Construction of Mortgage Risk Index System for Farmland Management Right

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Abstract: This paper takes agricultural land management right as the research object, conducts in-depth research on the mortgage financing risk of agricultural land management right, and constructs the agricultural land management right mortgage financing risk evaluation system, and uses the Analytic Hierarchy Process (AHP) to construct the indicator importance matrix. The calculations were carried out, and the weights of each indicator were obtained and passed the consistency test to provide ideas for the mortgage financing risk of agricultural land management rights.

1. Introduction

Among the various measures for the reform of the “three powers separation” of agricultural land in China, one of the most ground breaking policies is the mortgage financing reform of agricultural land management rights. In the process of reform and implementation, the coordination of multi-interest relations involves new risks arising from the coupling of intangible asset mortgage financing risks and rural specific environments. Therefore, the construction of agricultural land management rights mortgage loan risk indicator system measures each risk indicator as a basis for risk prevention.

2. Literature Review

In recent years, the risk of mortgage financing for agricultural land management rights has attracted the attention of scholars. Some scholars have constructed a risk prevention and control system with farmers, fund providers and government as the core through analysing the risk of rural property mortgage financing[1]. Some scholars have studied the establishment of rural land contractual management rights mortgage loan risk index system from four aspects: natural risk, market risk, financial risk and policy risk. Combined with interviews and expert scoring method, the risk level of Chengdu land contractual management right mortgage loan is carried out. Measure calculate the risk by the indicator weight[2]. Some scholars use AHP decision analysis method to evaluate and rank the risk influencing factors of land management rights mortgage financing, and find the key points and countermeasures of risk management, so as to provide ideas for rural land management rights mortgage loan risk management[3]. Some scholars have constructed the credit risk evaluation index system of rural land management rights mortgage loans from three levels: borrowers, environment and financial institutions[4]. Based on the survey data of financial institutions and financial regulatory authorities, AHP decision analysis method is used to analyse rural land management rights. The influencing factors of the credit risk of the mortgage payment, and the ranking of the influencing factors, on the basis of which the countermeasures are proposed [5][6].

According to the research ideas of previous scholars, we will divide the mortgage risk of agricultural land management rights into four dimensions: political risk, market risk, Mortgage risk and financial institution risk[7][8]. We use the analytic hierarchy process to rank the weights of risks. As the basis for risk prevention and control.

3. Analysis of the formation of mortgage financing risk of farmland management rights

The risk analysis of farmland management rights mortgage financing is an important prerequisite for constructing risk index system. This paper draws on the characteristics of risk in other fields, and summarizes the sources of farmland management rights mortgage financing risk into the following four aspects.

3.1. Political risk

Political risks can be divided into policy risks, government support, and confidence risks. Limited by the current laws and regulations, coupled with the ambiguous land property rights and the lack of an effective risk-sharing mechanism, there is a large policy risk in the current development of farmland mortgage loans. At the same time, the government's support for this policy is not strong enough. Moreover, due to unclear responsibilities due to lack of legislation, or illegal interests, the relevant functional departments cannot effectively supervise the land transfer, and the land transfer is in an unconstrained chaotic and disorderly state, and it is not surprising that there is a transfer risk.

3.2. Market risk

Market risk is divided into the soundness of rural financial markets, credit environment and assessment agencies. At present, there is no complete land transfer transaction market in China, let alone related transaction service institutions. Most of the land transfer is still in a state of fragmentation and spontaneousness, and it is inevitable that there will be various problems in the two sides of the transaction. There are many irregularities in the operation of the evaluation of the value of agricultural land management rights. For example, the lack of institutions and experts for the evaluation of the value of land management rights is mostly assessed by the exchanges, lacking professionalism, resulting in inaccurate valuation and failure to reflect the true nature of land management rights. value.

3.3. Mortgage risk

The mortgage risk includes disposal risk and impairment risk. In the mortgage operation of farmland management rights, there is a risk of realizing the mortgage. Once the peasant fails to operate, the financial institution needs to dispose of the mortgage, no matter whether it is re-circulating or the pricing of the transfer of management rights, there are certain difficulties. Agricultural production is fragile and vulnerable to natural factors. The output of agricultural land is easy to reduce due to natural disasters. In addition, the possibility of poor management of farmers has led to great uncertainty in the value of agricultural land management rights. It is a hidden danger for its financing party to repay on time.

3.4. Financial institution risk

The risks of financial institutions include loan officer risk, internal control and the type of financial institution. In terms of the business development of each pilot institution, its practitioners lack professional training. At the same time, this innovative business has a short time to come, and the relevant practitioners have insufficient experience. The history of cooperation with third-party organizations is almost zero, which will also bring certain operational risks to the loan business. Moreover, the smooth development of the land property mortgage loan business is required. The internal control technology of financial institutions is not mature enough; the financial institutions that provide loans include rural credit cooperatives, and the commercial banks such as Agricultural Bank of China and Postal Savings Bank have also established the “three rural” financial sector, and different types of financial institutions, because of their winds. Different control standards and loan policies, different degrees of proficiency in rural financial services, will also increase uncertainty in the financing of farmland management rights.

4. Construction of the risk index system for farmland management rights

The farmland management right mortgage financing risk evaluation index system is based on the analysis of the risk factors of the farmland contract management right mortgage financing, establish a set of risk assessment indicator system, calculate the weight of various possible risks and the risk of each layer of risk. Proportion, thus conducting a comprehensive evaluation.

Through the previous research, the construction of agricultural land management rights mortgage financing risk evaluation index system, including political risk, market risk, mortgage risk and financial institution risk, and other four first-level indicators, 11 secondary indicators constitute a risk prevention evaluation index system.

According to the composition of the above indicators, the construction of the indicator system is shown in Table 1.

Table 1 Agricultural land management rights mortgage financing risk evaluation index system.

	Primary indicator	Secondary indicators
Agricultural land management rights mortgage financing risk evaluation index system	Political risk	Confirmation risk
		Support
		Policy risk
	Market risk	Rural financial market soundness
		Evaluation agency
		Credit environment
	Mortgage risk	Impairment risk
		Disposal risk
	Financial institution	Loan officer risk
		Internal Control
		Type of financial institution

In this paper, the analytic hierarchy process is used to establish the judgment matrix, and the weights of each index are solved. Then, the expert evaluation method is used to establish the comprehensive evaluation matrix, and the membership degree matrix of each index layer is obtained. Finally, the comprehensive scores of each scheme are obtained according to the normalization method.

4.1 Build a judgment matrix

Through expert scoring, the relative importance of each factor in each layer is expressed in numerical form, usually taking 1, 2, ..., 9 and their reciprocal as a scale, and the scale meaning means that the judgment matrix represents the previous level. For a certain element and the same level of elements, a Nth order judgment matrix can be established to calculate the maximum eigenvalue and its corresponding eigenvector. The scale meaning is shown in Table 2.

4.2 Weight vector calculation

The purpose of weight vector calculation is to find the regularity of the problem to be determined. After theλ_{max} is calculated by the weight vector, the consistency test is needed.

The weight vector calculation uses the total method, that is, the column vector is normalized first. The sum of the obtained new matrices is normalized and the weight vector is obtained. The corresponding λ_{max} is obtained by the formula, where A is the original judgment matrix and W is the weight vector obtained by calculation.

$$A \cdot W = \lambda_{max} \cdot W \quad (1)$$

Table 2 Comparison scale and meaning.

Scale value	meaning
1	Equally important compared to the two indicators
3	One indicator is slightly more important than the other because of the two indicators.
5	One indicator is significantly more important than the other because of the two indicators.
7	One indicator is more important than the other because of the two indicators.
9	One indicator is more important than the other because of the two indicators.
2,4,6,8	Taking the median value of the above two adjacent judgments

4.3 Calculation and verification of consistency indicators

The consistency indicator is calculated as follows:

$$CI = \frac{\lambda_{max} - n}{n-1} \tag{2}$$

Generally speaking, the larger the CI, the stronger the consistency of the judgment matrix, and the more reasonable the judgment matrix is constructed. However, considering the existence of the possibility that the judgment matrix is subject to random deviation, a consistency evaluation index CR is established, and CI is compared with RI to test the consistency of the judgment matrix.

$$\mathrm{CR} = \frac{CI}{RI} \tag{3}$$

CR is used as a consistency indicator to test whether the judgment matrix passes the consistency test. If CR<0.1, it indicates that the judgment matrix passes the consistency test; on the contrary, it fails the consistency test. The average random consistency index RI size is related to the order of the judgment matrix. The larger the order, the larger the RI value and the greater the possibility of random deviation. If the consistency check is passed, it can be confirmed that $\lambda_{\max}$ corresponds to the weight vector.

In order to determine the weights of the indicators in the criterion layer and the index layer, according to the modeling principle of the analytic hierarchy process, the expert scoring method is used to establish the judgment matrix for each index layer and the criterion layer index. According to the correlation algorithm of the analytic hierarchy process, the summation method is used. The weight of each indicator is measured and then tested according to the principle of consistency.

The criterion layer judgment index matrix is established as shown in Table 3.

Table 3 criterion layer indicator judgment matrix.

Evaluation index	Political risk	market risk	mortgage	financial institution
Political risk	1	2	2	2
Market risk	1/2	1	1/2	1/2
mortgage	1/2	2	1	1/2
Financial institution	1/2	2	2	1

Through the evaluation of the index of the criterion layer, the following judgment matrix is established, and the normalization method is used to gradually normalize the following, and the corresponding weight vector is obtained, and the weight vector is calculated according to the calculation result.

$$W_0=[0.452,0.146,0.198,0.204]^T,\ \text{Obtain}\ \lambda_{max}=4.26 \tag{4}$$

The consistency indicator is calculated as follows:

$$CI=\frac{\lambda_{max}-n}{n-1}=0.086 \tag{5}$$

$$CR=\frac{CI}{RI}=0.095<0.1, \tag{6}$$

4.4 Pass inspection

According to the same calculation method, the weights of the indicators are sequentially obtained. The weights of the indicators of the farmland management right mortgage financing risk evaluation index system are summarized in Table 4.

Table 4 Summary of the weights of each indicator of the agricultural land management right mortgage financing risk evaluation index system.

Criteria level indicator	Weights	Indicator level indicator	Indicator layer weight	Sort
Political risk Market risk Pawn	0.452	Confirmation risk	0.162	2
		Support	0.047	8
		Policy risk	0.243	1
Financial institution Criteria level indicator Political risk	0.146	Rural financial market soundness	0.052	6
		Evaluation agency	0.014	10
		Credit environment	0.079	5
Market risk Pawn	0.198	Impairment risk	0.049	7
		Disposal risk	0.149	3
Financial institution	0.204	Loan officer risk	0.088	4
		Internal Control	0.088	4
		Type of financial institution	0.028	9

From the weight of the criteria layer in the table, among the indicators affecting the mortgage financing risk of agricultural land management rights, policy risk is the most important indicator, mainly because this indicator is systemic risk; secondly, financial institution risk indicates that agriculture Mortgage financing of land management rights is related to the development level of financial institutions; mortgage risk ranks third, with a weight of 0.198; market risk ranks fourth with a weight of 0.146.

From the indicator level, the policy risk weight in the political risk indicator is 0.243, and the security risk is 0.162. Both of them have a large impact, and the support risk has a low degree of impact. Among the market risk indicators, the weight of the credit environment is 0.079, followed by the soundness of the rural financial market, the weight is 0.052, and the weight of the evaluation agency is 0.014. The main factor affecting the market risk is the credit environment, which is a systemic risk and needs to be focused. The credit risk and internal control risk weight of the collateral risk are both 0.088, and the impact is equally large. The weight of the financial institution type is 0.028, which has a small impact, indicating that the indicator is not an important impact indicator

5. Conclusion

Based on the analysis of the risk factors of farmland management rights mortgage financing loans, this paper establishes the agricultural land management rights mortgage financing risk index system, we can get the following conclusions: First, strengthen the farmland management rights

policy guarantee. We must establish a legal system for the transfer of farmland management rights, clear the obstacles that hinder the mortgage of farmland management rights, and build a trading platform for agricultural land management rights, which provides services for the management of property rights of agricultural land. Secondly, establish a risk dynamic early warning monitoring system to serve the credit risk assessment of financial institutions, and then build bridges to communicate with agricultural enterprises and agriculture-related financial institutions, and finally open up departmental barriers, build risk prevention and financing service platforms, and provide agriculture for government authorities. Key data for land capitalization reform. Finally, improve the top-level system design of farmland management rights mortgage. The supporting institutions for improving the mortgage financing of agricultural land management rights, such as rural credit cooperatives, land property rights exchanges, guarantee institutions, etc., provide a full range of services for the financing of farmland management rights and promote the comprehensive development of farmland management rights financing.

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