and his current net worth. As a result of this maximization the current consumption of the individual can be expressed as a function of his resources and the rate of return on capital with parameters depending on age. The individual consumption functions thus obtained are then aggregated to arrive at the aggregate consumption function for the community[52].

Modigliani have made a great contribution on this theory which also made him the winner of Nobel Economics Prize in 1985. In this theory, it assumed a rational consumer is maximizing not only the present specific value of utility but also the value of utility associated with the lifetime and the limitation of long-term capital budget is the balance of income and expenditure during the life span. Individuals' income and property should be governed scientifically during different life stages also include retirement. Thereby, the allocation of individuals' resources could be optimized and the utility could be maximized. The basic view of the Life Cycle Hypothesis is whether the individuals' income and consumption could be matched during the life cycle. To maximize the utility of consumption, people's income during the whole life should be allocated effectively in the life span in the condition of budget surplus. In other word, the individual could consider the factors like present saving, present income, future income, expectancy consumption, working periods and retire time, and then estimates the expenditure and saving in the whole life. Therefore the individual could keep the consumption of whole life maintaining at a stable level. Modigliani expressed it as:

---

[52] Ando, Albert & Modigliani, Franco (1963) The "Life Cycle" Hypothesis of Saving: Aggregate Implications and Test. The American Economic Review, Vol. 53, No. 1, Part 1 (Mar., 1963), pp. 55-84

$$C = a * W + b * Y_d \quad\quad\quad (1)$$

Where a is the marginal propensity to consume (MPC) out of accumulated wealth, W is the initial endowed wealth, b the marginal propensity to consume out of income and Y_d is income.

In the condition of the individual choose to maximize his or her resource utility, we assume the individual's life cycle as L (start with the working period) years, and there are N years that the individual gains income by work. Then the retirement is L - N years. Ignore the accrual, if the individual's average income per year is Z, the total life consumption would equal to the total income earned by the individual during the working periods. It is expressed as:

$$C * L = N * Z$$

Rewritten as: $\quad\quad\quad C = (N / L) * Z \quad\quad\quad (2)$

In the equation (2), the individual's consumption per year equals to a rate of income per year, and the rate is the proportion of working periods and life cycle which means, the individual's marginal propensity to consume depends on the individual's life cycle condition.

If the individual has initial wealth and accepts property in the life cycle, start with the year that the individual get the property, combine the equation (1) and (2) we could get:

$$C = [1 / (L - T)] * W + [(N - T) / (L - T)] * Z \quad (N \geq T) \quad\quad\quad (3)$$

Where T is the year that the individual accepts the property. What we can conclude from the equations are followed:

- ◼ The total consumption expenditure comes from the total income plus the initial wealth.
- ◼ The consumption expenditure per year equals to $1 / (L-T)$ of the wealth plus average expectancy income. L is the individual's life cycle starts with the working period and T is the year that the individual gains the property.

■ The individual's present consumption expenditure depends on the individual's wealth and life cycle income condition.

■ The marginal propensity to consume is related to the condition of life cycle. The closer to the end of life cycle the higher the marginal propensity to consume out of accumulated wealth is.

Applications and Extensions

The early development and application of the life cycle theory benefit from the studies of rational expectations theory and unit root process in time series econometrics. Hall (1978) brought up the consumer's rational expectations by using the framework of life cycle hypothesis. He stated that under rational expectations, individual's consumption is martingale which implies the changes of individual's consumption is unpredictable rather than the traditional linear from life cycle hypothesis[53]. Then, Flavin (1981)[54] and Campell et al (1989)[55] found two important characters of the individual's consumption, excess sensitivity and excess smoothness of consumption. The former means the individual is sensitive to the changes of expectancy income and the latter means the individual feel smooth to the changes of unexpected income. In other words, if the consumer is sensitive to one of the changes there must be smooth feelings to another. After that, researchers corrected and improved some hypothesis based on life cycle framework, for instance, precautionary savings hypothesis (Caballero, 1990), liquidity constraints hypothesis(Zeldes, 1989), loss aversion hypothesis (Shea, 1995), near-rational hypothesis (Akerlof and Yellen, 1985:1987), etc. In this respect, the life cycle hypothesis was promoted much deepen and further.

The applications and extensions of the life cycle hypothesis was marshaling due to the rapid development of social security. Studies by Feldstein (1974) and Kotlikoff (1984)

---

[53] Hall, R.E. (1978): "Stochastic Implications of the Life-Cycle-Permanent Income Hypothesis: Theory and Evidence," Journal of Political Economy, Vol. 86, No. 6, 971 – 987.

[54] Flavin, M. (1981): "The Adjustment of Consumption to Changing Expectations About Future Income," Journal of Political Economy, Vol. 89, No. 5, 974 – 1009.

[55] Campbell, J.Y. & Deaton, A. (1987): "Is Consumption Too Smooth?," National Bureau of Economic Research Working Paper No. 2134.

applied the life cycle hypothesis on private savings, variation of retirement. Seidman (1984) discussed the effects of switch from income or capital taxes to consumption taxes. Börsch-Supan et al. (1999) had focused on the social security research which related with the defined wealth and income figures.

At the mean while, lots of questions have been raised by the empirical research on the life-cycle hypothesis. Rodepeter & Winter (1998) argued that the existing researches of the life-cycle model were lack of attention to herritage issues and uncertainty allowance as to date of death. There are also arguments about the different criteria in life cycle model when it applied to a large section of the population (Kotlikoff & Summers (1981). Through not in all samples, the decrease in wealth with age is insignificant and it even rises with age in some finely grouped data.

The Life Cycle Hypothesis is technically developed along with the modern investment theory emphasizing in the individual or household's strategy of investment in different life stages. Due to the modern investment theory assumed personal willingness of investment depends on the aversion of risk, the early home portfolio theory mostly focus on the allocation of financial assets rather than the other parts of the household's property, for example, human capital and real estate. The reverse mortgage programme could be one of the empirical application of the life cycle hypothesis with transferring the real estate into pension. It builds on individuals' consumption plan during the life cycle and consummates the macro economic theory of consumption and savings. According to the Life cycle Hypothesis, the consumption and savings in one's life span could be divided into two main parts – savings during the working periods and consumption during the retirement. Savings and property accumulation appears due to the unmatchable between individuals' income and consumption presently and in the future. Individuals' consumption and savings not only relate to the present income, people always try to distribute the consumption into present and future, thus one could achieve the maxi utility of resource. [56]

---

[56] Ando, Albert & Modigliani, Franco (1963) The "Life Cycle" Hypothesis of Saving: Aggregate Implications and Test. The American Economic Review, Vol. 53, No. 1, Part 1 (Mar., 1963), pp. 55-84

The life-cycle theory of consumption and saving behavior is often used to explain the demand for reverse mortgages. Rasmussen et al (1995) used life cycle model to estimate the potential demand of reverse mortgage products based on U.S. Census Public Use Microdata Sample in 1990[57]. Davidoff and Welke (2007) made discussion about moral hazard in reverse mortgages research underling the framework of life cycle hypothesis[58]. Zheng and Chen's research (2009) also applied life cycle hypothesis into the studies of fluctuation of housing prices in reverse mortgages programme[59].

Applying the life cycle hypothesis into the reverse mortgages programme, individuals' income which gain from their working period should be distributed into all life stages include retirement. Whereas the income is not only manifested by currency but also the accumulation of property. Housing property is one of the main real estate and occupies a great proportion of households' property. Therefore, the scientific distribution of individuals' life income also include the govern of housing property. Since the housing value takes significant part of households' income, the utility of resources distribution would be discounted without considering the distribution of housing value. The life cycle hypothesis has been enriched and deepen by the raising of reverse mortgages programme. The household could transfer the real estate such as house value into current assets by financial insurance without losing the right of usage. Thus the individual could maximize one's distribution of resource utility thoroughly during the life span.

---

[57] Rasmussen, David W., Megbolugbe, Isaac F. and Morgan, Barbara A. (1995) Using the 1990 Public Use Microdata Sample to Estimate Potential Demand for Reverse Mortgage Products. Journal of housing Research. Volume 6, Issue 1.

[58] Daviddof, T. AND Welke , G. (2007) Selection and Moral Hazard in the Reverse Mortgage Market. Working Paper, Haas School of Business, UC Berkeley.

[59] Zheng, Bowen & Chen, Jin (2009) The Research on Reverse Mortgage Based on the Fluctuation of Housing Prices , Journal: ETP International Conference on Future Computer and Communication Year: 2009 Pages: 3-7
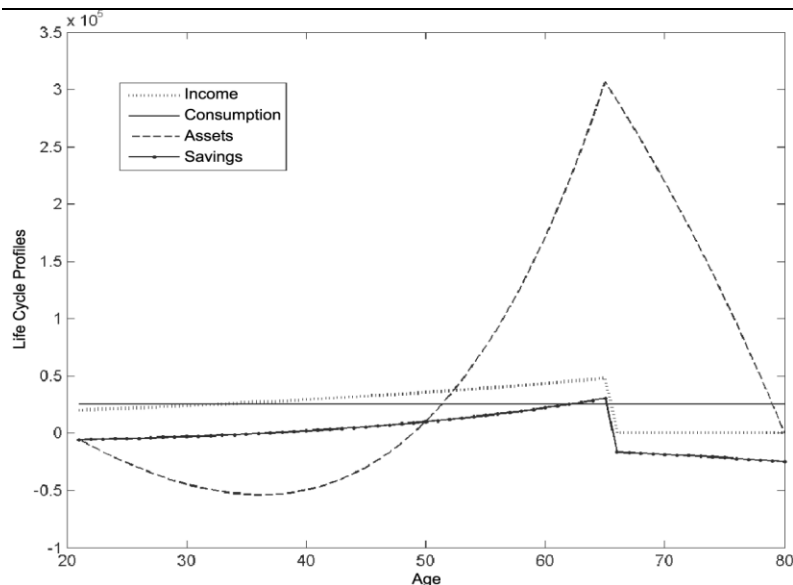
Figure 1. Income, consumption, assets and saving in the basic life cycle model[60]

Figure1 shows stylized life cycle profiles of labour income, consumption, savings and accumulated savings (assets) based on Krueger's (2004) basic life cycle model[61]. Generally, individuals income is relatively lower in youth and elderly stages and higher in the middle age. The most significant change is the fluctuation of individuals' assets. The individual's assts start at zero with a gradual decrease in the first 35 years and dramatically increase to the highest in the next 35 years, then end with zero.

It is theoretically feasible to use the house's surplus value to support the individual's retirement when we compared the household's life cycle with house life span. The house constructions nowadays mostly built by reinforced concrete structure and their life span are around 70 to 100 years. Normally, new family is built up when people are around 25 years old and the life expectancy is about 75 years old. Then the house life cycle is 50 years. Nevertheless, there are rarely young people could afford a house or an apartment by their own. Due to the special condition of China's housing market,

---

[60] Lindbergh, Jessica; Nahum, Ruth-Aïda; Sandgren, Sofia (2008) "Population ageing: opportunities and challenges for retail banking", International Journal of Bank Marketing, Vol. 26 Iss: 1, pp.6 - 2

[61] Krueger, D. (2004) The effects of demographic change on aggregate savings: some implications from the life-cycle model, Capital Markets in the Long Term: Demography, Economic Development and Funded Pension Systems, Center for Financial Studies Conference, Center for Financial Studies, Frankfurt, pp. 71-82.

the mechanism of housing commercialization is immature and there exists much economic froth, the housing price is quite high in lots cities of China. Therefore, a lot of households buy a house at their 30s, 40s or even older. For instance, someone buys a house at 35 years old and die at 80 years old, the house is used in 45 years. The life span of a house is 70 years and there are still 25 years left. In this respect, the value of the house is still pretty high when the household is retired and it is reliable for pension. Besides, there are lots of house buyers would buy a house at their 50s or 60s with a low exception on house quality and sets which makes the operation of reverse mortgages programme more feasible.

With the social and cultural changes, the concept of property inheritance became weaken. Usually, the retired elderly people have no income but consumption, they can only live on the saving which was accumulated in their working periods. This kind of perception need to be broken, the housing property could also considered as the assets for future consumption. The life quality of elderly people could be improved by reverse mortgages programme when they feel their life is not good enough which provided by their savings and pension.

The life cycle hypothesis has a great support to the reverse mortgages programme for the elderly households who have insufficient assets. According to the research by Merrill et al (1994) based on the data of American Housing Survey (AHS) in 1989, housing value occupy about 80% of households' assets in the elderly families without pension and more than 1, 200, 000 households own the property of the house[62]. It is rational for those elderly households which are called "rich in assets, poor in cash " participant in the reverse mortgages programme to improve their life quality. The reverse mortgages programme advocates the maxima of households' resource utility and it is the optimal portfolio of housing and pension.

Liquation of real estate

---

[62] Merrill, Sally R. ; Finkel, Meryl; Kutty , Nandinee K. (1994)Potential Beneficiaries from Reverse Mortgage Products for Elderly Homeowners: An Analysis of American Housing Survey Data, Journal: Real Estate Economics ISSN: 10808620 Year: 1994 Volume: 22 Issue: 2 Pages: 257-299

Real estate is a legal term (in some jurisdictions, such as the United Kingdom, Canada, Australia, USA and The Bahamas) that encompasses land along with improvements to the land, such as buildings, fences, wells and other site improvements that are fixed in location—immovable [63]. Although the real estate is physically immovable, its valuation is liquid. Houses are one of the important real estate, according to the households' needs they could transfer their housing property partly or entirely into liquid value by transactions. The liquid valuation between the household's financial and housing assets could help the household to scientifically distribute the utility of available resources.

Liquidation is the premise of the assets' utility could be used. The assets value could increase only in assets liquidation. When we apply this concept into the household's consumption especially in the period of retirement, the real estate such as housing assets could be liquefied, in order to satisfy the family's financial demands. As a main part of the household's total assets the housing property is the foundation of the family. Usually the function of the house is living, whereas the function of arbitrage are always ignored by people. Some households possess a high value of assets but the manageable currency are limited, which had been mentioned in this paper, "rich in assets, poor in cash". Therefore, the institution of value liquidation need to be built up and the valuation of real estate could be circulated, finally then, the household's financial assets and housing property could be exchanged.

The reverse mortgages programme is a kind of application in the exchange of real estate and currency assets. It estimate the future value of the house and arbitraged it to satisfy the needs of retirement. Thus, the real estate is used in a more effective way. In the process of value exchange, the utility distribution is maximized and the different demand of the house and currency is satisfied for people in different classes, ages and characters.

Limitations of applying LCH in reverse mortgages

---

[63] "Real estate" The American Heritage Dictionary of the English Language, Fourth Edition. Houghton Mifflin Company, 2004.

The life cycle hypothesis aims at the distribution of individual's resource utility which affects the individual's rational choice. When reverse mortgages is put into the framework of life cycle hypothesis, the life cycle hypothesis could influence the individual's choice of reverse mortgages, which also leads to the impacts on structure choice ore group choice. However, another important factor that the life cycle cannot interpret is the political considerations of reverse mortgages.

Political considerations refer to the context in which projections are made. All projections are influenced by the context in which they are produced. In the reverse mortgages case, the political consideration is the value judgment of reverse mortgages programme which produced by its own mechanism. It is the consideration that whether it is worth for households participating in the reverse mortgages programme because of the interests brought by mortgages or the payment for participating in reverse mortgages programme, which means the money the household could get would be less than the total value of the house due to the interests or payments. Moreover there are also some other variables would influence the carrying out of reverse mortgages programme.

Political Consideration

The political consideration had been mentioned in section above, the limitation of life cycle hypothesis in reverse mortgages. It is the value judgment of reverse mortgages programme which produced by its own mechanism. In other words, it is the consideration that whether it is worth for households participating in the reverse mortgages programme because of reverse mortgages' own risks, such as interests rate risk, longevity risk, fluctuation of housing value and moral hazard.

Longevity risk refers to that the loan institution could be exposed as a result of higher-than-expected payout ratios due to the increasing life expectancy of the elderly households. In the reverse mortgages programme, the expectancy lifespan is made by the average life span which means some of the elderly households who in a good health condition and have a high life span anticipation would tend to apply the programme, whereby the willingness would be lower to the households who think

their life span is comparative shorter. However, in the perspective of social welfare, the contrast is that the latter households are the subjects who need the pension. Moreover, the reverse mortgages could improve the households' life quality and respond for the medical expenses, which means the improvement also extent the households' life span. But, the longevity risk could be decentralized by increasing the volume of loans. Because people's life span would meet the law of large numbers (LLN), the budget loss of longevity could be offset by the profit of short-lived case when the size of volume is large enough.

The different between longevity risk and interest rate risk is that the latter cannot be simply decentralized by extent the volume of loans. Since the loan of reverse mortgages associate a large numbers of amounts, the fluctuation of interest rate influence the whole operation system. According to the reverse mortgages programme in United States, the interest rate on the Home Keeper mortgage is determined as a spread above an index rate — the current weekly average of the 1-month secondary market rate, which is published by the Federal Reserve and the rate adjusts monthly. Thus, interest rate risk could be avoided by using of adjustable interest rate.

Moral Hazard of reverse mortgages programme usually means that in the loan period, due to the lack of housing maintenance, the house price cannot reach the expectancy amount in the original contract or the appreciation rate is lower than normal, it also known as maintenance risk. In the research of Robert and Weiss (2000), they suggested to reset the future house price in the contract, the calculation of some house's future price could associate with a certain housing price index not only by estimating house's own value, then the house hold cannot make impact on the housing price index as on the house value, so moral hazard could be relieved[64]. The loan institution firstly make a expectancy house price by calculating the current value and housing price index, and when the future house price has a large deviation from the expectancy price the household need to pay the fine. In this respect, although moral

---

[64] Shiller, Robert J. & Weiss, Allan N. (2000)Moral hazard in home equity conversion.
Real Estate Economies. Spring 2000: 28, 1. ABI/INFORM Global.

hazard could be relieved, it involves another basic risk when the housing price index can not reflect some part of price fluctuation which beyond the household's influence.

Fluctuation of housing value would lead to that by the end of reverse mortgages programme, if the house equity depreciate or value less than expect, the house value would be lower than the loan and relevant fees, and lead the loss of the institution. And the key point is the prediction of house price in the future which is hard to predict since the loan period is long. But the uncertain of housing value could be partly decentralized by collecting enough loans from different areas. The house equity from different areas could reduce the risk of housing value fluctuation. But the risk that decline of house price due to national economic recession cannot be decentralized.

Besides, some social impacts may emerge as the reverse mortgages programme carrying out. Will the wealth gap would become wider since that the reverse mortgages programme require the applicants must own the property of a house? Will the reverse mortgages programme influenced the welfare system? Indeed, the reverse mortgages programme are the financial products only for those households, someone would consider this is unfair to the poor social members who do not own a house. However, the home ownership rate is more than 80% in China, when the majority aged care pressure is relieved, it helps the government saving large amount of welfare expenditure which could provide better supporting for the poor social members. As reverse mortgages programme involves a long loan period, and lots of uncertain factors will emerge in the future, which will need more research and policy to improve the reverse mortgages programme.

Methodology

In quest of the research question, case study would be a comprehensive research strategy for this paper. It is frequently discussed within the context of qualitative studies and it can provide a complete understanding of the phenomenon under research which could not be achieved through other methods. In this paper, it would be quite suitable by using case study when comes to the feasibility study of reverse mortgage analysis by taking Hangzhou city as the subject.

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. It seeks a wide understanding of the entire situation[65]. 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. It is very difficult to prevent or detect researcher induced bias. Its scope is limited due to the in-depth, comprehensive data gathering approaches required[66]. In this paper, the reverse mortgage programme is almost the new stuff to the Hangzhou city even in China. Due to the different social contexts between western and eastern countries, theories assumption or deduce from other cases outside China would be insufficient and unconvincing when comes to a feasibility study. Being deductive and particularistic, quantitative research is based upon formulating the research hypotheses and verifying them empirically on a specific set of data[67]. Quantitative research would be strength 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[68], and

---

[65] Miles & Huberman. (1994) *Qualitative Data Analysis* , p. 40

[66] Key, P. James. (1997) Research Design in Occupational Education. publication : Oklahoma State University

[67] Frankfort-Nachmias, C., & Nachmias, D. (1992). Research methods in the social sciences (4th ed.) New York: St. Martin's Press.

[68] Kealey, D.J., & Protheroe, D.R. (1996). The effectiveness of cross-cultural training for expatriates: An assessment of the literature on the issue. International Journal of Intercultural Relations, 20(2), 141-165.

allowing for longitudinal measures of subsequent performance of research subjects. A combination of qualitative and quantitative methods would help us to obtain a much richer understanding. Therefore, in this paper the research methods will be combined with text analysis and questionnaire besides by using case study.

Case study

Case study methods involve an in-depth, longitudinal (over a long period of time) examination of a single instance or event: a case. They provide a systematic way of looking at events, collecting data, analyzing information, and reporting the results. As a result the researcher may gain a sharpened understanding of why the instance happened as it did, and what might become important to look at more extensively in future research[69]. In this paper, the case structure will be built by several steps: raising research question, collecting data, analyzing data and conclusion.

The research question has been built, *Is it feasible to apply reverse mortgages for pension in Hangzhou of China*? To answer this question, it comes to the next phase – data collection.

In Ong's research (2008) of housing equity in reverse mortgage, Ong has used the data of 2002-2003 Survey of Income and Housing (SIH), a comprehensive Australian survey rich in socio-demographic, income and housing variables; real House Price Index (HPI), reveal the house price appreciation rates vary widely across states and

---

[69] Flyvbjerg, Bent (2006)Five Misunderstandings About Case Study Research. Qualitative Inquiry, vol. 12, no. 2, April 2006, pp. 219-245.

territories[70]. In Fratantoni's research (1999), the data from HECM (Home Equity Conversion Mortgage programme) have been used to explain the determinants of reverse mortgage product choice, the data consists of approximately 17,000 loans originated between 1993 and 1997 mainly about income, borrower age, wealth and home equity[71]. Venti and Wise (1989) used the data of Retirement History Survey (RHS) which related with subjects like health care, housing, assets, pensions, employment and disability, and concluded housing equity is typically not reduce as the elderly age[72].

The data of 1990 U.S. Census Public Use Microdata Sample (PUMS) has been used for estimating the potential demand for reverse mortgages among elderly home-owning households in Rasmussen et al's (1995) research, the data includes a sample of housing units, with information on the each housing unit and its households within the limits of sample size and geographical detail[73]. Merrill, Finkel, and Kutty (1993) use AHS (the Annual Housing Survey) data include the information on the number and characteristics of U.S. housing units as well as the households that occupy those units. Mayer and Simons (1994a, 1994b) use SIPP (Survey of Income and Programme Participation) data to estimate the potential demand for reverse mortgages. The survey

---

[70] Ong, Rachel. (2008) Unlocking Housing Equity Through Reverse Mortgages: The Case of Elderly Homeowners in Australia European. Journal of Housing Policy Vol.8,No.1,61–79,March2008

[71] Fratantoni, Michael C. (1999) Reverse Mortgage Choices: A Theoretical and Empirical Analysis of the Borrowing Decisions of Elderly Homeowners. Journal of Housing Research. Volume10, Issue2.

[72] Venti, Steven F. and Wise, David A. (1989) Aging, Moving, and Housing Wealth, in: D. Wise, ed., The Economics of Aging. University of Chicago Press. p.9-48.

[73] Rasmussen, David W., Megbolugbe, Isaac F. and Morgan, Barbara A. (1995) Using the 1990 Public Use Microdata Sample to Estimate Potential Demand for Reverse Mortgage Products. Journal of housing Research. Volume 6, Issue 1.

provides information about income, housing wealth, and other assets as well as the required demographic data.

Davidoff and Welke (2007) used the data from HUD (United States Department of Housing and Urban Development) to discuss the moral Hazard in the reverse mortgage market. The data include, for each of the approximately 77,000 loans issued between 1989 and mid-2003, the age, gender, and marital status of the borrower as well as the state and appraised value of the home[74]. An AARP (American Association of Retired Persons) survey, cited by Venti and Wise (2000), found that 89% of surveyed Americans over 55 years old reported that they wanted to remain in their current residence as long as possible[75].

According to previous research in other reverse mortgages studies, inquest of the feasibility study on reverse mortgages several issues should be considered, such as targets' willingness, market demand, policy support, risk and prevention. The data needed in this paper should cover households' age, income, wealth, pensions, willingness, employment, house equity and house price index of Hangzhou city.

Text analysis

Text analysis will be used in this paper for drawing on the experience of other reverse mortgage cases by reviewing previous researches; analyzing polices which related to reverse mortgage programme; counting particular features of relevant data.

---

[74] Daviddof, T. AND Welke , G. (2007) Selection and Moral Hazard in the Reverse Mortgage Market. Working Paper, Haas School of Business, UC Berkeley.

[75] Venti, Steven and Wise, David (2000) Aging and Housing Equity. NBER Working Paper 7882.

Questionnaire

In the respect of life cycle hypothesis, it assumed that the rational individual is maximizing not only the present specific value of utility but also the value of utility associated with the lifetime and the life cycle hypothesis is regarded as the strategy of individual financial choice which provide an optimal form to maximize the individual's resources utility. In this case, the acceptability of reverse mortgages among the residents of Hangzhou reflects the tendency of individual choice and structure (group) choice. Thus, the public willingness is an important factor that influenced the carrying out of reverse mortgages programme.

Questionnaire method in this paper will mainly focus on the elderly households' willingness of participation in reverse mortgages programme. Due to the different cultural contexts with western countries, reverses mortgage programme is not consistent with few Chinese traditional values. For instance, Chinese older adults prefer to pass their properties to their descendants or next generation. It is also a tradition among Chinese to hold properties as a means to protect old age[76]. Therefore a willingness inquiry is necessary and it would provide an empirical base for a further feasibility study.

Data collection

The sample used in the empirical analysis of this paper will be discussed in this section. The data below are all selected from related official website, reports etc., there are also other journals have possibilities of offering sources like local newspapers or web sites, yet those sources have not been used in this report because it is hard to prove the validity of non-official data. According to the previous research, whether the reverse mortgages programme could be carried out it depends on three main aspects: the capacity of markets (market demand), funds of the operation and social and cultural acceptability (willingness), which aims to answer the research

---

[76] Choua, Kee-Lee, Nelson W.S. Chowa, Iris Chi (2006) Willingness to consider applying for reverse mortgage in Hong Kong Chinese middle-aged homeowners. Habitat International 30 (2006) 716–727.

question that *Is it feasible to apply reverse mortgages for pension in Hangzhou of China*?

For the **capacity of markets** part, the data of *home ownership rates,* were collected from China Cities Report 2010. The data of *population structure and status, empty nesters proportion, house price index, condition of elderly pension, households' income and expenditure by average* were caught from Statics Bureau of Hangzhou[77].

In the framework of life cycle hypothesis, the *households' income and expenditure by average* are need to calculate the resident's expectancy consumption, which could provide a deep understanding of the resident's living conditions during his or her lifespan when compared with the actual expenditure. The data about *condition of elderly pension, population structure and status and empty nesters proportion* are mainly used for the studies of the condition of elderly people and their pension situation, and which would be help for estimating the aged care pressure in Hangzhou. *Housing possession proportion* is the premise of carrying out the reverse mortgages programme. *House price index* could be used for the research of the fluctuation of housing price which could be used for estimating the future value of the house.

In the **funds of the operation** section, the chosen data is *bank excess reverse and social idle funds* in Zhejiang Province. The source of data were taken from China Financial Yearbook 2009. The launch and operation of reverse mortgages programme needs a large amount of money. The loan could be provided by the bank. *Households' savings, bank excess reverse and social idle funds* could reflect the loan capacity of the bank.

---

[77] http://www.hzstats.gov.cn/

Data collection in **social and cultural acceptability** part mainly based on the questionnaire.

Questionnaire Design

Samples selection

There are two types of sample had been considered for the questionnaire. One is the subjects who possess the property of a house which means the selected sample would be qualified to participant in the reverse mortgages programme currently or in the future. Another type of subjects are chosen among all the citizens which represent the public opinion. When we choose the former type of sample, the result specifically aims at the households' willingness of participation in reverse mortgages programme, which could provide a direct understanding of the households' attitude.

However, individuals' decision making usually influenced by the environment. The influence of other people that leads us to conform in order to be liked and accepted by them[78] which often lead to public compliance of group's social norms. The reverse mortgages programme is a completely new stuff in China. The possible value conflict need to be regarded. Thus, when we are doing feasibility studies of this programme not only the main subjects' attitude is needed but also the social and cultural acceptance have to be considered. The latter type of subjects covers all the society members, the data collected from different ages, careers and levels of education. The results could be provided for future studies on reverse mortgages. Besides, the main subjects who own the house are also included in the sample. Therefore the latter type of sample would be selected which could provide a more comprehensive understanding of social and cultural acceptability of reverse mortgages programme.

Questions design

Q1. Income per month (*Yuan almost equal to SEK*):

□Less than 1000   □1000 – 3000   □3000 – 5000   □more than 5000

---

[78] Aronson, E.; Wilson, T.D. & Akert, A.M. (2005). Social Psychology (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Subjects' level of income could provide a view of their living standard which help us classifying the subjects.

Q2. The pension you have now (or will get in the future) is _____ to cover your cost of living. (The anticipate pension could be estimated by subjects' career and income.)

□Abundant   □Balanced   □Barely enough   □Insufficient

The amount of pension relate to subjects' life quality. Subjects' perception of the pension reflects the demand of pension improvement which could be the premise of carrying out reverse mortgages programme.

Q3. How much money per month (*Yuan*) would be sufficient for your retirement life?

□Less than 1000   □1000 – 3000   □3000 – 5000   □more than 5000

The detailed amount of money could be a reference for choosing different kinds or design of reverse mortgages programmes.

Q4. You have been living or will live with ____ when you retired.

□Yourself   □Your wife/husband   □Your children

Subjects' resident condition associates with the house transferring. For instance, subjects who live with their children after retired probably would not participate in the reverse mortgages programme because of the involved housing property.

Q5. What kind of aged care you have chosen or will prefer when you retired?

□Home-based age care (live on children)   □Community aged care (paid by children)

□By own savings or social relive   □Reverse mortgages   □others

A comparison of reverse mortgages among other kind of age care services give a direct reflection of willingness.

Q6. Do you presently have the housing property for reverse mortgages?

□Yes   □No

Classification of house owners and non-house owners. House owners' answers would be more specific and subjective. Non-house owners' views are supplementary and helping to comprehend the social context.

Q7. If you own a housing property, you would_____.

□Left to your children   □Use for aged care   □Uncertain

How subjects would deal with their housing property. It is a question related to generation ties.

Q8. What bother you the most when the reverse mortgages programme has been carried out?

□Family ties would be weakened by RM   □I do not think the current bank system has the ability to well organize the RM   □The process of RM would be redundancy   □others_____

Thinking at subjects' position, what would be the resistance of carrying out reverse mortgages programme which could provide reference for strategy making.

Q9. Would you like to choose reverse mortgage for your retirement if it is possible?

In the condition of that you no need to concern and support your children

□Yes   □No   □Uncertain

In the condition of that you have the responsibilities of supporting your children

□Yes   □No   □Uncertain

The question tests for that the responsibilities of supporting children whether would be a resistance for applying reverse mortgages programme.

Q10. How do you think if the reverse mortgages programme has been widely applied in Hangzhou?

□It would be welcome   □Not sure   □I do not think it is a wise choice

Catching general ideas of the feasibility for applying reverse mortgages in Hangzhou.

The questionnaire is designed to reflect the **social and cultural acceptability** of reverse mortgages in Hangzhou, the focus of the questions are from several

perspectives, one is the capabilities of reverse mortgages, questions like subjects' current life standard and expectancy life in retirement implies the possible demand of life improvement which form could be turned out as money. i.e. Q1, Q2 and Q3. Another one is trying to explore subjects' attitude towards to reverse mortgages by asking specific willingness of choosing reverse mortgages for aged care. It could provide direct understanding of subjects' opinion about reverse mortgages. The third perspective emphasize in the impediments of the carrying out of reverse mortgages programme by looking for the factors obstruct the development of reverse mortgages programme. For example, whether the Children bound or generation ties would be a main resistance for applying reverse mortgages programme (Q9). In short, those questions give an overview of subjects' tendency about reverse mortgages and the group choices as the public opinions are the reflection of all the society members which forms the climate of the society. Then the extent of **social and cultural acceptability** of reverse mortgages could be measured.

Data and Analysis

Home ownership rates

The Housing Conditions Survey of Hangzhou reported by Hangzhou Housing Management Bureau in 2007 shows that the housing possession proportion of the main districts (Shangcheng, Xiacheng, Jianggan, Gongshu, Xihu, Binjiang, Xiaoshan and Yuhang) of Hangzhou is 83.8%[79].

The home ownership rate for 2010 was 66.9% in United States according to the Housing Vacancy Survey, conducted by the US Census Bureau in conjunction with the Current Population Survey[80]. As we can see the home ownership rate in Hangzhou

---

[79] Hangzhou Housing Conditions Survey. http://www.hznet.gov.cn/xxfb/1103/9353.htm   accessed date 20110423

[80] Home ownership rates. http://www.danter.com/statistics/homeown.htm accessed date 20110423

is quite high which would be one of the important premises for carrying out reverse mortgages programme.

Population structure and status

Table 2. The past Censuses and Population Structure[81]

Year	The percentage of age 0-14（%）	The percentage of age older than 65（%）	the proportion of the old in the youth（%）	Median Age
1953	33	3	10	23.13
1964	41.81	3.95	9.45	19.04
1982	24.41	5.89	23.65	25.19
1990	20.19	6.79	33.63	28.72
2000	16.45	8.76	33.24	33.20

Table 3. Hangzhou 1% Population Sample Survey in 2005[82]

2005	13.34	10.23	76.69	

According to the data from past censuses (Table 2) and Hangzhou population sample survey (Table 3), due to the Only Child Policy has been carried out since 1980s, the percentage of age group 0-14 had a dramatic decline from 1982 whereas the percentage of age group older than 65 rises gradually and it hit 10.23% in total population which is much more than the standard of aging society 7%. The ageing problem is increasingly serious and which would lead to the "four-two-one" problem. As the first generation of law-enforced only children came of age for becoming parents themselves, one adult child was left with having to provide support for his or her two parents and four grandparents. In this respect, the burden of aged care in Hangzhou is becoming heavier day by day.

---

[81] The past Census of Hangzhou http://www.hzstats.gov.cn/web/tjnj/nj2010/02/nj_.htm accessed date 20110423

[82] Hangzhou 1% Population Sample Survey in 2005.
http://www.hangzhou.gov.cn/main/xxbs/T62614.shtml   accessed date 20110423

Empty nesters proportion

According to the report of Living conditions of elderly population in Zhejiang Province [83] (2006), the elderly empty nesters(older than 60 years old) takes a proportion at 67.6% of total and the elderly dependency ratio is 22%. The data reflect that most of elderly households are living apart with their children which means the traditional aged care that the elderly are taken care by their children became weaker. Thus, new forms need to be introduced for relieving the pressure of aged care.

House price and house price index

According to the ranking list of Chinese cities' housing price[84], the average price per square meter for Hangzhou property hit 25,840 Yuan ($3,921), putting the city at the top of 110 Chinese cities in July of 2010. Based on the new policy[85] of Hangzhou government, the housing down payment is 30% of the total price of the house for the citizens who first time buy the house and 60% for the citizens buy their second house.

In contrast of the resident's income, it is very hard for the resident to afford the house in Hangzhou. In the words, the housing value takes considerably large proportion of the household's expenditure in his or her whole life which would ask for a rational strategy of financial management. In applying the life cycle hypothesis, the reverse mortgages programme would be a wise solution to the contradictions between the household's income and housing price which could help the household to make a financial plan of whole life.

---

[83] Zhejiang Aging Research Center.(2006) Living conditions of elderly population in Zhejiang Province. http://www.shanghaigss.org.cn/news_view.asp?newsid=4321 accessed date 20110423

[84]Lab of Elivecity. (2010) Ranking list of Chinese cities' housing price of July in 2010. http://www.elivecity.cn/html/chengshifangjia/fangjiapaixing/256.Html   accessed date 20110422

[85] Further Implementation of the real estate market advice - regulation and control by government of Hangzhou. http://www.hzfc.gov.cn/zwgk/zcfgxx.php?id=207078 accessed date 20110422

Table 4. **House Price Index of Hangzhou** (regard last year's price as 100)[86]

Year	House in general	Normal House	Top Grade House
2005	109.7	112.1	110.2
2006	103.2	103.0	105.5
2007	108.3	108.3	114.0
2008	109.9	107.8	123.7
2009	102.1	102.1	103.5

During last few years, the house price is growing rapidly but getting steady recently (Table 4). The house price index could be helpful for drawing up the mortgages scales in reverse mortgages programme.

Condition of elderly pension

By the end of 2009, a total of 3.4224 million people (42% of total population) participated in the basic pension programme, 2.9831 million people participated in the basic health insurance programme. The lowest living security issued is 400 Yuan per month in urban districts and 300 Yuan in rural areas. The average pension for enterprise retirees was 1,516 Yuan per month[87]. The pension and social relief is quite low in compare with the households' expenditure level in Hangzhou. Besides, there are bunch of citizens have not participated in the basic pension programme.

Households' income and expenditure by average

Table 5. Households' Income and Expenditure per Capita in Hangzhou[88] (Yuan)

---

[86] Hangzhou real estate sales price index. http://www.hzstats.gov.cn/web/tjnj/nj2010/13/nj_.htm accessed date 20110423

[87] Statistic Bureau of Hangzhou. Social security.

http://www.hzstats.gov.cn/web/shownews.aspx?id=tY7U9xcLE0c= accessed date 20110424

[88] Households' Income and Expenditure per Capita in Hangzhou.

http://www.hzstats.gov.cn/web/tjnj/nj2010/13/nj_.htm accessed date 20110424

Year	Total Income	Disposable Income	Total Expenditure	Savings at the end of the year
2005	18761.51	16601	17260.06	2255.52
2006	21367.13	19026.86	19513.14	1963.45
2007	24474.89	21689.36	21545.09	2270.43
2008	27034.76	24103.58	23289.70	1743.08
2009	30337.78	26863.93	29159.11	1282.59

When compare with the household income and expenditure in Hangzhou (Table 5), the total expenditure ascends significantly which even cannot match the disposable income in 2009. The household's savings end of the year is seldom which would be the backup for living because of the imperfect welfare system.

Summary of market capacity

As we have the data above, according to the life cycle hypothesis, when we assume that the individual (one of citizens in Hangzhou) tries to maximize his or her resource utility during lifespan. His or her annual consumption could be estimated as:

$$C = (N / L) * Z \qquad\qquad (2)$$

The individual's expectancy consumption is C, the individual's life span is L (start with the working period) years, and there are N years that the individual gains income by work. Then the retirement is L – N years, Z is the individual's average income per year. By using the data of Hangzhou the equation could be calculated, we assume that the individual's life span is 80 years old (the residents' average life span in 2010 is 80.67 years old[89]) and the individual gains income since 25 years old and retired at 65 years old. Considering the accrual, the individual's total income gradually increased at about 3000 Yuan per year (Table 5), if the individual is 25

---

[89] Hangzhou Health Bureau (HZWS). Life expectancy of Hangzhou residents 2010.
http://www.hzws.gov.cn/site/znss/show.asp?docid=14694 accessed 20110517

years old now, his or her total income I = 30,000 * (65 − 25) + 3000 * (65 − 25 − 1) = 1,317,000 Yuan. Z = 1,317,000 / (65 − 25) = 32,925 Yuan.

$$C = [25 / (80–25)] * 32,925 = 14,966 \text{ Yuan}$$

The individual's expectancy consumption annual is 14,996 Yuan, the number is only the half of the individual's total expenditure in 2009 (Table 5), which means the individual's life quality is quite low when compare with the average living standard. Another issue should be noted is that the average house price of Hangzhou is around 25,000 in July of 2010, when we assume the individual bought a house in a remote area which price is 15,000 per square meter, dimension is 80 square meter. Then the house price is 1,200,000 and if the individual get 70% mortgages in 30 years. The total payment including interest is around 20,000,00 Yuan. If the individual share the payment with his or her companion, there still 1,000,000 Yuan need to be paid which equals to almost all of the individual's income during lifespan.

There is obvious contradictions could be found among the individual's income, expenditure and house price when we using the equation of life cycle hypothesis. Those contradictions leads to the demand of improvement in life quality which could be achieved by the mechanism of reverse mortgages that to get pension from the household' house property, thus the utility of household's income is maximized and his or her life could be improved.

Besides, according to the data above, the demand of reverse mortgages programme in Hangzhou is obvious and it is practical necessity and possibility. The main reasons attribute to:

1) The aging problem is becoming serious and empty nester rates are increasingly high, which lead to the heavy pressure of aged care in Hangzhou.
2) The existing aged care system cannot meet with the growing pension demand both in quality and coverage.
3) The high home ownership rate makes the reverse mortgages programme possible.

4) The real estate market of Hangzhou was taking a good and steady growth in the recent years.

5) The large contradictions between the households income and housing price lead to a new form of financial strategy to maximize the resource utility which turn out to be the reverse mortgages programme.

In short, the potential demand of reverse mortgages is large in Hangzhou especially the elderly empty nesters who are "asset rich, income poor".

Bank excess reverse

Table 6. Bank Reverse and Loans in 2007 and 2008 in Zhejiang Province (Billion Yuan)[90]

Year	Bank Assets Size	Total Bank Deposits	Regular Savings	Total Loans
2007	33,926.6	5257.4	430.9	3,989.5
2008	42,069.1	6,419.3	2,499.2	4,739.6

The operation of reverse mortgages programme needs a large amount of money, according to the large bank assets size in Zhejiang province (Table 6), the financial support could be provided by the bank system.

Home Equity Conversion Mortgages (HECM) account for more than 90% of all reverse mortgages originated in the United States. In the year of 2001, 7,781 HECM loans were originated[91]. Considering the house price of Hangzhou, the loans provide by the bank are sufficient for the start of reverse mortgages programme. And as the market is big enough the houses for reverse mortgages could be sold to second hand house markets. Besides the relevant purchase programme could be established. The Housing and Economic Recovery Act of 2008 provided HECM mortgagors with the opportunity to purchase a new principal residence with HECM loan proceeds — the so-called *HECM for Purchase* program. The program was designed to allow seniors to purchase a new principal residence and obtain a reverse mortgage within a single

---

[90] Zhejiang. China Financial Yearbook 2009. ISSN 1001-5841.

[91] Home Equity Conversion Mortgages Monthly Report. Pub. L. No. 109-289, s.131 (2006).

transaction by eliminating the need for a second closing[92]. Thus, the funds that provide by the bank system for current reverse mortgages operation is sufficient.

Questionnaire results and analysis

The questionnaire was distributed face to face at the end of April 2011 in Hangzhou. The sample was randomized among eight districts below (Table 7). 160 of questionnaire had been sent and 5 of them are invalid due to the lack of subjects' information.

Table 7. Questionnaire Distribution

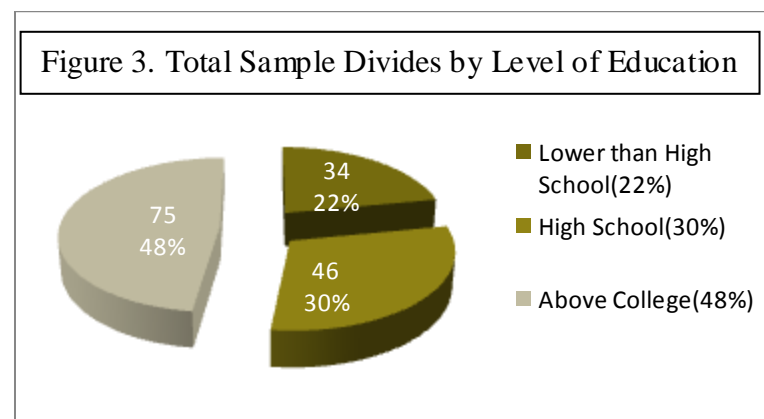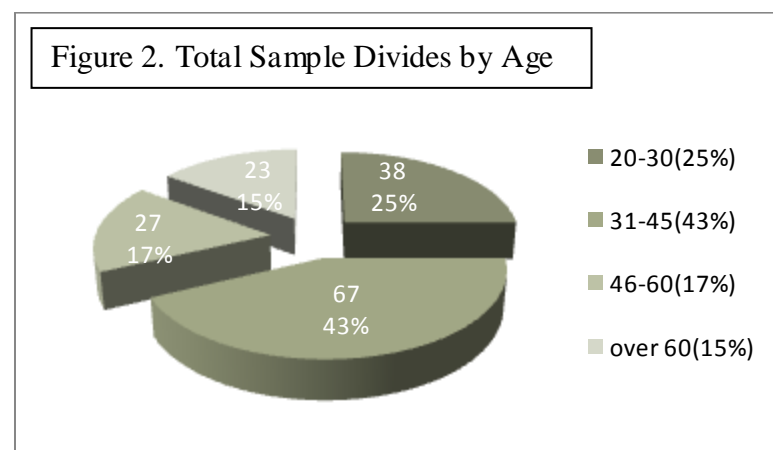| District	Numbers of Questionnaire	Percentage
Shangcheng	20	12.5%
Xiacheng	19	11.8%
Jianggan	20	12.5%
Gongshu	20	12.5%
Xihu	20	12.5%
Binjiang	19	11.8%
Xiaoshan	19	11.8%
Yuhang	18	11.3%
Invalid	5	3.1%
Total	160	99.8%

Results and Analysis

Firstly, the support rate of reverse mortgages is moderately high in Hangzhou, the data show there are around 60% of subjects agree to choose reverse mortgages programme as a kind of way for their aged care. According to the relations of agreement level, education and income are in direct proportion to the agreement, whereby age is inversely proportion to the agreement. In other words, the higher
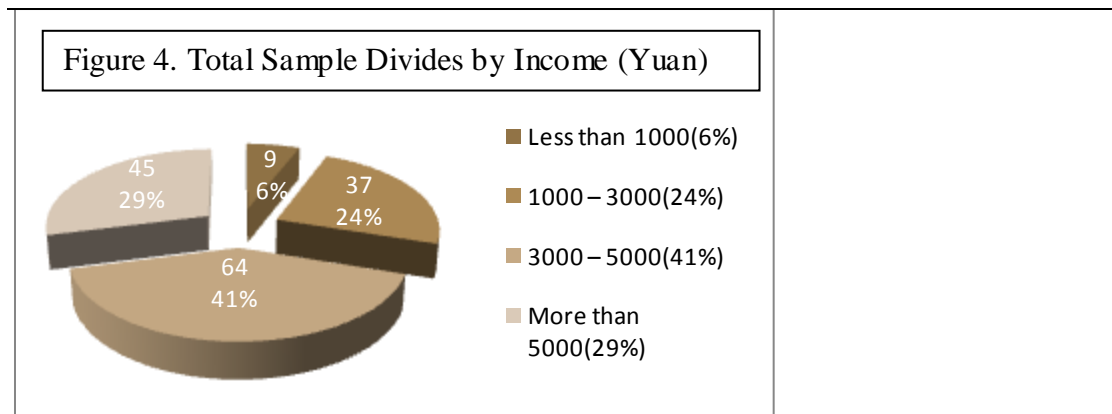
---

[92] HECM for Purchase.

http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/faqs_hecm accessed date 20110427

educated people have a higher acceptability of reverse mortgages and the people who have a higher income shows higher attention to the quality of retirement.

As the distinction of age, in the group who accept reverse mortgages programme, subjects between 20 to 30 years old take 41%; subjects from group 31- 45 years old takes 37%; subjects between 46 and 60 occupy 15% and subjects older than 60 years old only occupy 7%. In the category of education, there are 75% subjects whose education level higher than college support the reverse mortgages programme, 53% in subjects with an education level at high school and it is significantly lower in subjects with a lower education level which is 11%. In the category of income, there are 77% of subjects with income more than 5000 Yuan shows acceptability of reverse mortgages programme, 68% of subjects in group income between 3000 and 5000 Yuan, 35% of subjects in group income between 1000 and 3000 Yuan.

Figure 2. Total Sample Divides by Age

20-30(25%)
31-45(43%)
46-60(17%)
over 60(15%)

38 25%
67 43%
27 17%
23 15%

Figure 3. Total Sample Divides by Level of Education

Lower than High School(22%)
High School(30%)
Above College(48%)

34 22%
46 30%
75 48%

Figure 4. Total Sample Divides by Income (Yuan)

- Less than 1000(6%)
- 1000 − 3000(24%)
- 3000 − 5000(41%)
- More than 5000(29%)

9 6%

37 24%

64 41%

45 29%

Secondly, in the section of willingness to choose reverse mortgages (Figure 5), 68% of subjects hold positive attitude, while 11% of them still "not sure", and 19% of them are negative toward reverse mortgages in the condition of that they do not need to concern about their children. Whereas the numbers turn to 23%, 14%, 63% in the condition of that they have the responsibilities of supporting their children (Figure 6). The contrast clearly reflects the generation ties have a significant impacts on people's choice toward to reverse mortgages. The positive news on the research on is that, according to the results of "how people think about the reverse mortgages programme has been widely applied in Hangzhou" (Figure 7), 58% of people think it would be welcome, while 35% of them hold opposite opinion, and 7% given no clear answer, it is a positive sign that the form of reverse mortgages is accepted by most of residences of the city.
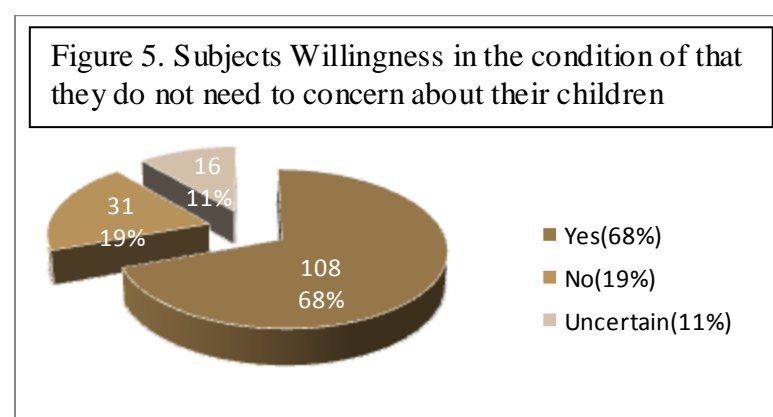
Figure 5. Subjects Willingness in the condition of that they do not need to concern about their children

16 11%

31 19%

108 68%

- Yes(68%)
- No(19%)
- Uncertain(11%)

Figure 6. Subjects Willingness in the condition of that they have the responsibilities of supporting their children

- Yes(23%)
- No(63%)
- Uncertain(14%)
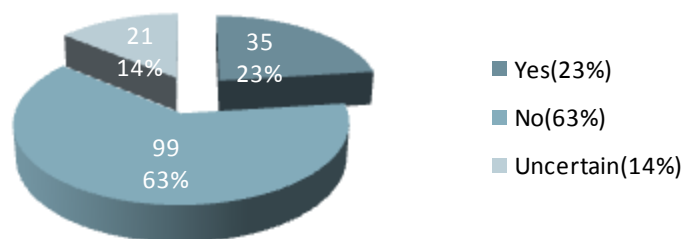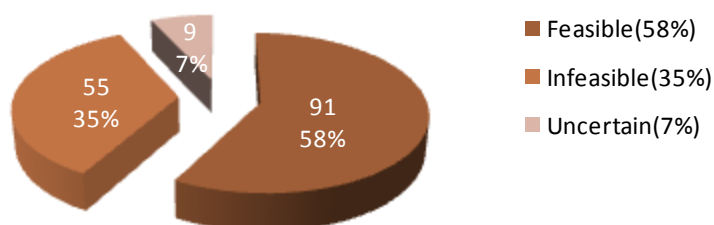
21 14%
35 23%
99 63%

Figure 7. Feasibility of reverse mortgages applying in Hangzhou

- Feasible(58%)
- Infeasible(35%)
- Uncertain(7%)

9 7%
55 35%
91 58%

Thirdly, it is shown that (Figure 8), there are 67% of subjects already own a hosing in the city, it is the premise for reverse mortgages being applied in the city. Moreover, 48% of them stated that they would like to leave hosing for their children, 43% of them plan to take it as aged care, and 9% of them have no clear plan. It reflects that, the traditional concept of aged care has been changed, people tend to seek more opportunities for aged care; also it shows that some of the subjects are trying to avoided to make trouble on their children including aged care problem, and as long as they could offer their expense for life, they would like to take care of themselves. All of those evidence appear a positive sign for applying aged care. However, it is also noted that, though people's concepts on housing property is more open than before, the traditional impacts still dominate a big party of community, as some of the subjects regard the houses as the heritage for their children, and they do not hold any other plan for their housing property.

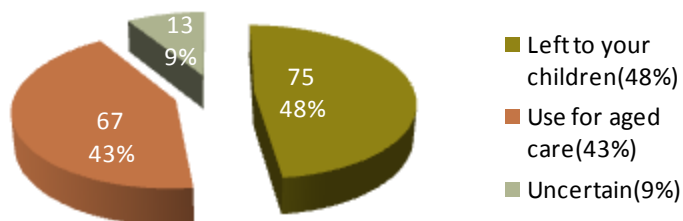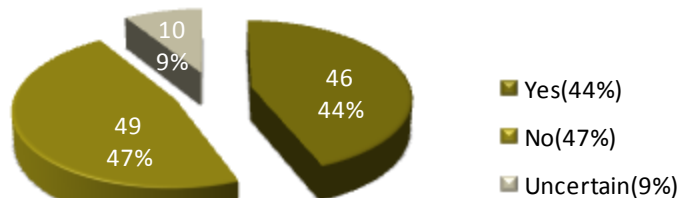Figure 8. How will subjects deal with their housing property

- Left to your children(48%)
- Use for aged care(43%)
- Uncertain(9%)

Figure 9. Willingness of subjects who own a house

- Yes(44%)
- No(47%)
- Uncertain(9%)

Fourthly, among the subjects who currently own pension, only 25% of them stated that the pension is abundant for them to use; 29% of them stated that they are in the balance of financial cash flow; whereas 31% stated that the pension is barely cover their expense, and they stressed that the mount of pension they have is far less than they expected (Figure 10). This situation made it necessary to introduce the reverse mortgages and its research, which would be a way out to reduce burdens for those people who are in a short of pension.
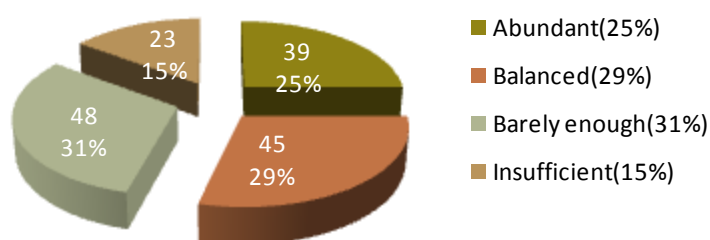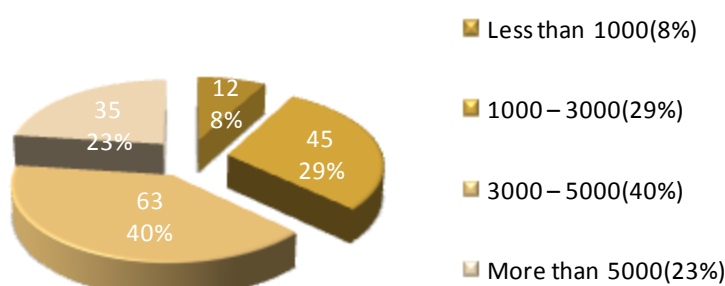
Figure 10. Expectancy Perception of Pension

- Abundant(25%)
- Balanced(29%)
- Barely enough(31%)
- Insufficient(15%)

23 15%

39 25%

48 31%

45 29%

Figure 11. Ideal Amount of Pension per Month (Yuan)

- Less than 1000(8%)
- 1000 – 3000(29%)
- 3000 – 5000(40%)
- More than 5000(23%)

12 8%

35 23%

45 29%

63 40%

Last but not least, move to the research on negative perceptions upon reverse mortgages programme. The results have shown that family ties would be weakened gathered 45% of people; doubting of the current bank system dominate 33% people; rest of them being shared by 15% for the reason that the process of RM would be redundancy, and 7% with the other reasons such as creditability, unnecessary and uncertain (Figure 13). The results also show that, living by own savings is the most welcome form of aged care among the subjects (Figure 12). It reflect that, though reverse mortgages programme is exploitable in the city, there are a lot of difficulties estates. It requires the close cooperation among governments, financial agencies and civil organizations. Also the citizens need a much more clear knowledge of reverse mortgages, and the clear and simple process of reverse mortgages is needed.
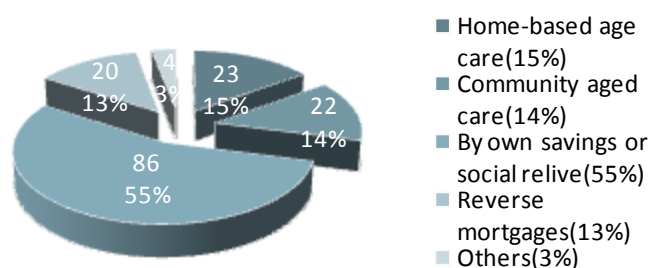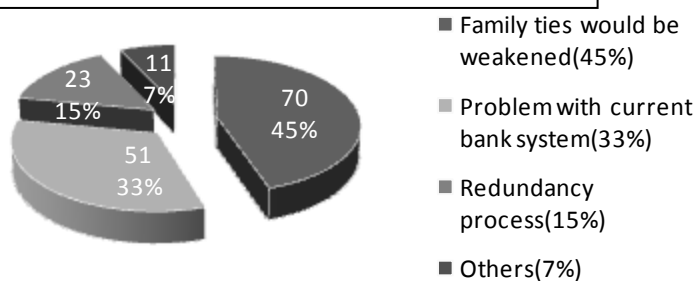
Figure 12. Expectancy Forms of Aged Care

Home-based age care(15%)
Community aged care(14%)
By own savings or social relive(55%)
Reverse mortgages(13%)
Others(3%)

Figure 13. Negative Perceptions upon Reverse Mortgages

Family ties would be weakened(45%)
Problem with current bank system(33%)
Redundancy process(15%)
Others(7%)

Summary of questionnaire

Generally, according to the life cycle hypothesis, when we considered the tendency toward reverse mortgages programme as an individual choice and structure (group) choice and based on the questionnaire results and analysis above, most of subjects show the reverse mortgages programme is understandable and it is acceptable in a certain condition, which means reverse mortgages is feasible to be applied at certain extent. Whereas the elderly people's plan of future is limited by economical factors and traditional concept. For the elderly households who is lack of financial support from their children and pension but own housing property, they would choose reverse mortgages programme but they hesitate and doubt about it when considering the extent of life quality could be improved, mortgages scales and credibility. On the other hand, for the elderly households who have a good financial situation, have a harmonious relationship with their children and also have a conservative mind, usually they would not tend to choose reverse mortgages programme, but few cases would be different in the condition of that they do not need to concern and support your children.

Besides, what should be noted is that the age group of 31 to 45 years old who would be the elderly household in the future shows a much higher willingness of participation in reverse mortgages programme. Thus, it is feasible that for applying reverse mortgages in Hangzhou in the future as resistance of reverse mortgages became smaller and people's conservative concept changes.

Summary

Based on the data and analysis above, three aspects had been measured, the capacity of markets (market demand), funds of the operation and social and cultural acceptability (willingness). In the capacity of markets section, the data of *population structure status, empty nesters proportion* and *condition of elderly pension* show Hangzhou is under the great pressure of aged care and current pension and welfare system cannot meet the increasingly aged care demand. The data of *house price and house price index*, and *households' income and expenditure by average* illustrate the housing property occupies a large proportion of the household's life income and the reverse mortgages programme could provide a scientific financial strategy for maximize one's resource utility when considering the life cycle hypothesis. Moreover the high *home ownership rates* ensured the precondition of carrying out the reverse mortgages programme. Thus, what could be figured out is that there exist strong market demands of reverse mortgages programme in Hangzhou.

Moreover according to the data of Bank Reverse and Loans in Zhejiang province, the bank assets size is large enough for providing the funds of launching and operation of reverse mortgages programme in Hangzhou when compared the annual volume of loans in United States.

As to the social and cultural acceptability part, the questionnaire result indicates that there are over half of subjects hold positive perceptions of reverse mortgages. It seems that the reverse mortgages programme will be well accepted by more households as the publicity of reverse mortgages in the future due to the data shows that age is inversely proportion to the agreement on reverse mortgages.

Conclusion

The research question of this paper is that *Is it feasible to apply reverse mortgages for pension in Hangzhou of China*? Theoretically, the application of reverse mortgages programme depends on three main factors, individual choice, structure (group) choice and political consideration. The framework of life cycle hypothesis provide a deep understanding of the individual's rational choice that to maximize one's resource utility during the life span, which could meet the individual choice and structure choice. The political consideration involves with the risks that produced by the reverse mortgage itself, those risk also could be reduced and relieved by making relevant strategies and polices. Thus, the reverse mortgages programme is theoretically workable for relieving aged care pressure in Hangzhou.

Practically, there are also three aspects associate with the carrying out of reverse mortgages programme in Hangzhou, the capacity of market (market demand), funds of the operation and social and cultural acceptability (willingness). The chosen data are *home ownership rates, population structure and status, empty nesters proportion, house price index, condition of elderly pension, households' income and expenditure by average, bank excess reverse and social idle fund, and questionnaire collected in Hangzhou*. According to the previous data and analysis, the market demands of reverse mortgages programme in Hangzhou seems quite strong; there are also sufficient funds for launching and operation of reverse mortgages programme; the public willingness shows a moderate support rate of the carrying out of reverse mortgages programme due to some traditional conservative minds. In this respect, to respond to the research question, it is feasible to use reverse mortgages for pension in Hangzhou but still with some cultural diversity need to be overcome currently. However, it should be noted that the reverse mortgages will be widely approbated in the near future.

Besides the empirical study, the aim of this paper is to explore a possible form to relieve the increasingly serious aged care pressure by taking Hangzhou as an empirical case and later applying in China. Since the aging problem becoming one of

the main global issues need to be concerned in the 21st century, aged care turns to be a key problem that relevant to the development of a country or even the civilization. Find a way to solve the aged care is especially important in China since it has one fifth population of the world. When compared with some other solutions of aged care in China, as the "four-two-one" problem emerged the traditional aged care like home-based aged care cannot meet with the demand; community and institution aged care costs lots of resources and there exists limitations such as quality and coverage. As to some new forms of aged care from developed countries like integrated aged care or aged care service enclose in the welfare system takes a quite high expenditure which cannot match the current situation in China. Whereas, the reverse mortgages programme regard as both financial product and aged care service is necessary to be provided in China.

As to the provider of reverse mortgages programme, according to the reverse mortgages programme in United States and some other countries, supporting from financial markets and governments are needed in order to build a complete system for operation of reverse mortgages programmes.

The housing finance system of China is still new, and there exists lots of limitations which are barricading the development of reverse mortgage in China. The primary market of housing finance is still lacking a long-term financial support and a apportion insurance mechanism of mortgages; loan securitization; a well complete secondary market and so on. A appropriated financial system need to be established in the financial markets to support the reverse mortgages programmes.

Besides, supports form government have been expected. Because the reverse mortgage is not only benefiting in economic perspective, but also positively impacting on social welfare. Moreover the operation of reverse mortgages programme involves bunch of funds, it is not easy for private financial institution to management and the insurance guarantee of government would provide a much more reliable, creditable and effective reverse mortgages system.

References

Ando, Albert & Modigliani, Franco (1963) The "Life Cycle" Hypothesis of Saving: Aggregate Implications and Test. The American Economic Review, Vol. 53, No. 1, Part 1 (Mar., 1963), pp. 55-84

An overview of Reverse Mortgages. UBS Mortgage Strategist. June 6, 2006. P.8-15

Aronson, E.; Wilson, T.D. & Akert, A.M. (2005). Social Psychology (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Branson, W.H. (1972): Macroeconomic Theory and Policy. Harper and Row, Publishers, New York.

Campbell, J.Y. & Deaton, A. (1987): "Is Consumption Too Smooth?," National Bureau of Economic Research Working Paper No. 2134.

Chen, Jin et al (2008) Innovation of Finance: the Application of Reverse Mortgage in China. 2008 International Seminar on Business and Information Management

Choua, Kee-Lee, Nelson W.S. Chowa, Iris Chi (2006) Willingness to consider applying for reverse mortgage in Hong Kong Chinese middle-aged homeowners. Habitat International 30 (2006) 716–727.

Creighton, A., Jin, H., Piggott, J. & Valdez, E.A. (2005) Longevity Insurance: A Missing Market, Paper presented at the Singapore Economic Review Conference, Singapore, 4–6August.

Daviddof, T. AND Welke , G. (2007) Selection and Moral Hazard in the Reverse Mortgage Market. Working Paper, Haas School of Business, UC Berkeley.

Fabozzi, Frank J.; Modigliani, Franco (1992), Mortgage and Mortgage-backed Securities Markets, Harvard Business School Press, p. 2,

Feinstein, Jonathan & McFadden, Daniel (1989) The Dynamics of Housing Demand by the Elderly: Wealth, Cash Flow, and Demographic Effects. NBER Working Paper: 1989

Flavin, M. (1981): "The Adjustment of Consumption to Changing Expectations About Future Income," Journal of Political Economy, Vol. 89, No. 5, 974 – 1009.

Flyvbjerg, Bent (2006)Five Misunderstandings About Case Study Research. Qualitative Inquiry, vol. 12, no. 2, April 2006, pp. 219-245.

Foote, B. E. (2007) Reverse Mortgages: Background and Issues, CRS Report for Congress, 26 January, Washington, DC Congressional Research Service.

Frankfort-Nachmias, C., & Nachmias, D. (1992). Research methods in the social sciences (4th ed.) New York: St. Martin's Press.

Fratantoni, Michael C. (1999) Reverse Mortgage Choices: A Theoretical and Empirical Analysis of the Borrowing Decisions of Elderly Homeowners. Journal of Housing Research. Volume10, Issue2.

Glovinski, Shlomy. (2006) Israel Reverse Mortgage. Real Estate Economics

Hall, R.E. (1978): "Stochastic Implications of the Life-Cycle-Permanent Income Hypothesis: Theory and Evidence," Journal of Political Economy, Vol. 86, No. 6, 971 – 987.

Harrod, R. (1948): Towards a Dynamic Economics. London: Macmillan.

Jacobs B. (1986) The National Potential of Home Equity Conversion. The Gerontologist. V26, I5, pp. 496-504.

Kaldor, N. (1955 – 1956): "Alternative Theories of Distribution," Review of Economic Studies, Vol. 23, No. 2, 83 – 100.

Kealey, D.J., & Protheroe, D.R. (1996). The effectiveness of cross-cultural training for expatriates: An assessment of the literature on the issue. International Journal of Intercultural Relations, 20(2), 141-165.

Key, P. James. (1997) Research Design in Occupational Education. publication : Oklahoma State University

Keynes, J.M. (1936) The General Theory of Employment, Interest, and Money. New York: Harcourt, Brace, and Co.

Krueger, D. (2004) The effects of demographic change on aggregate savings: some implications from the life-cycle model, Capital Markets in the Long Term: Demography, Economic Development and Funded Pension Systems, Center for Financial Studies Conference, Center for Financial Studies, Frankfurt, pp. 71-82.

Kuznets, S. (1952): "Proportion of Capital Formation to National Product," American Economic Review, Vol. 42, No. 2, Papers and Proceedings of the Sixty-fourth Annual Meeting of the American Economic Association, 507 – 526.

Lindbergh, Jessica; Nahum, Ruth-Aïda; Sandgren, Sofia (2008) "Population ageing: opportunities and challenges for retail banking", International Journal of Bank Marketing, Vol. 26 Iss: 1, pp.6 - 2

Liondis, George. (2005) Mariner moves into reverse mortgages. Real Estate Economics

Maurice, Weinrobe. (1987) An Analysis of Home Equity Conversion in the RAM Program. Real Estate Economics. Volume 15, Issue 2, June 1987, Pages: 65–78

Mayer, Christopher J. & Simons, Katerina V. (1994) Reverse Mortgages and the Liquidity of Housing Wealth. Journal of the American Real Estate and Urban Economics Association. 1994, V22, 2: pp. 235-255.

Merrill, Sally R. ; Finkel, Meryl ; Kutty , Nandinee K. (1994)Potential Beneficiaries from Reverse Mortgage Products for Elderly Homeowners: An Analysis of American Housing Survey Data, Journal: Real Estate Economics ISSN: 10808620 Year: 1994 Volume: 22 Issue: 2 Pages: 257-299

Miles & Huberman. (1994) Qualitative Data Analysis , p. 40

Mitchell, Olivia & Piggot, John. (2004) Unlocking Housing Equity in Japan. National Bureau of Economic Research Working Paper No.10340. I March, 2004.

Modigliani, F. & Brumberg, R. (1954): Utility analysis and the consumption function: An interpretation of cross-section data. In: Kurihara, K.K (ed.): Post-Keynesian Economics. New Brunswick, NJ: Rutgers University Press.

Ong, Rachel. (2008) Unlocking Housing E quity Through Reverse Mortgages: The Case of Elderly Homeowners in Australia European. Journal of Housing Policy Vol.8,No.1,61–79,March2008

Quercia, Roberto G. (1997) House Value Appreciation among Older Homeowners: Implications for Reverse Mortgage Programs. Journal of housing Research. Volume 8, Issue 2

Rasmussen, David W., Megbolugbe, Isaac F. and Morgan, Barbara A. (1995) Using the 1990 Public Use Microdata Sample to Estimate Potential Demand for Reverse Mortgage Products. Journal of housing Research. Volume 6, Issue 1.

Shiller, Robert & Weiss, Allan N. (2000) Moral Hazard in Home Equity Conversion. Real Estate Economics. 2000, Volume28, Issue1

Venti, Steven F. and Wise, David A. (1989) Aging, Moving, and Housing Wealth, in: D. Wise, ed., The Economics of Aging. University of Chicago Press. p.9-48.

Zheng, Bowen & Chen, Jin (2009) The Research on Reverse Mortgage Based on the Fluctuation of Housing Prices , Journal: ETP International Conference on Future Computer and Communication Year: 2009 Pages: 3-7

Web References,

BBC: China steps up "one-child policy". http://news.bbc.co.uk/2/hi/asia-pacific/941511.stm   accessed date 20100405

Canadian Reverse Mortgage Rules. http://www.unlockequity.ca/qualify.php accessed date 20100428

FHA Reverse Mortgages (HECMs) for Consumers.
http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/hecma
bou   accessed 20110426

Further Implementation of the real estate market advice - regulation and control by
government of Hangzhou. http://www.hzfc.gov.cn/zwgk/zcfgxx.php?id=207078
accessed date 20110422

Hangzhou 1% Population Sample Survey in 2005.
http://www.hangzhou.gov.cn/main/xxbs/T62614.shtml   accessed date 20110423

Hangzhou Health Bureau (HZWS). Life expectancy of Hangzhou residents 2010.
http://www.hzws.gov.cn/site/znss/show.asp?docid=14694 accessed 20110517

Hangzhou Housing Conditions Survey.
http://www.hznet.gov.cn/xxfb/1103/9353.htm   accessed date 20110423

Hangzhou real estate sales price index.
http://www.hzstats.gov.cn/web/tjnj/nj2010/13/nj_.htm   accessed date 20110423

HECM for Purchase.
http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/hecm/faqs_h
ecm   accessed date 20110427

Home ownership rates. http://www.danter.com/statistics/homeown.htm   accessed
date 20110423

Households' Income and Expenditure per Capita in Hangzhou.
http://www.hzstats.gov.cn/web/tjnj/nj2010/13/nj_.htm   accessed date 20110424

International Longevity Center Global Alliance. Global aging report (2009)
http://www.ilcjapan.org/alliance/doc/Global_Aging_Report_090212.pdf

Lab of Elivecity. (2010) Ranking list of Chinese cities' housing price of July in 2010.
http://www.elivecity.cn/html/chengshifangjia/fangjiapaixing/256.Html   accessed
date 20110422

National Bureau of Statistics of China Population and Its Composition. http://www.stats.gov.cn/tjsj/ndsj/2009/indexeh.htm   accessed date 20110422

Reverse Mortgages Calculation made by https://www.benefits-mortgage.com/calculator/entry.do?linkType=mps   accessed date 20110427

Reverse Mortgages for Canadians. http://www.unlockequity.ca/   accessed date 20100428

Reverse Mortgages in Canada – Now Considered a Mainstream Solution. August 6th, 2010 http://www.reversemortgageadvantage.ca/reverse-mortgage-canada-news/ accessed 20100428

Statistic Bureau of Hangzhou. General situation. http://www.hzstats.gov.cn/web/shownews.aspx?id=UqUHIhAFC%2BY=   accessed date 20110422

Statistic Bureau of Hangzhou. People's living. http://www.hzstats.gov.cn/web/shownews.aspx?id=MkkIjQuni9Y=   accessed date 20110422

Statistic Bureau of Hangzhou. Social security. http://www.hzstats.gov.cn/web/shownews.aspx?id=tY7U9xcLE0c=   accessed date 20110424

The past Census of Hangzhou http://www.hzstats.gov.cn/web/tjnj/nj2010/02/nj_.htm accessed date 20110423

Viager and Property in France. http://www.frenchpropertylinks.com/essential/viager.html   accessed date 20110429

World Factbook. https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html   accessed date 20110422

Zhejiang Aging Research Center.(2006) Living conditions of elderly population in Zhejiang Province. http://www.shanghaigss.org.cn/news_view.asp?newsid=4321 accessed date 20110423

Appendix,

Questionnaire about Carrying Out Reverse mortgages Programme in Hangzhou

Reverse Mortgage: A reverse mortgage enables older homeowners to borrow against the equity in their homes without having to sell the home, give up title, or take on a new monthly mortgage payment[93].

Age_____   Education_____

Q1. Income per month (*Yuan almost equal to SEK*):
□Less than 1000   □1000 – 3000   □3000 – 5000   □more than 5000

Q2. The pension you have now (or will get in the future) is _____ to cover your cost of living. (The anticipate pension could be estimated by subjects' career and income.)
□Abundant   □Balanced   □Barely enough   □Insufficient

Q3. How much money per month (*Yuan*) would be sufficient for your retirement life?
□Less than 1000   □1000 – 3000   □3000 – 5000   □more than 5000

Q4. You have been living or will live with _____ when you retired.
□Yourself   □Your wife/husband   □Your children

Q5. What kind of aged care you have chosen or will prefer when you retired?
□Home-based age care (live on children)   □Community aged care (paid by children)
□By own savings or social relive   □Reverse mortgages   □others

Q6. Do you presently have the housing property for reverse mortgages?

---

[93] About Reverse Mortgage. http://www.reversemortgage.org/Default.aspx?tabid=230   accessed date 20110415

□Yes   □No

Q7. If you own a housing property, you would_____.

□Left to your children   □Use for aged care   □Uncertain

Q8. What bother you the most when the reverse mortgages programme has been carried out?

□Family ties would be weakened by RM   □I do not think the current bank system has the ability to well organize the RM   □The process of RM would be redundancy   □others_____

Q9. Would you like to choose reverse mortgage for your retirement if it is possible?

In the condition of that you no need to concern and support your children

□Yes   □No   □Uncertain

In the condition of that you have the responsibilities of supporting your children

□Yes   □No   □Uncertain

Q10. How do you think if the reverse mortgages programme has been widely applied in Hangzhou?

□It would be welcome   □Not sure   □I do not think it is a wise choice