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Design of Supply Chain Finance Credit Empowerment Ecological Platform

-- A Research based on the Practice of Haier Cloud Single Platform

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Abstract

Promoting and alleviating the financing of small and medium-sized enterprises is the guiding advice in promoting the healthy development of small and medium-sized enterprises in China. The emergence of supply chain financial services has greatly alleviated the financing difficulties of small and medium-sized enterprises, but there is still a bottleneck in supply chain finance, and the transformation and upgrading of supply chain finance centering on the core enterprise credit is very urgent. The credit risk of SMEs runs through the whole supply chain financing process. Based on the practice background of Haier cloud single platform, this paper uses factor analysis and logistic regression analysis method to analyze the factors affecting the credit evaluation of small and medium-sized enterprises, construct the credit index system of small and medium-sized enterprises, help them solve the financing credit problem, and study and design the supply chain finance credit empowerment ecological platform.

Keywords

Credit Index System; Logistic Regression; Supply Chain Finance; Credit Empowerment.

1. Introduction

Promoting the development of small and medium-sized enterprises is an important strategic task of the country, but small and medium-sized enterprises are faced with financing difficulties caused by credit risks. In recent years, the newly developed supply chain finance has greatly alleviated the financing difficulties of small and medium-sized enterprises, but further research shows that supply chain finance still has resistance in the financing of small and medium-sized enterprises. The risk of a single enterprise is transformed into the enterprise risk of the entire supply chain, so it is necessary to study the credit risk evaluation under the supply chain finance. At the same time, the "Several Opinions of the State Council on Further Promoting the Development of Small and Medium-sized Enterprises" proposes to "promote the construction of the credit system of small and medium-sized enterprises, establish and improve the credit information collection mechanism and evaluation system of small and medium-sized enterprises", in order to guide and solve the financing difficulties of small and medium-sized enterprises. Therefore, establish a credit indicator system for SMEs in order to better solve financing problems and better assist the supply chain financial credit empowerment platform.

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2. Introduction of Haier Cloud Single Platform

When China's economy is transforming from a stage of high-speed growth to a stage of high-quality development, enterprises cannot do without the flow and support of capital if they want to become bigger, stronger and thicker. The emergence of supply chain financial services has satisfied the demand of enterprises to obtain funds. At the present stage, most of the supply chain financial services are based on accounts receivable products, and haier Financial Factoring's "cloud single platform" is one of them.

Haier Cloud Single Platform is designed based on chain credit. First of all, all service operations of the cloud single platform are based on online, which can easily serve tens of thousands of enterprises in the industry chain all over the country; secondly, the core enterprises on the cloud single platform can issue cloud single credentials to a large number of enterprises The upstream and downstream supplier groups, and the cloud single certificate is highly flexible, transferable and split, and enterprises in urgent need of funds can also directly finance and realize on the cloud single platform; in addition, the cloud single platform allows users to enjoy the whole process , One-stop financing service and realize the continuous circulation and interactive value-added of credit, turn data into credit and realize value-added realization, at the same time meet the financing needs of the whole industry chain, and insist on empowering the whole industry chain.

3. Literature Review

At present, the emergence of supply chain finance provides a new financing service model for small and medium-sized enterprises, but supply chain finance also faces certain risks. Chen Yu (2021) mentioned in the exploration of the financing model of small and micro enterprises from the perspective of supply chain finance that although small and medium-sized enterprises can obtain financing through supply chain finance at this stage, their own financial risk control capabilities are still relatively weak, and Once the credit risk of small, medium and micro enterprises occurs, it will inevitably cause trouble to core enterprises. [1] Wang Yue (2020) believes that the emergence of supply chain finance has made more and more small and medium-sized enterprises join the supply chain system, but due to the complex operation network of the supply chain and internal management and operation problems, the credit risk of small and medium-sized enterprises often occurs, making their supply chain difficult. Chain Finance was destroyed, and suggestions were put forward to improve the credit reporting system for SMEs.[2] Tian Kun, Zhuang Xintian, etc. (2021) mentioned that how to accurately assess the credit risk of small and medium-sized enterprises has become the primary issue in the process of supply chain finance, and how to properly prevent and deal with the credit risk of small and medium-sized enterprises is particularly important.[3] Bao Min (2020) believes that the main problems in the current supply chain financing SME credit risk assessment can be summarized into two aspects:First, in terms of the evaluation index system, there is a lack of a targeted index system, the evaluation index system is not perfect, and the weight of the evaluation index system is biased; second, the evaluation models are mostly subjective evaluation models, relying on expert experience, although experts There is sufficient experience, but the method is too subjective and lacks objectivity.[4]

Demica (2009) believes that supply chain finance amplifies risks while developing effectively, and the original single-level risks are more diversified and complicated. Therefore, it is necessary to study the credit risk of small and medium-sized enterprises under supply chain finance. Foreign scholars have constructed different models in the research under the credit risk index system of small, medium and micro enterprises, and established indicators under different circumstances.[5] For example, Edmister's multivariate discriminant analysis model, [6]Márquez's scorecard model for small and medium-sized enterprises, [7]So Young Sohn and

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Hyejin Jeon used the data of Korean high-tech small enterprises and established a credit evaluation model using the Weibull model, etc.,[8]all of which fully illustrate the importance of credit evaluation for SMEs.

To sum up, based on the situation in my country and previous research, we build a complete credit index system by analyzing the credit evaluation factors of small and medium-sized enterprises, so as to better solve financing problems and help the supply chain financial credit empowerment platform. The design has far-reaching significance for solving the financing problem of SMEs.

4. Empirical Analysis of SME Credit Index System based on Logistic Regression Model

4.1. SME Credit Evaluation Index System

Based on the above introduction of the Haier waybill platform, we can clearly understand that in the supply chain financial system, it is mainly the core enterprises that provide credit guarantees for small and medium-sized enterprises and small and micro enterprises, and provide support for their financing. The credit risk of small and medium-sized enterprises cannot be ignored. Based on the research of previous scholars, we have extracted a total of 14 indicators such as operating profit rate and net sales interest rate as the evaluation indicators of their credit risk. Details are shown in Table 1.

Table 1. Small and medium-sized enterprise credit evaluation index system

Primary indicator	Secondary indicator
Profitability	Operating profit margin X_1
	Net sales margin X_2
	Return on equity X_3
	Return on total assets X_4
Operating ability	Inventory turnover rate X_5
	Accounts receivable turnover ratio X_6
	Total asset turnover ratio X_7
Solvency	Current ratio X_8
	Quick ratio X_9
	Asset-liability ratio X_{10}
	Shareholders' Equity Ratio X_{11}
Growth ability	Operating income growth rate X_{12}
	Net asset growth rate X_{13}
	Total asset growth rate X_{14}

4.2. Selection and Source of Sample Data

Supply chain finance mostly serves industries with high accumulation of accounts receivable, such as manufacturing and pharmaceutical industries. In order to assess the credit risk of small and medium-sized enterprises in supply chain finance, we selected the A-share small and medium-sized enterprises board of Shenzhen and Shanghai stocks in the forward-looking database. In the pharmaceutical industry, a total of 58 companies were screened. The data of the credit risk assessment indicator system comes from the financial statements of each company in 2021, and the sample selected the financial data of the first quarter of 2021. The corporate credit risk as a dependent variable is judged by the star rating of each company's fundamentals of flush, and the star status is 2 or more stars as low credit risk, high credit risk

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level, and its dependent variable value is recorded as 0, otherwise That is, the credit risk is high and the credit risk level is low, which is recorded as 1.

4.3. Factor Analysis

Since there are many independent variables in the credit risk assessment index system, in order to prevent the high correlation between the independent variables and extract the main common factors, we use SPSS26.0 for factor analysis.

First, we demonstrate whether factor analysis is possible by performing KMO and Bartlett's tests. The value of KMO is 0.696, which is greater than the threshold value of 0.5, indicating that there is a correlation between variables, which meets the requirements; looking at the results of the Bartlett sphericity test, the significance value is 0.000, which is less than 0.05. Therefore, the sample data can be subjected to factor analysis, as shown in Table 2.

Table 2. KMO and Bartlett's test

KMO Sampling Suitability Quantity	0.686	
Bartlett's sphericity test	approximate chi-square	1207.335
	degrees of freedom	91
	salience	0.000

Secondly, through the common factor variance results output by spss, it is found that the common factor variance is 0.935 at the maximum and 0.638 at the minimum, indicating that each variable can be represented by a common factor and can be represented well.

Through the total variance explanation, there are four variables whose eigenvalues are greater than 1, and the first four variables have accumulated to 84.83%, that is, the four factors can explain the dependent variable very well. We set F1, F2, F3, and F4 as the first to fourth principal components, respectively. See Table 3 for details.

Table 3. Total variance explained

Element	initial eigenvalues			Extract the load sum of squares			Rotational load sum of squares		
	total	percent variance	Cumulati-ve %	total	percent variance	Cumula-tive %	total	percent variance	Cumula-tive %
1	4.531	32.361	32.361	4.531	32.361	32.361	3.629	25.921	25.921
2	3.917	27.978	60.339	3.917	27.978	60.339	3.61	25.784	51.705
3	2.414	17.243	77.582	2.414	17.243	77.582	3.435	24.533	76.238
4	1.016	7.255	84.837	1.016	7.255	84.837	1.204	8.599	84.837

By analyzing the load coefficient of each independent variable on the factor through the rotated component matrix, we can conclude that F1 mainly includes X1, X2, X3, X4, and F1 is called profitability; F2 mainly includes X6, X7, X13, X13, F2 is referred to as capital turnover and growth potential; F3 mainly includes X8, X9, X10, X11, and F3 is referred to as solvency; F4 mainly includes X12, and F4 is referred to as business for the growth rate of revenue, see Table 4 for details.

4.4. Logistic Regression Analysis

We take the four main factors obtained by the above factor analysis as covariates and whether there is credit risk as the dependent variable, and use the input method to perform binary

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logistic regression analysis in spss26.0. The dependent variable is coded with a credit risk of 1 and no credit risk as 0.

Table 4. Component rotation matrix

	1	2	3	4
Operating profit margin X_1	0.938	-0.005	0.184	-0.027
Net sales margin X_2	0.94	-0.004	0.164	-0.026
Return on equity X_3	0.959	0.105	0.001	0.005
Return on total assets X_4	0.923	0.081	0.042	-0.011
Inventory turnover rate X_5	-0.008	0.425	-0.328	0.591
Accounts receivable turnover ratio X_6	0.06	0.918	0.008	0.049
Total asset turnover ratio X_7	0.062	0.846	-0.264	0.299
Current ratio X_8	-0.013	0.007	0.918	0.044
Quick ratio X_9	0.043	-0.016	0.903	0.056
Asset-liability ratio X_{10}	-0.21	0.158	-0.858	-0.014
Shareholders' Equity Ratio X_{11}	0.187	-0.226	0.858	-0.043
Operating income growth rate X_{12}	-0.042	0.044	0.232	0.867
Net asset growth rate X_{13}	0.066	0.919	-0.074	0.047
Total asset growth rate X_{14}	0.005	0.964	-0.071	-0.004

Through the Omnibus test results of the model coefficients, it is known that the model significance 0.01 is less than 0.05, so the overall model is meaningful. Extraction, the model has a high goodness of fit, see Table 5 and Table 6 for details.

Table 5. Omnibus test for model coefficients

		chi-square	degrees of freedom	salience
step 1	step	13.343	4	0.01
	Piece	13.343	4	0.01
	Model	13.343	4	0.01

Table 6. Hosmer-lemshaw test

step	chi-square	degrees of freedom	salience
1	6.51	8	0.59

Observing the variables in the equation in the output results, we can know that F3 and F4 can significantly affect whether an enterprise has credit risk, while the p-value of F1 and F2 exceeds 0.05, which has no significant effect on the dependent variable, that is, the current ratio. , quick ratio, asset-liability ratio, shareholder's equity ratio, and operating income growth rate have a significant impact on whether an enterprise has credit risk, and can be used to evaluate an enterprise's credit risk. See Table 7.

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Table 7. Variables in the equation

		B	Standard Error	Wald	degrees of freedom	salience	Exp(B)	95% confidence interval for EXP(B)	
								lower limit	upper limit
step 1	Profitability situation F_1	-0.353	0.437	0.653	1	0.419	0.703	0.298	1.654
	Capital turnover and growth potential F_2	-0.404	0.903	0.201	1	0.654	0.667	0.114	3.915
	Solvency F_3	0.926	0.395	5.495	1	0.019	2.524	1.164	5.475
	Operating income growth rate F_4	-1.402	0.698	4.028	1	0.045	0.246	0.063	0.968
	Constant	-1.593	0.473	11.341	1	0.001	0.203	-	-

Finally, from the prediction result table of the model, we can know that the accuracy rate of the model prediction is 81%, of which the prediction rate for enterprises with credit risk is 95.3%, and the prediction rate for enterprises without credit risk is 40%. The effect is very good. See Table 8 for details.

Table 8. Model predictions

Measured		predict			
		Is there credit risk			Correct percentage
			0	1	
Step 1	Is there any credit risk	0	41	2	95.3
		1	9	6	40
	Overall percentage				81

5. Design of Supply Chain Finance Credit Empowerment Ecological Platform

Based on the above mentioned, on the basis of haier cloud single platform practice and SME credit evaluation system, we have designed an ecological platform for supply chain finance credit empowerment.Taking the accounts receivable category as an example, through chain credit empowerment, core enterprises issue cloud bills, and the core enterprises provide guarantees so that financial institutions such as banks can provide financing for small and medium-sized enterprises, and first-tier suppliers can split and transfer cloud bills to N-tier suppliers, one time to achieve financing purposes. Then the credit risk in the supply chain financial chain can be obtained through empirical analysis. The current ratio, quick ratio, asset-liability ratio, shareholder's equity ratio, and operating income growth rate are used to evaluate the credit of small and medium-sized enterprises, and the correct rate of the evaluation index is 81%, so by evaluating the results in order to respond to financing needs, it is designed to be a credit-enabled supply chain financial integration service.As shown in Figure 1.

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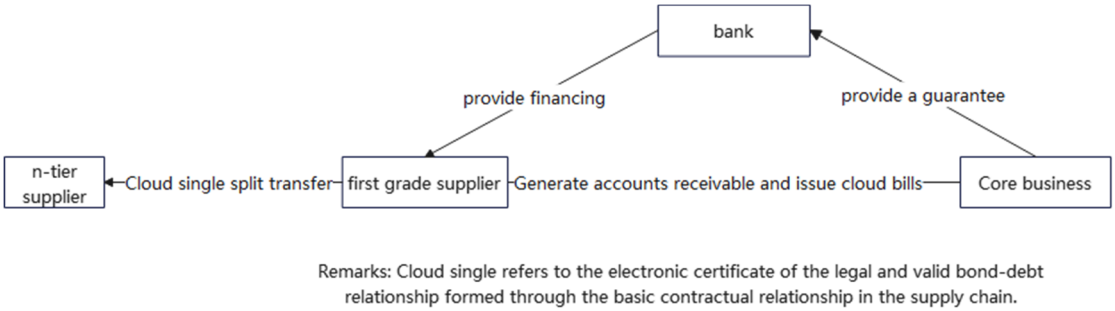

Figure 1. Supply chain finance credit enabling ecological platform

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