

Risk Management Policy of Reverse Mortgage Loan

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— *Review of* —
**Integrative
Business &
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— *Research* —

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ABSTRACT

This paper integrates the approaches of the AS/NZ Risk Management, SWOT analysis, and in-depth interview to assess the risks derived from the reverse mortgage loan (named the Easy Pension Loan) introduced by the Land Bank of Taiwan and provide corresponding risk management policies for a reference to the bank, its competitors, and the government. The results show that the bank may face twenty-eight risk factors when it executes the Easy Pension Loan, including three extreme risks, thirteen high risks, eight moderate risks, and four low risks. These risk factors can be further summarized as seven major risk sources. This paper also offers risk management policies for the three extreme risks and eight high risks.

Keywords: Reverse mortgage loan, Easy Pension Loan, AS/NZ Risk Management, in-depth interview

1. INTRODUCTION

Affected by medical advances, increase in average lifespan, and declining birth rate, the number of the elderly and its share of the total population have shown rapid growths. According to the definition of the United Nations, people over the age of 65 can be regarded as the elderly while the share of the elderly population over 7% is called the aging society. The statistical digits reveal that the life expectancy of Taiwan is on the rise. In 2016, the average life expectancy was 80.0 years, including 76.8 for male and 83.4 for female. It is estimated that the elderly population share will reach 14% (3.44 million people) at the end of 2018 and it will have already entered the old age community. Obviously, the problems of care, quality of life, and economic support

derived from the elderly population all require government's detailed planning and response.

With the continuous exacerbation of the aging society, the economic sources of life for the elderly are also showing instability. According to the survey of the Ministry of Health and Welfare in Taiwan, the proportion of the elderly who rely on government assistance or subsidies rose from 29.7% in 2009 to 34.3% in 2016. During the same period, the proportion supplied from their own pensions and savings decreased from 32.3% to 27.7%, indicating that the elderly are more dependent on the government and their children's supply. Regarding the living expenses, the elderly who consider their resources are enough decreasing from 63.51% in 2009 to 62.7% in 2016 and a little insufficient increasing from 15.34% to 19.4%. The results indicate that there is a slight increase in the living pressure of the elderly.

Under the Chinese traditional belief of "*There is soil, there is wealth*", the homeownership rate in Taiwan has been higher than in other countries. The report of "the Family Revenue and Expenditure Survey in Taiwan" shows that in 2014, the owner-occupied housing rate was 84% which was 6.2 percentage points higher than it was 25 years ago. It was also higher than 64.8% in the U.K., 67% in Australia, 64.5% in the U.S., and 61.6% in Japan, and it was only slightly lower than 90.3% of Singapore. Despite the relatively high self-owned housing rate of the elderly in Taiwan, many elderly people are short of cash (the most liquidity asset) which leads them to get life into trouble. Thus, in addition to depending on the existing social welfare system and children supporting, providing a channel to revitalize the elderly's real estate is a problem worthy of attention.

The U.S. and Japan have implemented real estate reverse mortgage loans (commonly known as reserve mortgage loans) to finance the economic lives of the elderly for many years. A reverse mortgage loan is an old-age borrower who mortgages its self-use house to a financial institution or government and receives a fixed income monthly (or yearly) during the mortgage period, and the ownership of the house is transferred to the lending institution until the elderly passed away. Obviously, the main difference between a reverse mortgage loan and a traditional home mortgage loan is that the cash flow process is reversed and is an annuity product based on the value of the home (Nakajima, 2012).

Some studies on reverse mortgage loans have focused on how to increase the market of reverse mortgage loans (e.g. Burns, 2014; Cocco and Lopes, 2015; Warshawsky, 2015). For example, Burns (2014) points out that if reverse mortgage loans do support the elderly to their basic retirement expenses and do not become a burden on the government, the government must regulate the market by law and step in

protecting borrowers and assisting lending institutions. Cocco and Lopes (2015) find that lowering the costs associated with reverse mortgage loans, including mortgage insurance premiums and credit line, would increase the attractiveness of reverse mortgage loans. Davidoff et al. (2015) indicate that the demand for reverse mortgage loans is related to the borrower's financial knowledge and the degree of understanding of the product content. If banks can provide the borrower with complete financial knowledge and reduce the complexity of the loans, it will effectively increase the demand for the loans, and then expand the scale economies of the loans.

In Taiwan, the reverse mortgage loan is a new policy and commodity. In February 2013, the Executive Yuan approved the official version of the "*Real Estate Reverse Mortgage Loan Pilot Program*". The Ministry of Health and Welfare plans to process two applications from May 1 to September 30, 2013. On the bank side, it is exclusively executed by the Land Bank of Taiwan. Nevertheless, there are not qualified applicants because the real estate has legal inheritance and has other collateral rights. The first commercial reverse mortgage loan was developed by the Taiwan Cooperative Financial Holding Company in December 2015. Since then, the Land Bank of Taiwan, Taiwan Enterprise Bank, Hua Nan Financial Holding Company, First Financial Holding Company, and Taiwan Bank have continued to undertake different commercial reverse mortgage loans. Until the end of September 2017, 11 banks have undertaken 2007 reverse mortgage loans, the total of 10.8 billion New Taiwan dollars.

Since the development of the reverse mortgage loan in Taiwan is still in its early stage, banks are likely to face considerable risk in the implementation process of the loan. What are the risks that banks may bear as a result of undertaking a reverse mortgage loan? What are the impacts and the corresponding risk management policies? These are all lacking in Taiwan's literature (Yang, 2009). In view of this, this paper intends to identify, evaluate, and analyze the risks that the bank may pose when it undertakes the reverse mortgage of real estate and proposes corresponding risk management policies for high-risk issues.

While 11 banks in Taiwan have offered various reverse mortgage loans with different terms and contents, the differences between them are not significant. The Land Bank of Taiwan is a specialized bank of real estate and has well-experienced in the real estate loans. Thus, this study uses the reverse mortgage loan—Easy Pension Loan handled by the Land Bank of Taiwan as the object of research to assess the risks derived from the loan and develop the corresponding risk management policies. Its conclusions can also be used as a reference for other banks to avoid risks when undertaking similar reverse mortgage loans. Compared to the previous studies (e.g. Boehm and Ehrhardt, 1994; Miceli and Sirmans, 1994; Szymanoski, 1994; Shan, 2011), the approaches

adopted in this study have the following traits. First, the risk management process is established through "*the Australian and New Zealand standard on risk management (AS/NZS 4360:2004)*", which includes establishing a risk management environment, identifying risks, analyzing and evaluating risks, treating risk, monitoring and review, and communication and consultation procedures. Second, one can understand the threats and weaknesses of the Land Bank of Taiwan through *SWOT cross-analysis* and then find out the risk factors that it may face when it executes the Easy Pension Loan and the policies that can reduce the impacts of these risk factors. Finally, through the *in-depth interviews* of the bank's managers, government officers, and specialists on the loan to strengthen the risk assessment and suggestions of risk management policies.

The aim of this study is twofold. First, using rigorous and complete approaches we provide relevant risk management policies for decision-making units of government agencies, the Land Bank of Taiwan, and peer companies. Second, through the bank's effective risk control, three major extension effects can be achieved. At the family level, the elderly are self-sufficient for the medical and daily living needs and can also reduce their child support burden. At the government level, social welfare expenditures can be reduced. At the economic level, real estate can be activated to increase domestic consumption and promote economic growth.

The rest of this paper is organized as follows. Section 2 is the related literature review, including Taiwan's reverse mortgage policy and the risks of the reverse mortgage loan. Section 3 briefly introduces the research methods used to conduct risk analysis and policy recommendations in this paper, including a risk management process through the "New Zealand and Australian risk management framework", the cross-analysis of SWOT, and three-dimensional in-depth interviews by the bank's managers, government officers, and specialists. Section 4 reports the empirical results, and the final section concludes this study and offers several risk management policy.

2. LITERATURE REVIEW

2.1. Reverse Mortgage Loan in Taiwan

A reverse mortgage loan refers to an old fund demander who mortgages a house under his own name to a lending institution or government unit, and the lending institution pays a fixed monthly or annual amount within the loan period until the loan period expires. After the borrower ends his life, the lending institution will dispose of the collateral to repay the loan or the borrower's heir will pay off the loan to retrieve the collateral. Since applicants for reverse mortgage loans are the elderly persons who are retired, the only protection for the banks comes from the guarantee of claims which is

the borrower's collateral. Therefore, reverse mortgage loans are risky for banks.

In Taiwan, the Executive Yuan executes the official-type reverse mortgage loan during the period from March 1, 2013 through December 31, 2017. According to the statistics of the Financial Supervisory Commission in Taiwan, at the end of 2017, 11 banks have launched different commercial-type reverse mortgage loans, and a total of 2,007 reverse mortgage loans approximately amounted 10.8 billions of NTD have been signed. Except for the tiny differences in the age of application, the amount of loans, and the interest rate on loans, the situation in which 11 banks apply for commercial-type reverse mortgages is similar. Therefore, this study selects the Land Bank of Taiwan (hereafter the Land Bank) as the research object, and the conclusion can be used as a reference for other peer banks.¹

The Land Bank launched the commercial reverse mortgage loan—Easy Pension Loan on February 18, 2016. The contents of the loan contract are listed as follows:

1. Application qualifications: All natural persons who have reached the age of 63 and have normal credit records can apply. For those who are 65 years of age or older, the period of the loan plus the age must not be less than 95 years, and the maximum loan period is 30 years. For those who are 63, 64 or 65 years old, the loan period will be 30 years.

2. Application purposes: To provide funds for the safety of living in old age, and can also be used freely.

3. Collateral: The house must be separately owned by the borrower. More specifically, the use registration of the building registration book should contain the words of "residential" and "commercial use".

4. Approved loan-to-value (LTV): For houses located within 1,000 meters of an operational MRT station in Taipei City and New Taipei City, the maximum loan amount is 70% of the authorized price or 90% of the forecasted price. For houses in the remaining regions, the maximum loan amount is 60% of the authorized price or 90% of the forecasted price.

5. Collateral setting: According to the authorized price, the borrower shall set the first priority mortgage of the house to the bank. If the amount of the approved loan does not exceed 50% of the authorized price, the maximum amount of the setting can be adjusted according to the approved amount plus 40% of the amount.

6. Renewal on expiration date: At the end of the loan contract, the borrower will have to extend the loan term for a maximum of three years with the consent of the bank.

¹ The SWOT analysis of the Land Bank in the following section can support the reason we choose this bank as the research sample.

7. Expenses: The lending start-up fee is 5000 New Taiwan dollars (TWD), credit checking fee is 200 TWD per person, and credit investigation fee of the bill is 100 TWD per person. The above fees do not include lawyer consultation fees, land scrivener fees, setting fees, and annual fire and earthquake insurance premiums during the loan period.

8. Guarantor: The borrower may provide a general guarantor for the purpose of strengthening his credit conditions and needs to assign a notifying obligor.

9. Upon the expiry of the loan, the heir can repay the principal and interest of the loan and obtain the collateral; or the land bank will dispose of the collateral to repay the loan.

2.2. The Risk of Reverse Mortgage Loan

In Taiwan, the commercial-type reverse mortgage loan is still in its infancy stage of development. Therefore, there is no enough historical data available for evaluating what risks the banks may face in undertaking the loan. In light of this, this section is intended to explain the probable risks from the review of foreign experience and literature.

According to the experience of various countries, Kumar et al. (2007) find that reverse mortgage loans may have the following risks, including the non-recourse guaranty risk, crossover risk, longevity risk, adverse selection risk, moral hazard, and litigations. Crossover risk can be further divided into occupancy risk, liquidity risk, interest rate risk, and home appreciation risk.

Kim (2015) uses VAR and VARX models to evaluate the impact of economic factors on reverse mortgage loans. The empirical results indicate that the risks originated from reverse mortgage loans less occur during the periods of low interest rates and high appreciation rates of the house. However, the longevity of the borrower, the time exposure of the interest rate, and the depreciation rate of the house will be uncertain factors for the sustainability of the loans. Moulton et al. (2015) analyze the behavior of 30,000 elderly Americans who applied for reverse mortgage loans between 2006 and 2011. The empirical results show that the borrower with a low credit score at the time of bidding has a higher probability of arrears in the future (including unpaid taxes and premiums). Therefore, setting a threshold of the credit scoring is required. For borrowers with poor credit score (i.e., under the threshold), part of the loan amount owed by the loan agency (HECM) may be reserved for future related taxes and insurance premiums to reduce the effect of their default on the lending institution.

To my best knowledge, no document (especially in Taiwan) has evaluated the risks of reverse mortgage loans that the banks may face from the terms of the contract and then has proposed the corresponding management policies for different risk levels. Thus, this study simultaneously employs three approaches – AS/NZ Risk Management,

SWOT analysis, and in-depth interview – to conduct the risk assessment and the associated risk management policy suggestions, which can strengthen the robustness of the results.

3. METHODOLOGY

3.1. Risk Management Framework

To assess the possible risks of the Land Bank's reverse mortgage loan and to offer the corresponding risk management policies, this study employs the risk management framework developed by the Australia and New Zealand National Standard (AS/NZS 4360:2004). This study conducts “in-depth interviews” with industry experts, officials, and scholars and the SWOT analysis to further strengthen the robustness of risk management, including the identified risk factors and risk management strategies.

The risk management process of the Australia and New Zealand National Standard (AS/NZS 4360:2004) contains six important steps, which can be briefly described as follows:

Establishment of risk management environment

The first step in risk management is to identify the contents of the management environment, including risk assessment and acceptance rules. The specific contents are as follows: 1. Confirm the external environmental factors: Understand the external (systematic) environmental conditions, mainly to consider relevant stakeholders' goals and issues of concern. 2. Confirm the internal environmental factors: Refers to the internal environmental characteristics of an organization's achievement of operational goals, including the organization's internal culture, operating procedures, and various departmental structures and strategies. The purpose of risk management is to ensure that the organization achieves its operational objectives and adopts different execution plans or operating methods based on different objectives so as to avoid or mitigate the obstacles caused by the risks. 3. Consider the organization's financial situation, operations, and systems, as well as legal and financial supervision and other factors.

Risk identification

The second step is to identify the sources, causes, and possible consequences of risks in the process of an organization's operations. These risks may cause damage or hindrance. Notably, the loss of opportunities is also treated as a source of risk.

Organizations should use appropriate risk measurement tools and most up-to-date information to identify risk factors, such as the SWOT analysis or risk-enumeration

approach, and appoint the ones familiar with risk management to execute the identification of risks.

Risk analysis and evaluation

The main purpose of risk analysis is to establish standards and benchmarks for risk measurement and to assess whether risks need to be dealt with and choose the most appropriate method to manage the risks. The possible sources of risks and their positive or negative effects on the achievement of the organization's goals also need to be considered. In conducting the risk analysis, the score of risk and the grade of risk should be determined according to the combined influence of the probability of risk occurrence and the severity of risk occurrence.

In literature, the 3 by 3 matrix, 5 by 5 matrix, or N by N matrix is used to assess the probability of risk occurrence and the severity of risk occurrence. However, more researchers use the 3 by 3 matrix to determine the score of risk. When the risk event is not likely to occur within one year, the probability of risk occurrence is low, which is recorded as 1 point. If the risk event may occur within one year, then the probability of risk occurrence is moderate, and the score is 2 points. Finally, if the risk event is likely to occur within one year, the probability of risk occurrence is high, and the score is 3 points. As for the degree of impact after the occurrence of the risk, it can be measured by three levels of severity: minor, normal, and serious. The score of risk can be formed according to the product of the probability of risk occurrence and the severity of risk occurrence.

Based on the 3 by 3 risk matrix, we can further construct a risk scatter matrix as shown in Table 1. The matrix can show the grade of risk events, and then can decide whether to handle or monitor them according to the risk scores and the priority of the risk treatment. For the high risk, managers need to handle the risks and continuously inject resources and monitor the risks. For the moderate risk, managers accept and continuously monitor the risks. For the low risk, managers accept the risks and handle them in a normal procedure. For the extreme risk, managers need to work hard to deal with the risks.

Risk treatment

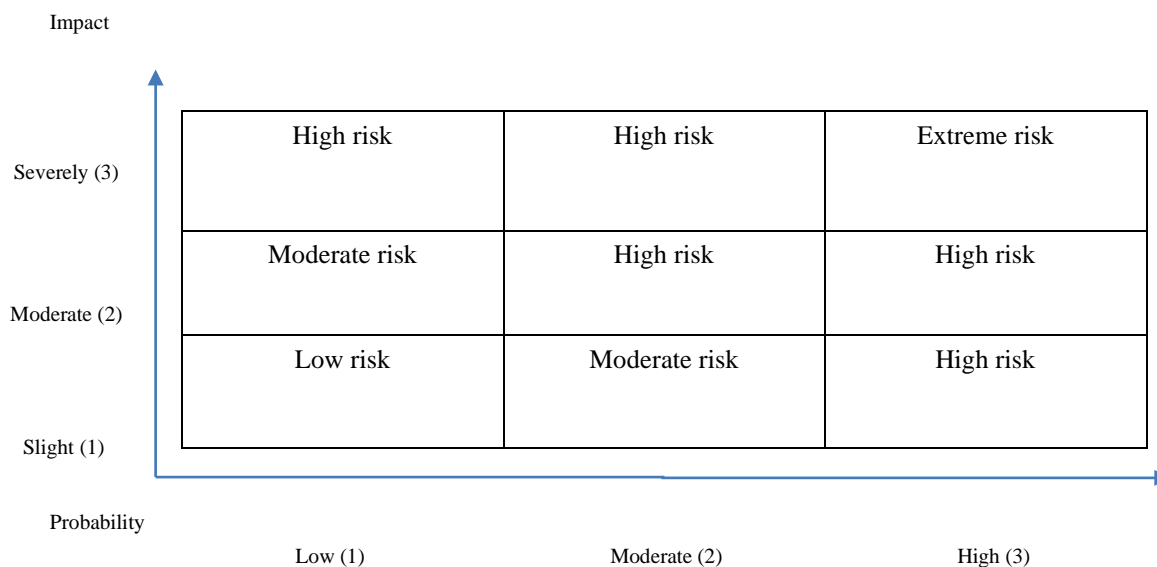
Risk treatment is a cyclical process that includes the assessment of the optimal risk treatment and the determination of whether the remaining risk is within tolerance. If the remaining risk is unbearable, it should look for other ways to deal with risks different from the design, and monitor the effectiveness of treatments (Conrow, 2003). Regarding the methods to deal with risk, if the risk is within tolerance, do nothing and accept the

risk. If the risk is beyond tolerance, but the cost of the treatment is higher than the benefit, then avoid it. The decrease in the probability of risk occurrence is another method to manage risks, for example, strengthening internal control to lessen risks. In practice, the risk can be transferred to a third party, for example, purchasing insurance.

Monitoring and review

Monitoring and review mean regular and non-regular checking and monitoring related risk events, including all the risk-handling procedures, monitoring the effectiveness of existing risk management methods as well as the impact of changes in external and internal environments. Managers need to gain experience and change the priority of processing risk from improper management techniques and pay more attention to possible new risks, and timely announce the results of monitoring and review.

Table 1 Risk Map



Communication and consultation

The perception and identity of risk may be different due to differences in the positions, concepts, and needs of the agents within the organization. Communication and consultation can promote communication between stakeholders and create a consensus. That is, the senior managers of organizations should do their best to promote the full communication and consultation of all stakeholders on risk management.

3.2. SWOT Analysis

The method of analyzing the competitive situation is one of the basic analysis tools for conducting a company's marketing. To obtain enough information, a company can evaluate the situation it faces and takes appropriate actions to maximize its opportunities and avoid possible threats.

The SWOT analysis, proposed by Humphrey (2005), can be divided into two main categories: internal factors and external factors. Internal factors include the strengths and weaknesses of the company, and external factors include the opportunities and threats to the company. Strengths are the features that give the business its competitive advantages in manpower quality, product characteristics, production technology, and marketing strategy; while weaknesses are the features that a company needs to overcome in order to improve its performance. Opportunities are elements that the company sees in the external environment and that it could pursue in the future to generate value. Threats are elements in the external environment that could prevent the company from achieving its goal or creating value. Critical internal factors include an organizational structure, culture, image, and resources; while important external factors cover social and economic environment changes, customers, competitors, suppliers, partners, and government regulations. Roger and Jerry (1991) indicate that through the SWOT analysis, a company's policymakers can identify, collect, and monitor the strengths, weaknesses, opportunities, and threats from the existing internal and external environments.

This paper uses the SWOT analysis approach to investigate the advantages, weaknesses, opportunities, and threats of the Taiwan Land Bank when it undertakes the reverse mortgage loan. We can use the results of the analysis to provide a reference for suggesting appropriate risk management policies.

3.3. In-Depth Interviews

In-depth interviews refer to the important factors that can be achieved through interviews with experts (Morse, 1994). Its purpose is to analyze the real insider of the interview, the possible impact and the way to respond, in order to seek for future development and solutions. Its basic motivation stems from the enthusiasm of the interviewer to seek the truth, so it is necessary to draw deeper into the inner world of the interviewee and discover its true view of the event. In view of this, we must understand and analyze the entire interview environment, including the external environment and internal resources.

To conduct in-depth interviews, the interviewer needs to fully understand the background of the respondent and integrates the background into the research issues. The procedures of the in-depth interview include adjusting the interviewer's mentality,

pre-interview preparations, pre-visitation work, visiting work, grasp the atmosphere of the interview, and really presenting the interview results (Morse, 1994; Robson, 2011). In addition, in-depth interviews must achieve certain levels of reliability and validity. Reliability refers to the degree of difference in the degree of consistency produced by the measurement. As for validity, it refers to the extent to which the measurement results can be matched with the results that the researcher wants to measure. The method is to use the survey to determine the answer and an error-free event measurement and to compare the correlation between the two or the degree of compliance with each other.

4. EMPIRICAL RESULTS AND ANALYSIS

4.1. SWOT Analysis

This section reports the results of the SWOT analysis as the Land Bank of Taiwan undertakes the reverse mortgage loan, named the Easy Pension plan.

Strengths

First, the Land Bank of Taiwan, a state-owned bank, was set up in 1946 and is a specialized bank designated by the government for undertaking real estate loans. Based on the solid and professional experience for providing real estate loans, Taiwan Ratings Corporation (2016) affirms the long-term rating of on the Land Bank of Taiwan is twAA, and the short-term rating is twA-1+. Evidently, the rating outlook is stable. Now, the Land Bank has the highest market share in mortgage loans in the country and has developed the leading commodities in real estate trusts and financial asset securitization.

Second, the Land Bank has a leading position in assets, deposits, and loans in Taiwan's financial market. According to the statistical data of the Financial Supervisory Commission in Taiwan (2017), the Land Bank's asset size is the fifth largest, and the total amount of deposits and loans is the third largest, for its domestic banks.

Third, the Land Bank has many domestic channels, strong customer base, and trust by the public. Moreover, its operating style is stable and reliable.

Fourth, the Land Bank has good risk control and rich experience in real estate credit management.

Weaknesses

First, the amount of capital is relatively insufficient. The report of the Financial Supervisory Commission in Taiwan (2017) shows that the Land Bank's net worth ranks the last but one in the eight state-owned banks. Subject to the constraint of tight national finances, the State Treasury could not provide the capital injection, which makes the

business be unable to expand and limit the establishment of branches abroad.

Second, the Land Bank is a pure state-owned bank; therefore, all annual budgets need to be submitted to the Legislative Yuan for consideration in advance. That is, the use of funds is lack of flexibility compared to the private-owned banks.

Third, the operation of the Land Bank is conservative but stable.

Fourth, loans over-concentrate in real estate; therefore, profitability and asset quality are vulnerable to the business cycle of the economy.

Opportunities

First, the relaxation of law and “the New Southbound Policy” promoted by the government should increase the Land Bank’s operating opportunities.

Second, the increasing competition in the domestic financial environment has forced public banks to seek new changes to meet the needs of the new trend. For example, the new commodities such as mobile credit cards and “Taiwan Pay” combined with the Land Bank’s big market share in the real estate loan will have enormously potential business opportunities.

Third, with the basis of the official bank and a solid customer base, it can diversify its efforts to operate new kinds of businesses.

Threat

First, the operating is relatively conservative and needs to meet the government's policy tasks so that profit and market share are gradually caught up by private banks.

Second, both the software and hardware upgrades and the introduction of foreign talents are constrained to restrictions of the relevant laws and regulations that making it impossible for the Land Bank to be more flexible and innovative in their operations, and it is difficult to make strategic alliances with international financial conglomerates to expand international markets.

In sum, this study considers the internal weaknesses, external threats, and the disappearance of new opportunities as the risks.

4.2. In-Depth Interview Design

In addition to using the Australia-New Zealand risk framework to assess the risks that the Land Bank may incur in undertaking the Easy Pension Loan, this paper also adopts an in-depth interview method to ask interviewees to provide opinions on the risk factors and further seek to avoid or reduce them. Table 2 lists the interviewees in the in-depth interviews of this study, including six experts in industry, government, and academia.

Table 2 Representative Interviewees

Position	Identity	Code
Head, the Financial Management Committee	Official	A
Director, Department of Social and Family Affairs, Ministry of Health and Welfare	Official	B
Professor at University	Scholar	C
Professor at University	Scholar	D
Director, the Personal Finance Department of Land Bank	Industrial representative	E
Manager, the branch of Land Bank	Industrial representative	F

In addition to the assessment of the risk value of each risk factor or event, the other interviewed items are shown in Table 3.

Table 3 Interview Questions about the Easy Pension Loan

Question 1	The loan cost of the bank will rise as the interest rate increases. How will the bank respond?
Question 2	How will the bank ensure the claims once the amount of the claims exceeds the value of the collateral?
Question 3	If the borrower fails to properly maintain the house or maliciously destroys it, the collateral will be damaged. What precautions should banks take?
Question 4	With the expansion of the reverse mortgage loans, the bank will hold a large number of real estate to be disposed of when the loan expires. How will banks respond to the probable liquidity risk?
Question 5	The bank only assesses the value of the collateral when the borrowers apply for loans. If the real estate market falls, how should the bank respond to the devaluation of the collateral?
Question 6	When the loan expires, if the loan cannot be renewed due to the constraint of the mortgage limit, the borrower will be unable to repay the loan. If the bank recovers the house according to the contract, it may cause a negative social perception. How will the bank respond?
Question 7	According to the enforcement rules of the Easy Pension loan, what are the risks the bank may face?
Question 8	According to the enforcement rules of the Easy Pension loan, what are the shortcomings that need to be improved?

4.3. Risk Analysis of the Easy Pension Loan

Risk factors

Before conducting the risk assessment of the Land Bank's Easy Pension Loan, this

paper first executes risk register and identifies risk items and risk scenarios based on the contract content and the experience of the undertaking bank. There are 30 clauses for the contract, which generates a total of 28 risk items (coded as R(1) to R(28)). Table 4 lists the risk items, risk scenarios, and their corresponding contract clauses.

Table 4 Risk Registration

Risk item	Risk scenario	Corresponding contract clause
R(1) Tracking the record of cash withdrawals	In the event that multiple-period disbursements are not used, the bank should pay attention to the reasons why the borrower has not used them.	1
R(2) Negligence of notifying obligor	If the borrower dies or is incapacitated and is guarded by another person, the notifying obligor does not find the change and notify the bank, or the notifying obligor dies would create a risk of over-disbursement.	2
R(3) Residual value of collateral	If the borrower delays the payment of interest, and the cumulative principal and interest exceeds the residual value of the collateral, and the borrower has no heir or no other assets available for repayment, it will result in an unrecoverable claim risk of the loan.	3
R(4) Vicious competition among peers	Low-interest rates competition among peers will increase the bank's operating costs when the market interest rates rise.	4
R(5) Interest rate fluctuation risk	If the interest rate rises significantly, the bank's capital cost will rise.	4
R(6) Incomplete information transmission and communication	Impeded information between the bank and the borrowers will result in disputes regarding the changes in contract contents.	5
R(7) Insufficient credit guarantee	On the expiration date, if the cumulative principal and interest exceed the residual value of the collateral, bank's claims cannot be fully recovered through the disposal of the collateral.	6
R(8) Negligence of collateral management	The borrower neglects to maintain the collateral. For example, failure to buy fire and earthquake insurances will prevent the collateral from being in a status of safety.	7
R(9) Poor social perception caused by forced deductions	The bank imposes deductions from the borrower's account for the relevant overdue money, which leads to poor social perception if the borrower's live is interrupted.	9
R(10) Borrower's other debt risks	Due to the borrower's credit problems or civil and criminal procedures, the bank's claims are influenced.	10
R(11) Loss in the collateral claim	Borrower's other debts or external forces cause the bank to face the risk of irrecoverable claims.	11

R(12) Guarantor's ability to guarantee the contract	Due to the guarantor's credit problems or civil and criminal procedures, the guarantor's ability to guarantee the contract is affected.	12
R(13) Insufficient loan repayment	On the expiration date, if the collateral or the borrower's (or the guarantor's) property is insufficient to repay the loan, causing damage to the bank's claims.	13
R(14) Poor preservation or maintenance of collateral	The collateral is mostly used by the borrower. If it is preserved inadequately or damaged, it will cause damage to the bank's claims.	15
R(15) Borrower's personal data leaked	The bank fails to keep the personal data of the borrower confidential, causing damage to the borrower and the bank's reputation.	16
R(16) Fierce or illegal collections	The outsourcing company adopts a more fierce or illegal collection behavior, which hurts the bank's social image and reputation.	17
R(17) Borrower's personal data leaked or used illegally	The disclosure or other illegal purposes of customer information by the outsourcing company has hurt the bank's social image and reputation.	18
R(18) Inconsistent between borrower's needs and contract contents	The conditions listed in the contract cannot meet the needs of the vast majority of borrowers, making it difficult to expand this business.	19
R(19) Preservation of transaction details	The heir of the borrower suspects the truth of the account details between bank and borrower.	20
R(20) Preservation of transaction certificates	Borrowers' relevant documents of the loan are stolen or occupied.	21
R(21) Loss of contact with the borrowers	The change of the communication method of the borrower or the notifying obligor does not inform the bank, and the bank could not contact the borrowers and inform important matters.	22
R(22) Preservation of notice voucher	Changes in the communication methods of the borrowers and notifying obligor do not pass to the bank, resulting in a risk that the customer cannot object within the time limit and the rights are impaired.	24 & 25
R(23) Before the due date risk	If the borrower has an abnormal repayment or is under guardianship and assistantship, or there are other circumstances that are unfavorable to the bank's guarantees, there will generate the risk before the due date.	27
R(24) Disposal of collateral	On the expiration date, if the residual value of the collateral is insufficient to repay the cumulative principal and interest, and the bank implements the fluidity contract, resulting in difficulties in the disposal of collateral.	28
R(25) Longevity risk	If the loan period expires, and the borrower is still alive, the bank needs to handle the extension of the loan and the revaluation of the collateral. However, if the residual value of the collateral is not enough to be extended, it may lead to a loss of life of the	29

	borrower.	
R(26) Breach of contract specifications	Borrowers violate the specifications of the loan contract.	22 & 30
R(27) Liquidity risk	Holding a large amount of real estate may generate a risk of lack of liquidity.	28
R(28) Demand risk	The concept of traditional inheritance is a crucial obstacle to the expansion of the loan.	Easy Pension loan

Risk assessment

After completing the registration of the risk factors, we can then assess the risk using the probability of risk occurrence and the severity of risk occurrence. Each risk factor is evaluated using a three-point scale. The probability of a risk occurrence is specified based on the judgment of the damage caused by the execution of the Easy Pension Loan in the past year and environmental changes in the next 1 to 3 years. Let P1 represent a low probability of occurrence (0%-30%), P2 a medium occurrence probability (31%-60%), and P3 a high probability of occurrence (61%-100%).

The impact of risk is the cost, quality or timeliness that may affect the execution of the loan. Assessors can measure the risk impact according to different indicators, including the shocks on bank's image, property loss, casualties, appeal/petition/complaint, information services, administrative operations, and geographical range, and select one of the most severe shocks as the basis for classifying the impact level of risk. This study evaluates the impact degree of the risk items based on the criteria listed in Table 5.

Table 5 Measure of Risk Impact

Impact level	Impact measure
Serious (I3)	<ol style="list-style-type: none"> 1. Negative news reported by international media 2. Financial loss over one hundred million TWD 3. Death to one or more persons 4. Appeal, petition or complaint more than 10 persons 5. Cessation of information service for more than 3 days 6. Interruption of administrative operation for more than 5 days 7. Damage area expanded outside the bank
Moderate (I2)	<ol style="list-style-type: none"> 1. Negative news reported by Taiwan's media 2. Financial loss between 10 million and 100 million TWD 3. Serious injuries to one or more persons 4. Appeal, petition or complaint for 3-10 persons 5. Cessation of information service for 1-3 days 6. Interruption of administrative operation for 3-5 days

	7. Damage area extended to the whole bank
Minor (I1)	1. Negative news reported by regional media
	2. Financial loss less than 10 million TWD
	3. Minor injury to one or more persons
	4. Appeal, petition or complaint less than 3 persons
	5. Cessation of information service for less than 1 day
	6. Interruption of administrative operation for less than 3 days
	7. Damage limited to a specific branch

Note: These risk measures are suggested by the interviewees.

Finally, the "value at risk" of a specific risk event is measured by multiplying the probability of occurrence of the risk with the impact of the risk, as shown in Table 6. Notably, the assessment of the value at risk comes from the SWOT analysis of the Land Bank and the comprehensive opinions of the representative interviewees to enhance the robustness of the conclusion.

Table 6 Risk Assessment of the Easy Pension Loan

Risk items	Probability(a)	Influence (b)	Value at risk (c=a*b)	Supported by reviewee
R(1): Requisition records	P1	I1	1	B、 D、 E
R(2): Obligors	P1	I2	2	B、 D、 E、 F
R(3): Collateral residual value	P2	I3	6	A、 B、 C、 D、 E、 F
R(4): Cut-throat competition	P3	I1	3	B、 C、 D、 E
R(5): Interest rate fluctuation risk	P3	I2	6	A、 B、 C、 D、 E、 F
R(6): Insufficient debt security	P2	I2	4	A、 D、 E、 F
R(7): Incomplete communication	P1	I1	1	A、 D、 E
R(8): Lack of management of collateral	P1	I2	2	A、 B、 D、 E
R(9): Forced deductions	P1	I1	1	B、 C、 F
R(10): Borrower's other debt risks	P1	I3	3	A、 B、 D、 E
R(11): Guaranteed claims are not guaranteed or lost	P1	I3	3	B、 C、 D、 F
R(12): The guarantor cannot continue to provide guarantee	P1	I2	2	A、 D、 E
R(13): Insufficient loan repayment due	P2	I2	4	B、 C、 D、 E

R(14): Collateral maintenance status	P1	I2	2	A, C, E
R(15): Borrower's personal data leaked	P2	I2	4	A, B, D, E
R(16): Outsourcing risk	P2	I2	4	B, D, E, F
R(17): Accounting data outsourcing risk	P1	I2	2	D, E, F
R(18): Advertising and contract content	P1	I2	2	D, E, F
R(19): Current transaction details are saved	P1	I1	1	B, C, E
R(20): Loan related documents are saved	P1	I2	2	A, E, F
R(21): The borrower is missing	P1	I2	2	A, D, F
R(22): Notice matters	P1	I2	2	B, D, E
R(23): Borrowing early maturity risk	P2	I3	6 6	A, B, C, D, E, F
R(24): Collateral risk	P3	I3	9	A, B, C, D, E, F
R(25): Borrower longevity risk	P3	I3	9	A, B, C, D, E, F
R(26): Infringement of contract content	P2	I2	4	A, D, F
R(27): Liquidity risk	P3	I3	9	A, B, C, D, E, F
R(28): Demand risk	P3	I2	6	A, B, C, D, E, F

Notes: P1, P2, and P3 represent low probability (0%-30%), moderate probability (31%-60%), and high probability (61%-100%), respectively. I1, I2, and I3 represent the influence are minor, moderate, and serious, respectively. Value at risk=Probability*influence. The respondents are official (A, B), scholar (C, D), and industrial representative (E, F).

The results of the risk assessment in Table 6 can be converted into a risk map, as shown in Table 7. In Table 7, the risk items R(24), R(25), and R(27) reveal an extreme risk when the Land Bank executes the Easy Pension Loan. Therefore, the bank must pay attention to these risk events. R(24) and R(27) are linked to Article 28, and R(25) is linked to Article 29. In addition, the risk items R(3), R(5), R(23), and R(28) generate a high risk with 6 points of value at risk; R(6), R(13), R(15), R(16), R(22), and R(26) generate a high risk with 4 points of value at risk, and R(4), R (10), R(11), and R(23) have a generate a high risk with 3 points of value at risk. The remaining risk items belong to the moderate risk and low risk. As long as the scope of responsibility of the management is clearly defined, these risks only need to be properly monitored.

Table 7 Risk Map

Risk impact	Serious	R(10), R(11)	R(3), R(23)	R(24), R(25), R(27)
	Moderate	R(2), R(8), R(12), R(14), R(17), R(18), R(20), R(21)	R(6), R(13), R(15), R(16), R(22), R(26)	R(5), R(28)
	Minor	R(1), R(7), R(9), R(19)		R(4)
		Low (0%~30%)	Moderate (31%~60%)	High (61%~100%)
		Risk occurrence probability		

The risks mentioned above may come from internal operations and changes in the external economic and social environments. The former is called internal risk or unsystematic risk, while the latter is called external risk or systematic risk. They are summarized in Table 8.

Table 8 Risk Classification: Systematic and Unsystematic Risks

Risk classification	Corresponding risk item
Unsystematic risk	
Collateral valuation risk	R(22), R(4), R(1)
Collateral realization risk	R(14), R(7)
Collateral maintenance risk	R(25), R(11),R(8), R(14)
Goodwill risk	R(15), R(16), R(17), R(9)
Debt exemption risk	R(23), R(13),R(12), R(2), R(14),R(7), R(9)
Liquidity risk	R(24), R(27), R(11)
Systematic risk	
House price volatility risk	R(14), R(7)
Borrower's life cycle risk	R(23)
Interest rate risk	R(5), R(6), R(4)

Since the Easy Pension Loan involves banks, borrowers, guarantors, notice obligors, and consulting lawyers, the risks faced by the Land Bank can be classified as the collateral-related risk, borrower and guarantor risk, accounting-related risk, economic environment risk, contract and information risk, and outsourcing risk. Table 9 shows the results of the classification and the major risk sources. The largest risk source is the economic environment risk, which includes the extreme risk items R(24) and R(27) and high risk items R(23), R(28), R(6), R(4), and R(5).The second largest risk

source is the borrower and guarantor risk, covering eight high risk items R(25), R(10), R(12), R(14), R(20), R(21), R(22), and R(26). Finally, the third largest risk source is the collateral-related risk, including four high risk items R(25), R(22), R(3), and R(11).

Table 9 Classification of the risks derived from the Easy Pension Loan

Risk source	Corresponding risk item
1. Collateral-related risk	R(25), R(3), R(13), R(22), R(11), R(14), R(7)
2. Borrower and guarantor risk	R(25), R(22), R(26), R(10), R(12), R(14), R(20), R(21), R(1)
3. Accounting-related risks	R(5), R(16), R(4), R(19)
4. Economic environment risk	R(24), R(27), R(23), R(28), R(5), R(6), R(4),
5. Contract and Information Risk	R(2), R(8), R(17)
6. Outsourcing risk	R(15)

4.4. Risk Management Policy

According to the risk assessment results in Table 6, this study proposes the following risk management policies for 3 extreme risks and 13 high risks.

To avoid or reduce the extreme risks, the Land Bank should take the following policies. First, the bank can delegate professional asset management companies to dispose of the collateral. If it is insufficient to repay, the government should set a fund subsidy or introduce an insurance mechanism to share the risk. Second, the bank should make reference to the life expectancy to establish the optimal period of the loan. If the collateral is insufficient in the extension period, the government will set up a fund subsidy or introduce an insurance mechanism to share the risk. Third, it is best to choose collaterals with good resistance to falling and easy to release to ensure that the bank can easily dispose of the collaterals.

Regarding the management of the high risks, the suggested policies include:

1. Calculate the credit line of the loan based on the life span of the collateral and reasonable expense so that the total amount of principal and interest for the loan meets the current residual value of the collateral. (R(13))

2. Precisely calculate the reasonable expenses involved in this loan and set the corresponding interest rates for the purpose of facilitating the long-term operation of the loan. (R(4))

3. Regularly check the mortgage setting and inquire the credit of the borrower. If there are abnormal changes, the bank should take protection strategies, such as stopping the appropriation and disposing of the collateral to ensure the claims. (R(3), R(10), R(11), and R(23))

4. Regularly re-evaluate the collateral. If the cumulative principal and interest payments exceed the present value of the collateral, the government may consider setting up a special agency to raise financial resources, or introduce an insurance mechanism to share the risks of bank's operation and the borrowers' live. (R(5))

5. Carefully select legitimate collection companies and inspect the collection business irregularly. (R(16))

6. Properly maintain the personal information of the borrowers and their transaction data with the bank so as not to affect the rights of the borrowers. (R(15))

7. Relax the applicant age, application fee, and redeeming conditions of the collateral to increase borrowers' application willingness. (R(28))

8. Use more popular and easily accessible media to announce or notify the alternation items and keep notification records for inquiries and reducing disputes.

5. CONCLUSION

This paper integrates the approaches of the AS/NZ Risk Management, SWOT analysis, and in-depth interview to evaluate the risks stemmed from the reverse mortgage loans introduced by the Land Bank of Taiwan and provide corresponding risk management policies for a reference to the bank, its competitors, and the government.

The empirical results show that the Land Bank of Taiwan may face 28 risk events (or items) among which 3 are extreme risks, and 13 are high risks. If all risk items are classified, they can be divided into seven risk sources which are collateral-related risks, borrower and guarantor risks, accounting-related risks, economic environment risks, contract and information risks, and outsourcing risk. The three major risk sources that the Land Bank of Taiwan may face are risks derived from the economic environment, borrower and guarantor, and collateral.

Three main policy recommendations for managing extreme risks include: (1) entrusting professional asset management companies to dispose of the collaterals; (2) officially setting up a fund subsidy or introducing an insurance mechanism to share the risk due to insufficient collaterals; (3) choosing collaterals with good resistance to falling and easy to take off to ensure that the bank can easily dispose of the collaterals. Seven policy recommendations to manage the high risks are also offered.

Since the policy of the reverse mortgage loan has just been adopted, property market analysts and/or representatives from the real estate sector have not been able to understand the connotation of the policy and the actual problems encountered, so this paper does not invite them to participate in the in-depth interview. In any case, in the future, they can be invited to become the subject of in-depth interviews and refer to their

suggestions. The analysis framework constructed in this paper can be easily applied to other commercial banks even though they have different capital or asset scales. However, to control the loan risks, they can set the ratio of total amounts of reverse mortgage loans to total assets (or capital) under a specific level. In addition, the semi-qualitative analysis used in this paper can be extended to a completely qualitative analysis through the approach of value of risk (VaR) as the individual loan data are available.

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