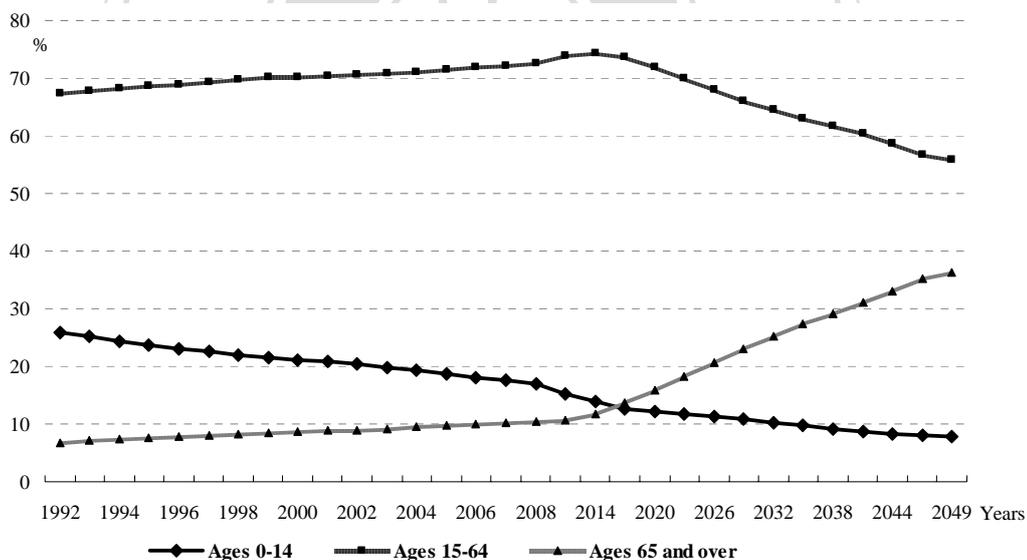# Chapter 1
# Introduction

## 1.1 General Background

According to the Social Indicator announced by the Ministry of Interior in 2007, Taiwan is one of the rapidly aging societies[1] in the world due to the continuously declining fertility rate and the increasing life expectancy. As shown in Figure 1.1, the percentage of population for ages younger than 15 will decrease from 18% to 8%, and the elders of over 65 will rapidly increase from 10% to 35% in coming forty years. Besides, the aging index[2] has gone up to 58% in 2007, which is 1.5 times than the global average. Moreover, it is expected to increase dramatically to 182% in 2029, the next coming two decades; and the old-age dependency ratio[3] will increase up to 35%. It implies that every three adults at least should take care of one elder; the aging society would become a serious problem in the near future.



*Figures after year 2009 are projected.

**Figure 1.1 Percentage of population by ages in Taiwan**

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[1] In Taiwan, the people aged 65 and older account for 7% of the general population in 1993, which is the criterion of an aging society. In 2006, it was 10% in Taiwan, compared with other country in Asia, Japan is 20%, Hong Kong is 12%, Korean is 10%, and China is 8% in 2006.

[2] According to the definition of the indicators of aging population from the U.N., the aging index is calculated as the number of persons 60 years old or above per hundred persons under aged 15.

[3] The old-age dependency ratio is the number of persons 65 years and above per one hundred persons 15 to 64 years old.

The seriously aging population has been getting considerable attention from the Taiwan government. In October 2008, Taiwan government enforced the "National Annuity" system by building the "National Annuity Law." According to the National Annuity Law, people in Taiwan who participate in the pension insurance program and pay the insurance monthly could obtain a life annuity when they reach 65 years old. The amount of the annuity they can get depends on how long they participate in the program.

Although the pension insurance system is in a way expected to cope with the aging problem, high dependency ratio will still drag down the government's financial system and the economic development of Taiwan (Jung, 2007). Fortunately, more and more financial innovative products have been developed to assist the elders by planning their income after retirement, such as Life Annuities, Long-term Care Benefits, Longevity Insurance and Reverse Mortgage (RM). However, in the case of RM, it could be the most feasible scenario due to it has long been developed in Europe and the United States (Mitchell, Piggott, Sherris & Yow, 2006). Reverse mortgage is a mortgage to help the elders convert their home equity into cash. They can receive a payment by using their house as collateral. And as long as they stay alive, they do not need to repay the mortgage and can still withhold ownership and residence of the house. This approach is somewhat like a home-based annuity (Cocheo, 1993).

On the basis of the Life-cycle Hypothesis, people will use their life-time accumulated assets during their retirement years (Ando & Modigliani, 1963; Artle & Varaiya, 1978; Shefrin & Thaler, 1988). That could be the reason why the elders will finance their residence even though the financial planners have recommended that mortgages should be paid off after they retired so that they will have more funds available for other expenses and reduce the risk of not being able to afford the mortgage payments. (Karen, Melinda & Doseong, 2006; Michael, 1999), or choose to draw down their home into smaller ones or with less value (Amanda, 2007; VanderHart, 1994).

The following evidence also demonstrated the feasibility of the application of RM in Taiwan. For the elders in Taiwan, there is a tendency of their major source of the income—coming from themselves or from their children—to go down, yet the income source from the government has a reverse trend (Ministry of Interior, 2005). Besides, among the households by tenure of dwelling, the self-homeownership ratio for people aged more than 65 has reached the 80% standard (Statistical Bureau, 2006). It shows that the Chinese traditional value, concept of raising children to prepare for getting old, has gradually become outmoded. Nevertheless, considering that the income source from the government and oneself take on a large proportion and with the high self-homeownership ratio, it can be pointed out that more and more elders have a lack of income to cover their daily expense, yet they own expensive houses. In other words, one can describe them as "living poor but dying rich" people.

Therefore, the current study suggests that reverse mortgage can be an alternative financial option for elderly people who have opulent houses but limited income. Homeowners in retired life are able to consume their home equity through RM with no need to move out. Meanwhile, RM could be a way to pay for services and support seniors "aging in place" (Redfoot, 1993; Stucki, 2005).

## 1.2 Research Purpose

As mentioned above, in more recent years, we have seen mounting evidence of the feasibility of the application of the reverse mortgage in Taiwan. Although many researchers also consider RM as a way to enhance the economic security preparation for elders, few attempts have been made to discuss the feasibility of RM in Taiwan from both the RM borrowers' and the RM lenders' acceptation and their consideration. That is, for the research in the feasibility of the reverse mortgage in Taiwan, little attention has been given to both the aspect of the supply and the demand. Hence, this study this study aims to offer a complete analysis by considering both these two aspects. In the aspect of the demand, this study attempts to find out the positive and negative factors which affect the intention of the middle-aged Taiwanese homeowners and see the basic need of RM for Taiwanese if it is available in the future.

On the other hand, this study compute the Loan to Value (LTV[4]) by using the simulation analysis in order to explore how much the disbursement that RM lender could offer. Furthermore, the study examines the degree of the income rising by comparing the pre-retirement earning and the income from RM. And then we discuss whether the application of RM in Taiwan could meet the basic need for Taiwanese or not.

In light of these concerns, this article includes the following three main purposes:

(1) To investigate potential market of RM in Taiwan by conducting the questionnaire for middle-aged (aged between 30 and 60) Taiwan homeowners.

(2) To explore the direction and relationship between the feature of the responders and their willingness to apply for RM. And to identify the reasons they are willing or not to apply for RM.

(3) To compute the LTV in RM the lender could offer and examine whether the Income Replacement Ratio (IRR-RM [5]) by applying for RM in different Taiwan place could meet the basic need for Taiwanese or not.

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[4] $\text{Loan to Value ratio} = \dfrac{\text{Mortgage Amount}}{\text{Appraised Value of the Property}}$

[5] $\text{Income Replacement Ratio of RM} = \dfrac{\text{Income receipt from RM}}{\text{Pre - retirement Earning}}$

## 1.3 Research Overview

For these objectives to be achieved, the article is structured as follows. The first section of the article defines what RM is and introduces the concept of RM. The second section is a review of the literature, addressing both the supply and demand aspects of the application of RM. And next, a research methodology is presented, with full detail of the participants in the survey, and of the instrument and procedures used. Results are then presented respectively in two parts: first is a thorough description of the survey of RM and the empirical findings by using binary logistic regression model and second is the execution of the reverse mortgage pricing model and the simulation analysis in order to estimate the LTV and the $IRR_{-RM}$.

Finally, the discussion and conclusion of the results are given with suggestions made for further research. The framework of this study is shown in Figure 1.2.

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                          │    Introduction     │
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┌──────────────────┐      ┌─────────────────────┐      ┌──────────────────┐
│  Demand Aspect   │──────│  Literature Review  │──────│   Supply Aspect  │
└──────────────────┘      └─────────────────────┘      └──────────────────┘
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                          ┌─────────────────────┐
                          │     Methodology     │
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Feasibility Analysis of Demand Aspect

Feasibility Analysis of Supply Aspect

Questionnaire

Model Assumption

Questionnaire Analysis

RM Pricing Model

Binary Logistic Regression

Simulation Analysis
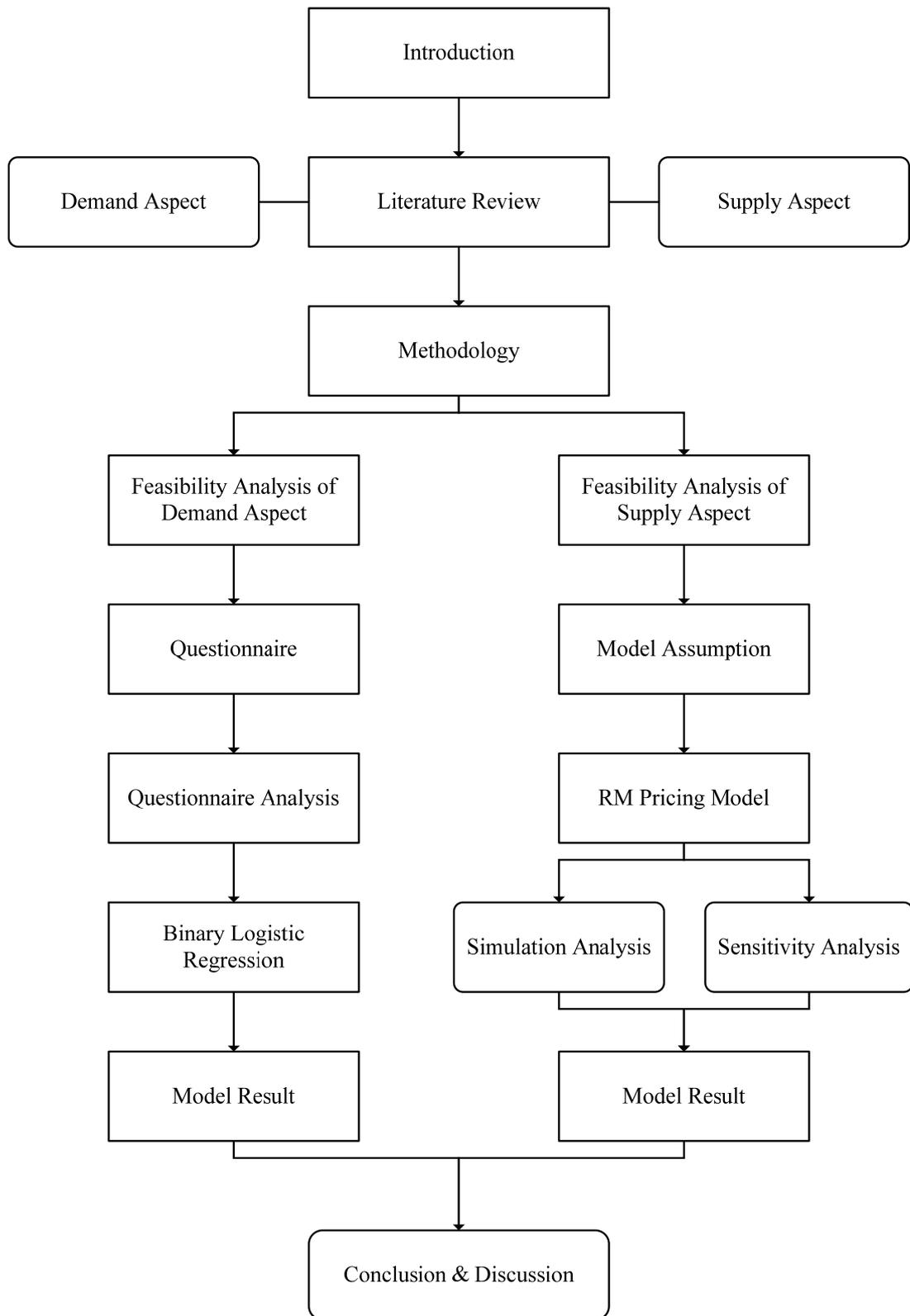
Sensitivity Analysis

Model Result

Model Result

Conclusion & Discussion

**Figure 1.2 Research Framework**