The City Commercial Bank's Credit Rating

on Auto Dealerships in China

Liqiong Yang[1]

[1] School of Economics, Northwest University for Nationalities, Lanzhou, China

Correspondence: Liqiong Yang, School of Economics, Northwest University for Nationalities, Lanzhou 730124, China. E-mail: 1123002683@qq.com

Abstract

Small and Medium-sized Enterprises make a significant contribution to economic growth in China. City Commercial Banks mainly serve the local Small and Medium-sized Enterprises in China. Every City Commercial Bank provides Small and Medium-sized Enterprise clients the credit rating grade, and it decides on whether to give them financial support according to credit rating result. Usually, banks work on credit rating of Small and Medium-sized Enterprise according to the characteristics of the industry. This work gives the designing process of credit rating system of auto dealerships. By using questionnaire and analytic hierarchy process, researcher chose a City Commercial Bank as an example and designed a credible credit rating index system for auto dealerships.

Keywords: Credit Rating, The City Commercial Bank, Judgment matrix

1. Introduction

City Commercial Banks mainly serve for the local Small and Medium-sized Enterprises in China. It is an important work for these banks to give the Small and Medium-sized Enterprise's credit rating objectively. According to this, City Commercial Banks need to establish a new set of credit evaluation system to help them find high quality clients from the Small and Medium-sized Enterprises relatively. In China, Small and Medium-sized Enterprises exist widely in most industries, except for their natural characteristics themselves. On the other side, each Small and Medium-sized Enterprises also have regional and industrial characteristics obviously. Therefore, City Commercial Banks need to classify Small and Medium-sized Enterprise customers according to the industry and design different credit evaluation systems for different industries.

Now, there are abundant materials on this topic. Qiao Wei (2011) points out that it is useful to design a credit rating index system for Small and Medium-sized Enterprises by AHP and provision of common model for credit rating index system. Zuo Rui (2015) uses AHP to design a credit rating index system which includes six of the first-class indexes and proves that financial index is not the most important index. Some people researched about specific Small and Medium-sized Enterprises Credit Rating index system, but the output is less.

Because of the increasing demand for cars, trucks and vehicles, auto dealerships have been the common industry in the local Small and Medium-sized Enterprises. At present, the auto dealerships exist widely in every province in China. Therefore, it is meaningful to design a credit rating system for this kind of small and Medium-sized Enterprises.

This paper includes five sections. First, there is a brief introduction of all the paper. The Second section introduces research method, that is AHP. The third section uses AHP and designs an industry credit rating system for auto dealerships. The fourth comes a conclusion from the last section. The final section expresses the application of this conclusion that may occur some problems.

2. Research Methodology

There are various research methods for credit rating, which can be generally divided into three types: qualitative analysis, quantitative analysis and the combination of qualitative and quantitative analysis. These three methods includes many concrete methods. Researcher uses Analytic Hierarchy Process (AHP), which belongs to the combination of qualitative and quantitative methods. AHP was firstly proposed by professor Sadie in the University of Pittsburgh in the 1970' s. AHP which is a combination of qualitative analysis and quantitative analysis is an analytic method on multiple criteria decision. Specifically, applying AHP to determine the index weight consists of four basic steps: First, establish a hierarchy of index system. Second, structure judgment matrix. Third, calculate the weight of each level. Forth, find the consistency of judgment matrix.

3. How to design auto dealerships industry credit rating system

3.1 How to build index system

Credit rating index system is divided into three levels: the target layer, criterion layer and index layer, and these three levels can also be named as primary-class index layer, the secondary-class index layer and the third-class layer. The researcher chose a City Commercial Bank in the northwestern China and selected a group of people in the bank who are mainly engaged in the credit work. Research also made a survey in the form of questionnaire among these people. The design on questionnaire took the relevant literature and the existing credit evaluation index system of this bank into consideration. Initially, researcher set up 5 primary-class indexes, 16 secondary-class indexes, 65 third-class indexes. Finally, 27 selected questionnaires serve as the basis of statistical index screening and weight calculating.

First of all, there is an option of "whether to delete" for each index in the questionnaire. Then the researcher figures out the number of this option for each index. If there is any figure that is beyond the normal range in the index, then this figure should be deleted. What's more, part of figures have not apparent features, so researcher is not sure whether to delete, and just determines to calculate the coefficient of variation (CV). CV is bigger, this index is more important, and vice versa. Finally, researcher determines 5 indexes in primary layer, 14 indexes secondary layer, 41 indexes in third layer.

3.2 How to construct judgment matrix

After researcher builds the structure of index system, the relationship among indexes should be determined. Next, construct judgment matrix by comparing the importance of these indexes in the high lever which are at same layer. That is one factor such as criterion. It's a corresponding dominant factor to the next level. Through comparing two of them, researcher determines various factors of relative importance of certain factors on same level and gives a certain score.

Score of every index is from calculating CV according to the statistics of the questionnaire. Each index can be classed from extremely important, very important, important, generally to less important that match with 1, 2, 3, 4, 5 five values in turn, and then researcher calculates matrix and makes a comparison between two indexes at the same level in details one by one according to which one is more important. According to their importance, the comparison of importance is various, an integer as a result, on the contrary a score as a result, comparing rules is row rather than column values. A judgment matrix shows a group of administrative relationship. The index system has total eighteen judgment matrix showed by figure 1 and table 1. Note: you can read table 1 and find every symbol representing every index, then read every judgment matrix. For example, U1 means Market evaluation, and you can find relationship between U1, C1 and C2.

U	U1	U2	U3	U4	U5
U1	1.0000	3.0000	1.0000	2.0000	0.5000
U2	0.3333	1.0000	0.3333	0.5000	0.2500
U3	1.0000	3.0000	1.0000	2.0000	0.5000
U4	0.5000	2.0000	0.5000	1.0000	0.3333
U5	2.0000	4.0000	2.0000	3.0000	1.0000

U1	C1	C2
C1	1.0000	0.5000
C2	2.0000	1.0000

U2	C3	C4	C5
C3	1.0000	0.2500	0.5000
C4	4.0000	1.0000	3.0000
C5	2.0000	0.3333	1.0000

U3	C6	C7	C8	C9	C10
C6	1.0000	0.3333	0.5000	0.5000	0.3333
C7	3.0000	1.0000	2.0000	2.0000	1.0000
C8	2.0000	0.5000	1.0000	1.0000	0.5000
C9	2.0000	0.5000	1.0000	1.0000	0.5000
C10	3.0000	1.0000	2.0000	2.0000	1.0000

U4	C11	C12
C11	1.0000	0.3333
C12	3.0000	1.0000

U5	C13	C14
C13	1.0000	0.5000
C14	2.0000	1.0000

C1	D0	D1	D2	D3
D0	1.0000	0.2500	2.0000	0.3333
D1	4.0000	1.0000	5.0000	2.0000
D2	0.5000	0.2000	1.0000	0.2500
D3	3.0000	0.5000	4.0000	1

C2	D4	D5	D6
D4	1.0000	0.2500	0.3333
D5	4.0000	1.0000	2.0000
D6	3.0000	0.5000	1.0000

C3	D7	D8
D7	1.0000	3.0000
D8	0.3333	1.0000

C4	D9	D10	D11
D9	1	1	3
D10	1	1	3
D11	0.3333	0.3333	1

C5	D12	D13	D14	D15
D12	1	0.5	2	1
D13	2	1	3	2
D14	0.5	0.3333	1	0.5
D15	1	0.5	2	1

C6	D16	D17	D18	D19
D16	1	1	0.5	0.5
D17	1	1	0.5	0.5
D18	2	2	1	1
D19	2	2	1	1

C7	D20	D21	D22
D20	1	0.5	0.3333
D21	2	1	0.5
D22	3	2	1

C8	D23	D24	D25	D26	D27
D23	1	3	2	1	4
D24	0.3333	1	0.5	0.3333	2
D25	0.5	2	1	0.5	3
D26	1	3	2	1	4
D27	0.25	0.5	0.3333	0.25	1

C9	D28	D29	D30
D28	1	1	3
D29	1	1	3
D30	0.3333	0.3333	1

C10	D31	D32
D31	1	1
D32	1	1

C11	D33	D34	D35
D33	1	0.5	0.5
D34	2	1	1
D35	2	1	1

C12	D36	D37
D36	1	1
D37	1	1

C13	D38	D39	D40	D41
D38	1	0.25	0.3333	0.5
D39	4	1	2	3
D40	3	0.5	1	2
D41	2	0.3333	0.5	1

Figure 1. All judgment matrix on every layer

3.3 Weight Calculation

The eigenvectors of normalization of judgment matrix from its eigenvalue of maximum is the weight which is this hierarchy factors relative to the level of the relative importance of one factor.

First, calculate all the elements in each row of the product of the NTH root in n order P judgment matrix, then get the

$$V_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad (n = 1,2,3 \cdots n)$$

vector V.

$$W_i = \frac{V_i}{\sum_{j=1}^{n} V_j} \quad (n = 1,2,3 \cdots n)$$

Second, calculate relative eigenvector W according to V.

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^{n} \frac{PW_i}{W_i} \quad (n = 1,2,3 \cdots n)$$

Third, calculate the eigenvalue λ of maximum of judgment matrix P.

λ_{max} is used for consistency check of judgment matrix. Figuring out CI and CR can determine rationality of judgment matrix.

3.4 Consistency test of Judgment Matrix

Because the judgment matrix is calculated by the people with subjectivity, judgment matrix which has been established actually is not completely consistent with the reference of consistency test to evaluate the reliability of the judgment matrix. From above results, CI of all the second order judgment matrix equal 0, CI from all more than the second order of judgment matrix are less than 0.1. So judgment matrix passes the consistency test, the result is credible.

4. Conclusion

Researcher calculated weight of index and made them rounded. Then total steel industry credit rating index system was finished. Because the local enterprises are the aimed customers of City Commercial, the bank needs to summarize features from local enterprises. If a City Commercial Bank wants to apply this index system to practice, it needs to consider other factors and makes a change according to its clients. Some weights are very low, if they are not practical enough, user should delete them according to the need. Therefore, by investigating the bank as an example, some indexes are adjusted, the results are shown in the following as table 1.

Table 1. All indexes, their weights and scores are in three layers.

target layer	criterion layer	index layer	weight	Final score
Market Evaluation U1	Industry Status C1	Entry Barrier D0	0.12	0
		Supply and Demand D1	0.49	4
		Cycle D2	0.07	1
		Policy Support D3	0.3	2
	Market Competition Condition C2	Enterprise Strategy Implementation D4	0.12	2
		Product Competitiveness D5	0.55	8
		The Market Share D6	0.31	5
Enterprise Basic Quality U2	Enterprise-scale C3	Total Assets D7	0.75	0.7
		Period of Enterprise Setting up D8	0.25	0.3
	Leader's Qualities C4	Ability to Decision D9	0.42	2
		Experience on Working D10	0.42	1
		Personal Qualities D11	0.14	1
	Enterprise Management Level C5	Business Model D12	0.22	0
		Marketing Ability D13	0.42	1
		Previous Sales D14	0.12	0
		Sales Revenue D15	0.22	1
Financial Evaluation U3	Operating Capacity C6	Current Asset Turnover D16	0.16	0.3
		Inventory turnover D17	0.16	0.4
		Accounts Receivable Turnover D18	0.33	0.6
		Fixed Asset Turnover Ratio D19	0.33	0.6
	Profitability C7	Net Asset Turnover Ratio D20	0.16	1
		Total Asset Turnover D21	0.29	2
		Sales Profit D22	0.53	4
	Solvency C8	Asset-liability Ratio D23	0.31	1
		Current Ratio D24	0.1	0.2
		Quick Ratio D25	0.18	0.6
		Cash Flows Coverage Ratio D26	0.31	1
		Times Interest Earned Ratio D27	0.06	0.2
	Growth Ability C9	Sales Revenue Growth Ratio D28	0.42	1.4
		Profit Growth D29	0.42	1.4
		Total Assets Growth Ratio D30	0.14	0.2
	Ability to Obtain Cash C10	The Sale Cash Ratio D31	0.5	3.5
		Asset Recovery in Cash D32	0.5	3.5

Enterprise Supply Chain Level U4	Cooperate with Supplier C11	The Risk of Changes and Countermeasures D	0.2	0
		33Agent Brand D34	0.4	2
		The Agent Models D35	0.1	2
	Cooperate with Customer Degree C12	Customer Acceptance of the Car D36	0.5	4
		Brand of Customer Recognition D37	0.5	4
The Performance Status U5	credit status in bank C13	Situation of Opening Account D38	0.09	1
		Settlement D39	0.46	6
		loan repayment D40	0.27	3
		Mortgage guarantee D41	0.16	2
	Commercial Credit Conditions C14		25	25

5. Some Problems in Application

Credit rating system can be divided objectively certain types of enterprise into some grades, but it does not work in some special conditions. In general, every credit rating system needs to add an instruction of special conditions. For example, most Banks refuse enterprises which exist less than a year to get credit rating grades, because bank can be aware of the situation of enterprise exactly by credit rating system. The contents of different banks are very different. In reality, bank uses credit rating systems and instructions of special condition together to distinguish enterprises credit rating grade.

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