A study on Evaluating and managing the financial risks of local banks in Henan Province based on Analytic Hierarchy Process Model

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Abstract. Henan is a populous province in China, and its banking system is sound. The development of local banks plays an significant role in economic development of Henan Province. For these factors, some suggestions are presented, such as increasing capital accumulation rate reasonably, improving the management of credit risk, realizing the diversification of profits and controlling cost-income ratio effectively.

1 Background

Economic globalization promoted the rapid development of Finance since 1990s.A variety of (Various) financial products were introduced in 2013, and government significantly introduced various financial reform policies[1][2]. On February 28, 2015, the central bank announced that the deposit and loan interest rates would decreased by 0.25% form March 1st 2015, and China's financial reform process continued to accelerate. Every economic agents' need for financial system was enhanced under the market economic system, and local banks having crisis would cause a certain impact on China's economy[3][4]. Evaluating the financial risks of local banks, finding out the important factors which influenced them in Henan Province could be effectively control the financial risks[5].

2 Introduction of analytic hierarchy process

Analytic hierarchy process which combined qualitative analysis and quantitative analysis was proposed by T.L.Saaty, a professor from University of Pittsburgh, US in 1970s.

2.1Establish the hierarchy model

The level is divided into three classes of top, middle and bottom. There is only one element in top, several elements in middle, and various measures in bottom.

2.2 Construct judgment matrix

Represent their level of importance in the form of the ratio of the two comparative importance degrees, and construct judgment matrix. When comparing the importance of the two factors, 1, 3, 5, 7, 9 are used to express its quantitative value, 1 means that the two factors are equally important, 3 indicates that the first factor is slightly important, 5 means that the first factor is more important, 7 indicates that the first factor is very important, 9 means that the first factor is absolutely important In addition, with 2, 4, 6, 8 to represent the importance between the above two adjacent levels.

2.3 Calculated the relative weight of each element

Normalized processing of the judgment matrix, the maximum eigenvalue of judgment matrix——λmax and the relative weight of each element are calculated.

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2.4 For coincidence test

Using CI to measure the deviation of the matrix, and $CI = \dfrac{\lambda_{max} - n}{n - 1}$, the smaller the value, the closer the judgment matrix to the complete agreement; Using RI to express the average random consistency, as is shown in Table 1; CR=CI/RI，when CR <0.1(<0.1 CR), it has a satisfactory consistency.

Table.1 Mean random consistency index RI standard value table

Matrix order: n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

2.5 Calculated the combination weight of each element

According to the relative weight of each element in each layer from top to bottom, the combination weight of all the elements in the bottom layer was calculated.

3.Evaluate the financial risks of local banks in Henan Province

3.1 Introduction of Henan local Banks

Henan is a larger province in China, and its banking system is sound. The local banks in Henan Province are mainly composed of 17 city commercial Banks, 207 small and new rural financial institutions. 13 city commercial banks, including Xinyang bank, Kaifeng bank, Xinxiang bank and Xuchang bank formed a regional joint-stock commercial bank, which was the central bank. The development of local banks plays an significant role in economic development of Henan Province.

3.2 Evaluate the financial risks of local banks in Henan Province

The financial risks of local banks in Henan Province would be divided into three levels, which are the top, middle and bottom.The top level X is measured by financial risk. Reference to notice 《Risk rating system of the joint-stock commercial banks (Provisional)》, which was issued by the China banking regulatory commission, the middle level is consist of capital adequacy X_1, credit risk X_2, operational risk X_3, liquidity risk X_4, development capacity risk X_5.

Each of the middle level X has its underlying index. Capital adequacy index X_1 mainly include (includes)capital adequacy ratio X_{11}, core capital adequacy ratio X_{12} and asset liability ratio X_{13}; credit risk X_2 mainly include non-performing loan ratio X_{21} more than 90 days overdue loan ratio X_{22}, the largest single customer loan proportion X_{23}, loan ratio of the ten largest customers X_{24} and provision coverage ratio X_{25}; operational risk X_3 mainly include asset profit margin X_{31}, capital profit margin X_{32}, cost income ratio X_{33} and non-interest income ratio X_{34}; liquidity risk X_4 mainly include current ratio X_{41}, deposit and loan rates X_{42}, RMB excess reserve ratio X_{43} and net lending capital ratios X_{44}; development capacity risk X_5 mainly include net profit growth rate X_{51}, capital accumulation rate X_{52} and operating income growth rate X_{53}.

3.3 Evaluate the financial risks of local banks in Henan Province
Construct judgment matrix.

In this paper, 50 experts were consulted, and 47 valid questionnaires were available. According to the experience of the experts, the judgment matrix of middle layer is shown in Table 2:

Table.2 Two judgment matrix

X	X_1	X_2	X_3	X_4	X_5

X_1	1	1/3	1/2	1/2	1/3
X_2	3	1	2	2	1
X_3	2	1/2	1	1	1/2
X_4	2	1/2	1	1	1/2
X_5	3	1	2	2	1

Calculate the weight.

Normalized the column vectors of judgment matrix in table 2, according to the row sum, sum with the row order，then normalized processing，the relative importance weight of every index to financial risks could be get, and the weight is W=（0.088 0.298 0.158 0.158 0.298）.

Calculate the combination weight of each element

The same for other matrices to calculate, W_1=（0.297 0.539 0.164）;W_2=（0.446 0.286 0.151 0.078 0.039）;W_3=（0.081 0.155 0.476 0.288）;W_4=（0.476 0.081 0.288 0.155）;W_5=（0.277 0.595 0.128）,and the consistency test is passed respectively.

The combination weight of each element is calculated, as shown in Table 3:

Table.3 Comprehensive evaluation weight value

The weight of middle layer	The weight of bottom layer	The combination weight
capital adequacy X_1=0.088	capital adequacy ratio X_{11}=0.297	0.026
	core capital adequacy ratio X_{12}=0.539	0.047
	asset liability ratio X_{13}=0.164	0.014
credit risk X_2=0.298	non-performing loan ratio X_{21}=0.446	0.133
	more than 90 days overdue loan ratio X_{22}=0.286	0.085
	the largest single customer loan proportion X_{23}=0.151	0.045
	loan ratio of the ten largest customers X_{24}=0.078	0.023
	provision coverage ratio X_{25}=0.039	0.012
operational risk X_3=0.158	asset profit margin X_{31}=0.081	0.013
	capital profit margin X_{32}= 0.155	0.024
	cost income ratio X_{33}=0.476	0.075
	non-interest income ratio X_{34}=0.288	0.046
liquidity risk X_4=0.158	current ratio X_{41}=0.476	0.075
	deposit and loan rate X_{42}=0.081	0.013
	RMB excess reserve ratio X_{43}=0.288	0.046
	net lending capital ratio X_{44}=0.155	0.024
development capacity risk X_5=0.298	net profit growth rate X_{51}=0.277	0.083
	capital accumulation rate X_{52}=0.595	0.177
	operating income growth rate	0.039

	X_{53}=0.128	

3.4 Risk assessment results of local banks in Henan Province

From the above risk assessment process, the most influential factor affecting local banks in Henan Province is capital accumulation rate, and the first five influencing factors are capital accumulation rate, non-performing loan ratio, more than 90 days overdue loan ratio, net profit growth rate and cost income ratio.

4 Countermeasures and suggestions for financial risks prevention of local banks in Henan Province

4.1 Reasonably increase capital accumulation rate

Capital accumulation rate refers to the ratio of the growth of the owner's equity to the amount of the owner's equity at the beginning of the year. Increasing capital accumulation rate reasonably can improve the ability of local banks to accumulate their capital, provide funds for their reserve development, and provide assistance for their further development.

4.2 Improve credit risk management

In this process of credit business, risk management is essential. In order to improve the internal control of credit risk in local banks, firstly the risk awareness of customer manager should be strengthened, and the possible non-performing loans should be controlled.

4.3 Achieve diversification of profit

Market environment changes quickly, so under the background of internet banking accelerated development, basing on their own endowment, local banks in Henan Province should actively promote the innovation of the internet banking business, increase non interest income, transform their operating structure, improve the operating characteristics, to achieve diversification of profit, and to win a more stable development.

4.4 Effectively control cost income ratio

Cost income ratio is necessary for local banks in Henan Province to do business, but high cost income ratio would cause waste of resources, so the ratio could be effectively controlled. And in order to control the ratio, firstly costs should be controlled, and the cost quota should be reduced. In addition, the operating efficiency could be improved.

Acknowledgment

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