Analysis of Default Risk of Credit Bond Market after Rigid Redemption

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Abstract: With the continuous development of China's financial market, credit bonds have become an important way for corporate finance. However, after the rigid redemption broke down, the credit bond market defaults frequently, so the investors and regulators pay close attention to the default risk of credit bonds. Based on the financial and non-financial indicators of bond issuers, this paper, by principal component analysis and logistic regression method, looks for the main factors that affect the default of credit bonds. Then, a credit risk discriminant model is built and the validity of the model is tested. The result shows that the model works well. It has certain reference value for predicting the default risk of credit bonds.

1. Introduction

China's credit bond market began in 1983, but it had been in a slow development stage. Until 2005, with the People's Bank of China started to implement short-term financing bills and reformed the issuance system, the financial structure continued to optimize, then the credit bond market enters a stage of rapid development and maintains a high-speed growth trend. According to statistics, the bond issuance scale reached 40.8 trillion yuan and the issuance of corporate credit bonds reached 5.5 trillion yuan in 2017, far exceeding the stock financing amount of 1.2 trillion yuan, becoming the most important channel for direct financing of enterprises. However, as the financing scale of the issuer continues to expand, the possibility of default on bonds is increasing. In 2014, the emergence of the “11 Super Day Debt“ default meant that the myth of rigid redemption in the Chinese bond market was broken. In the following years, China's bond market defaulted frequently. By December 3, 2017, a total of 142 bonds in the bond market had defaulted, and the amount of default shows a trend of increasing year by year. The default risk of the credit bond still continues to ferment. If the entire bond market is dragged down, it will certainly hurt the confidence of the bond market investors.

Therefore, in view of the current default problem of continuous fermentation in the bond market, considerating Comprehensively of macroeconomics and the economic development of the enterprise, looking for more scientific and effective methods to prevent the defult risk of credit bonds is the most important things for us. Finally, the investors can formulate correct investment strategies, the regulatory agencies can effectively identify risky enterprises and establish a more active and healthy development of the bond market.

2. Sample and indicator selection

2.1 Sample selection

Excluded the missing datas, the paper selects the number of thirty default bonds since 2014, then puts 30 normal bonds into the model for comparative analysis. The empirical research in this paper is implemented by SPSS22.0 and Excel2016.

2.2 Indicator selection

This article refers to the research directions of existing literature and articles. The indicators are selected as follows:

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Table 1 Financial and non-financial indicators

Gross profit growth rate	X1	X1=Annual profit increase/previous year total profit×100%
Net profit growth rate	X2	X2=(current net profit-previous period net profit)/current net profit
Operating income growth rate	X3	X3=(current operating income-previous operating income)/current operating income
Operating profit growth rate	X4	X4 = operating profit growth / total profit in the previous year
Asset-liability ratio	X5	X5=liabilities/assets*100%
Current ratio	X6	X6=current assets/current liabilities
Quick ratio	X7	X7=quick assets/current liabilities
Property ratio	X8	X8=Total liabilities/shareholders' equity
Annualized return on total assets	X9	X9=(total profit + interest expense) / average total assets X100%
Net sales margin	X10	X10=net profit/business income*100%
Gross profit margin	X11	X11=(Net sales revenue - product cost) / Net sales income × 100%
Total Asset Turnover	X12	X12=Sales Revenue/Average Total Assets
Inventory turnover rate	X13	X13=cost of sales/average balance of inventory
Accounts payable turnover rate	X14	X14= Main business cost net / average payables balance × 100%
Current assets turnover rate	X15	X15= sales income / average balance of current assets
Enterprise size	X16	X16=Natural logarithm of total assets

3. Regression analysis and model building

3.1 Logistic regression model

The Logistic regression model was first applied in the medical field, then discovered by relevant scholars and used widely in the field of economics. Logistic regression is a branch of the generalized linear model. Its dependent variable is divided into two categories,the two-category is more commonly used and easier to be explained. So the most commonly used in practice is the logistic regression of the two classifications. The mathematical expression of the model is as follow:

$$\ln\frac{p}{1-p} = \alpha + X\beta + \varepsilon \tag{1}$$

P is the probability of occurrence of the event,αis the intercept term of the model,βis the parameter to be estimated, X is the explanatory variable, andεis the error term.

The Logistic regression model established in this paper selects the financial indicators that reflect the solvency, profitability, operational ability and growth ability of bond as the independent variables, whether the bond defaults as the dependent variable, this article gives the default bond the value is 1 and the value of the non-default bond is 0. The regression results are shown in the following Table:

Table 2 Factors affecting bond default

Independent variable	Regressin coefficients	Standard error	Wald value	Signif-icant	Exp(B)	Trust interval of 95% EXP(B)	
						Lower	limit
Assets and liabilities ratio	.921	.403	5.217	.022	2.511	1.140	5.532
Annualized return on total assets	-1.064	.491	4.701	.030	.345	.132	.903
Current ratio	-1.049	.465	5.097	.024	.350	.141	.871
Total assets of the enterprise	-1.122	.457	6.016	.014	.326	.133	.798
constant	-.027	.342	.006	.938	.974		
-2 logarithm			54.920				
Model fit			0.717				
Predictive accuracy			80.0%				

4. The analysis of regression results

We use related data to establish logistic regression model by SPSS22.0, then get a regression model with a fitting degree of 0.717 and the accuracy rate of default risk reached 80.0%, it indicates that the logistic regression model we established is effective and can conduct risk monitoring and early warning of bonds risk.

The asset-liability ratio is positively correlated with the probability of default. That is, the higher the asset-liability ratio, the less capital the company has, then the debt pressure will increase, so that the ability of the company to repay long-term debt becomes weaker, the bonds maybe have the possibility to happen credit default.

The annualized return on total assets is negatively correlated with the probability of default. Because the annualized total return on assets reflects the production and operation of the enterprise. The higher the indicator, the better the economic development of the enterprise. Therefore the company has more funds to repay the debt,the pressure it faces is less than other enterprises.

The turnover rate of liquid assets is negatively correlated with the probability of default. Because the current asset turnover rate reflects the company's operational capacity. If the company's operational capability is healthy, the asset turnover rate will fast, and the company will get more profits and have more funds to repay the debt,so that the risk of default for companies is less then others.

The total assets of the enterprise are negatively correlated with the probability of default. Because the total assets of a company reflects the scale of operation and economic strength of a company. If the company has a lot of assets and strong economic strength, it will have sufficient capacity to deal with risks, so it will not easily happen bond risk and bankrupt events.

5. Policy recommendations

First, improve the operating mechanism and strengthen the transformation of the bond market. Above all, the regulatory authorities should raise the threshold for bond issuance and strictly investigate those issuers. For bond issuers with lower credit ratings, they can appropriately increase the access conditions for the issuance of those companies in the bond market. At the same time, we should establish and improve the information disclosure system, learn the experiences from developed countries, improve the construction of relevant institutional systems, strictly implement regulatory penalties, thereby improve market efficiency.

Second, it is necessary for us to establish and improve the database of the bond market. Although China's credit bond market develop rapidly, it is still exist many flaws, which result in some foreign credit risk measurement models can not be used for us. Meantime, because of the different level of development, we cannot directly adopt the data and methods form developed countries. Therefore it requires us to establish a database of defaults in line with the actual situation of China's bond market, deeply understand and analyze the default risk faced by the credit bond market.

Third, improve the development of credit rating agencies and establish authoritative rating agencies. combined with the actual situation of China's capital market, we should study foreign advanced experience, promote the positive and healthy development of the industry. At the same time, it is necessary to improve the effectiveness of credit rating agencies, the government should supervise related credit rating agency and require rating agencies to full understand the macroeconomic policy environment, analyze the rating results in a variety of scientific factors, help stakeholders make correct decision.

6. Summary

Combining with the status of default risk in China's credit bond market, we use Logistic regression method to analyze the key factors affecting credit bond default, construct a credit bond default risk measurement model, then test the validity of the model.Finally, the result shows that the Logistic model established in this paper is effective, which can accurately predict the credit default

risk of credit bonds and meet the needs of investors and regulators for assessing the default risk of credit bonds.

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