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Study of electronic manufacturing financial risk evaluation based on the z model

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ABSTRACT

With the rapid development of electronic information technology, electronic products multiply and its demand is also bigger and bigger. Therefore electronic manufacturing industry has become the sunrise industry. And it has been a leader in industrial development since the 21st century, becoming a new growth point of China's economy. Based on the financial data from 2009 to 2012 of the listed electronic manufacturing companies, the study adopts Z-score model method to analyze the existed financial risks of China's flourishing electronic manufacturing and carry out the study of financial risk evaluation. Through using Z-model and the analysis of mass data, the findings are as follows: the financial situation of China's most electronic manufacturing enterprises is not very good with Z value between 1.81 and 2.675, and the international debt crisis of this industry is still spreading. This study aims to learn the financial situation and development potential of China's electronic manufacturing industry and warns the relevant enterprises to financial risk prevention.

KEYWORDS

Electronic manufacturing industry; Financial risk evaluation; Z-model analysis.

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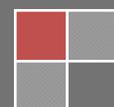
INTRODUCTION

Electronics manufacturing rise with the development of electronic products. Emerged in the 1990s, with the development of the electronic information technology, china's electronic manufacturing industry produced things from CD, TV, DVD audiovisual products, radio, etc to home appliance facilities, personal computer, Cell Phone, etc. and it has took off with the coming of information age.

China's electronic manufacturing industry is mainly located in developed coastal areas. And the time between Asian financial crisis in 1997 and global financial crisis in 2008 is called environmental period of the electronic manufacturing development. During this period, take Dong-Guan for example, the concept of "shortage of Dong-Guan racing car round the world" had appeared. After the financial crisis in 2008, influenced by international debt crisis, China's electronic manufacturing industry faced with serious financial situation, difficulty of development and fierce internal competition.

The study about financial risk evaluation has been the focus of the domestic scholars and there are also a lot of financial risk studies based on the Z-model method. For example, research about early warning on financial risk of China's coal listed companies based on Z-model authored by Wang Peicai (2013), in which the financial situation of China's coal listed companies was discussed; and the study about financial risk evaluation of internet companies based on Z-model authored by Ou Yangxin (2014), in which the financial situation of internet companies was concluded through analysis of mass financial data between 2009 and 2012.

This study takes China's electronic manufacturing industry as its research target and refers to predecessors' experience analyzing financial data, then works out the financial situation and finally provides theoretical basis for China's electronic manufacturing dealing with financial risks.

Z MODEL

At present stage, the main way to carry out company financial risk studies is multivariate model method which including Z model, Logistic regression model, Artificial neural network model and etc, and Z model is the most widely used among them. Z model refers to the Z-score model, which was firstly put forward by American scholar Altman in the year 1968. It adopted the multivariate linear discriminate analysis to conduct early warning analysis of enterprise's financial crisis. During which five of financial data was chose by Altman and through calculation of the weighted average of the data to test the financial risk, then the metric called Z model was concluded to judge the financial risk degree of the company. The five financial indexes of Z model selected are as follows:

$X1$ ：Working capital/ Total assets, it reflects the cash ability and scale characteristics of assets ；

$X2$ ：Retained earnings/Total assets, it reflects the accumulated profit ability of the company ；

$X3$ ：Profits before interest and tax /Total assets, it reflects profitability of the assets ；

$X4$ ：Market value of owner's equity / Total liabilities, it reflects the condition of enterprises when facing financial risk ；

$X5$ ：The total sales/ Total assets, it reflects asset turnover situation and evaluates asset efficiency of the enterprise.

The formulas are as follows: $Z=1.2X1+1.4X2+3.3X3+0.6X4+1.0X5$

The X1 is the ratio of the working capital to total assets. Generally speaking, if the X1 number is greater, it means that the enterprise has more current capital and the financial condition is better. The X2 is the ratio of the retained earnings to total assets. The number reflects the ability of the enterprise's reinvestment and refund. X3 is the ratio of profits before interest and tax to total assets, the number can be used to judge profitability of the assets. X4 is the ratio of the stock value to total indebtedness; the number reflects anti-risk capability of the company. X5 is the ratio of the total sales to total assets, the value reflects operational capability of the company' assets. Through data of the five variables above, which reflects the financial change of the company, Z model is used to comprehensive analyze the strength of company resisting financial risk. Generally speaking, the higher the financial risk is, the lower the Z value is. So the possibility of bankrupt is higher. Altman thought: 2.675 is the critical point of the Z value, if Z value is greater than 2.675, it means that the company's financial situation is better. If not, the financial situation is bad and the financial crisis is existed. However, Z value below 1.81 means bankrupt of the enterprise; Z value between 1.81 and 2.675 indicates financial crisis has already existed in the company, and Altman called this "the grey zone".

The greater the Z value is, the better the company's financial situation has. So the possibility of financial crisis is lower; or the other way around. However there is some limitation in this model, firstly, specific data values about the enterprise financial crisis possibility can not be given the enterprise's financial crisis possibility. Secondly, the consideration of change in cash flows impacting on financial situation is inadequate. However Z model is still the best method adopted to research the financial situation of enterprise except the above deficiencies.

THE SELECTION OF DATA AND THE SOURCE OF THE SAMPLE

Sample selection

This study selects some financial data of the listed company in CCER and the origin and quality are security. After the financial crisis in 2008, the electronic manufacturing industry had entered into a difficult developmental stage. It is very

vital for the enterprise to discover the problem and improve it and adjust strategy development. To be serious, the destiny of the enterprise even can be changed. The study selects dozens of A-share listed enterprises in Shanghai and Shenzhen counter exchange from 2009 to 2012 as research object, see the specific data in TABLE 1.

TABLE 1: Early warning index system of financial risk

Financial index			Definition
Solvency index	Liquidity ratio	X1	Liquid assets/Current Liabilities
	Asset-liability ratio (%)	X2	(liability/assets) * 100%
Operational ability index	Total assets turnover ratio (time/year)	X3	Operating revenue/ average balance of fund
	Receivable turnover ratio (time/year)	X4	Business income/ Average balance of receivables
	Inventory turnover ratio (time/year)	X5	Business income/ Average balance of inventory
Profitability index	Net profit margin (%)	X6	(Net profit/ sales revenue) * 100%
	Return rate of total assets (%)	X7	(Net profit before income tax) * 100%
Growth ability index	Total assets growth rate (%)	X8	(Assets growth / Initial assets) * 100%
	Net Profit Growth Rate (%)	X9	(Net profit growth / Net profit of the previous period) * 100%
Cash flow index	Cash flow debt rate (%)	X10	(Net cash flow of business activities/ Current debts) x 100%
	Cash flow per share from operating activities (Yuan/ per share)	X11	Net cash flow of business activities/ Shares of common stock outstanding

The selection of financial indicators

According to the principle of universality, relevance, comparability and practicality, with referring to the achievements of predecessors and considering the actual situation of the enterprise, emphasis is placed on the following factors when selecting target. Firstly, the general financial risk refers to the risk of debt that Companies cannot afford. So liquidity analysis of the company is one of the factors we concern. Secondly, company's judgement of financial risk will be influenced by operational ability and profitability. Therefore indicators reflecting operation ability and profitability of the company is one of the key factors that this study concern. According to the research data needed in Z model, the selection of financial indicators in this study is mainly from five aspects such as solvency, operational capacity, profitability, the ability of growth, cash flow of the company totally 23 indicators, in which the most representative eleven indicators related are selected. And then in accordance with the financial data in balance sheet, profit statement, cash flow statement and relevant list, various financial ratios are figured out to form early warning index system of financial risk.

ANALYSIS OF DATA

The research objects of Altman's Z model are companies in capitalist country featuring perfect capital market, sound allocation of resource, accuracy and scientificity of the data. While because of the different national conditions in China, the market economy is in the initial stage of development and the capital market relatively poorly structured, causing the existence of strong speculative in stock market. The market value of owner's equity in the X4 model can't well reflect the real value of the owner, so the study adopt data of owners' equity book value to make the results more accurate and practical. The sample data are put into formula to test applicability of the Z model in china's financial study. And then the results of original model and adjusted model are compared, Z value of the latter appears more accuracy than the former. Therefore Z model is completely suitable for china's financial data study.

Z value calculation and results distribution

The following are distribution of Z value calculation results. According to the Z model of Altman, when Z value is greater than 3, it means that the company's financial situation is better. When Z value is greater than or equal to 2.8 and less than 3, there is some possibility of company happening financial risk. When Z value is greater than or equal to1.8 and less than 2.8, there is a high possibility of company happening financial risk. Z value less than or equal to 1.8 indicates financial crisis has already existed in the company. See TABLE 2 the distribution of Z value from 2009 to 2011 in the analyzing enterprise.

Analysis of data predict situation

From the results we can see that 74 companies of 84 companies studied had already occurred financial risk in the year 2009, accounting for 88.1 percent of the total. The financial condition of the five companies appeared better, accounting for 5.94 percent of the total. Prediction accuracy of the comprehensive results is 94.06 percent. See the Figure 1 as follows.

TABLE 2: Z value distribution

| year	The distribution of the Z value			
	Z≥3	2.8≤Z<3	1.8≤Z<2.8	Z≤1.8
2009	5	0	5	74
2010	2	0	7	75
2011	2	0	6	76
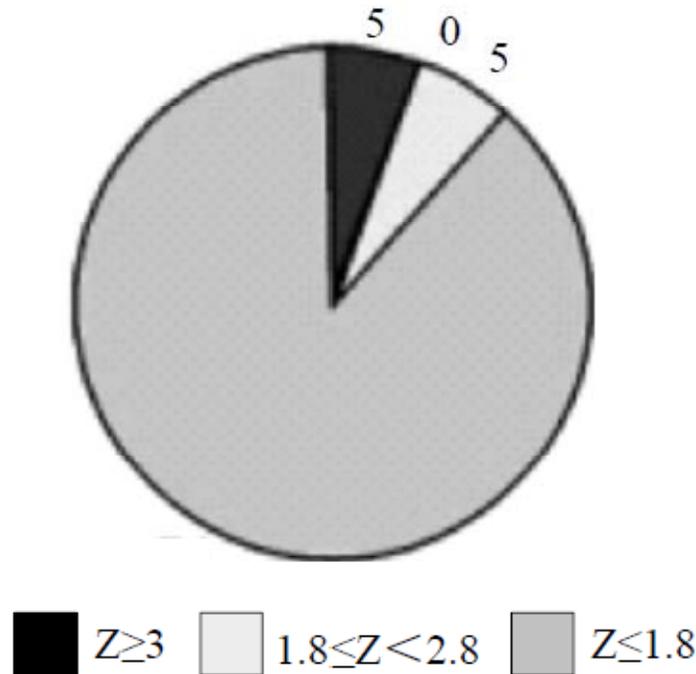
Figure 1:The distribution of Z value in the sample company in 2009

The results in 2010 showed that up to 75 companies had financial crisis, accounting for 89.30 percent of the total sample. Z value greater than 3 accounting for 2.38 percent of the total sample. 7 companies had serious financial risk, accounting for 8.32 percent of the total sample. And 97.62 percent of sample was predicted right.

The results in 2010 showed that 76 companies of 84 sample companies investigated had financial crisis, accounting for 90.48 percent of the total. And 6 companies had serious financial risk, accounting for 7.14 of the total. 97.62 percent of the sample was predicted right.

The results of the data

According to the study of the adjusted Z model and the data calculation of the selecting sample companies, the accuracy rate is above 94 percent. The results show clearly that the model is completely suitable for the study of china's listed companies. This model has high accuracy of risk identification. And as time going on, the accuracy of prediction will be better and better. The forming of American capital market is earlier than that of China, what's more, the capital market of China developed not well from 2006 to 2009 featuring imperfect allocation of resource and more speculative. So we use book value of owners' equity instead of market value of owner's equity in the X4 indicator of Altman's Z model, and after that the forecast accuracy is much higher than before. This suggests that the adjustment is suitable for the national condition.

Z model data analysis of the electronic manufacturing industry

Firstly, the other 20 selected manufacturing listed companies including 10 ST and 10 non-ST companies are treated as verification sample. Each index data is standardized and then was used to figure out the number of indicators including X1, X2, X3, X4 and X5. And then use the formula to calculate the Z value, see the results in TABLE 3.

The results suggest that companies whose Z value greater than 3 reduced year by year, while those of Z value less than 1.8 increased more with the passing year. This indicated that China's electronic manufacturing industry faced serious financial risk, and more than half of the company existed some degree of financial risk.

TABLE 3: The distribution sheet of Z value

year	the distribution of Z value			
	Z≥3	2.8≤Z＜3	1.8≤Z＜2.8	Z≤1.8
2009	8	0	7	5
2010	7	0	6	7
2011	6	0	5	9

MEASURES ADOPTED TO DEAL WITH FINANCIAL RISK IN CHINA'S ELECTRONIC MANUFACTURING INDUSTRY

Despite the global financial crisis has brought a lot of adverse effects on export-oriented electronic information industry in China, we should see the potential opportunity of development. See profits of the various economic types in China's electronic manufacturing industry 2007 shown in Figure 2.
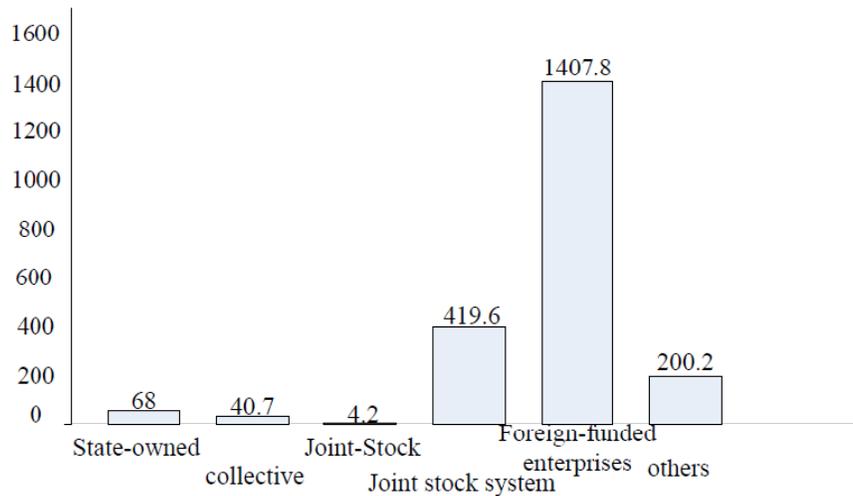

Figure 2: Profits of the various economic types in China's electronic manufacturing industry

Inherent advantages of electronic manufacture industry in China
Because of cheap labor force and low price of land utilization, the production cost of China's electronic manufacture industry has been lowered. That is the advantage of China's electronic manufacture industry, what's more, with the development of the economy, our electronic manufacturing industry are also gradually with international standards by cooperating with advanced overseas companies. After a long period of development and accumulation, many new industrial advantages are achieved. (See TABLE 5): (1) The increasingly perfect of infrastructure and development environment; (2) Industrial scale expands rapidly, and the preliminary forming industrial system will become reasonable; (3) The capability for cluster development is enhanced; (4) A host of IT talents are cultivated, forming a team with more than 8 million people; (5) A batch of large enterprise with greater competitiveness are developed; (6) The domestic market expands quickly, and a large number of international operation experience is accumulated with the breakthrough of the international market; (7) The ability of technology research has some degree of improvement, the sense of standards making improves significantly.

The advantages and opportunity analysis of China's electronic manufacture industry under the background of financial crisis.
Under the influence of the financial crisis, the development of China's electronic manufacturing industry development suffered a lot. But electronic manufacturing industry in other parts of the world suffered more serious. By contrast, we still have a lot of advantages.
1) Small influence affected by the financial crisis. The effect suffering from financial crisis is small because of the relatively independent financial and capital market of China. Owing to the unique national conditions and effective control of the domestic economy, the impaction, the loss and negative effects are relatively small, and the development foundation also appears stable.
2) The environment for development is good. The stability of political and financial environment has strong attraction of the international funds. Some capital invest China in order to avoid risk, and which providing a lot of opportunity for the electronic manufacturing industry and resolving their own crisis.

3) The development of foreign enterprise is difficult. The worsening of Enterprise survival environment in developed country brings good opportunities for enterprise internationalization development in China. The Influence of Financial Crisis to overseas company is big. So more difficulties are faced by overseas electronic manufacturing industry and their living environment is more severe. We have advantages over them by comparison, so the needed technology can be purchased at lower price and professional talents can be recruited.

TABLE 5: The advantage of China's electronic manufacturing companies compared to that of the similar international companies.

Comparison program			China	developed country	developing country
Labor force	price	middle		weak	strong
	Number	strong	↑	middle	strong
	Quality	middle	↑	strong	weak
Land		middle		weak	strong
Raw material		middle		weak	strong
Industrial scale and structure		strong	↑	strong	weak
R&D ability		middle	↑	strong	weak
Company Strength (local)		middle	↑	strong	weak
Preferential industrial policies		middle		middle	strong
Infrastructure		strong	↑	strong	weak
Political environment		strong	↑	strong	middle
Market scale		strong	↑	strong	middle

4) The good international environment. Harmonious international political environment supplies better foundation for China exploiting new international market. The IT companies in developed countries facing great pressure to develop under the influence of financial crisis and in a short term the development will be slow. So there is no time for concerning overseas market, which reduces competitive pressure of China's electronic manufacturing industry to some extent and brings opportunity of expanding emerging market for China's company in the weak competitive environment. Besides above, the harmonious relationship with the developing countries and the obvious geographical advantages are good for exploiting emerging market.

5) The aid of national policy. The policy of stimulating economic growth tackling the financial crisis will promote the development of IT industry and the electronic manufacturing industry, to a certain extent. Ten measures are enacted by the state council to resolve financial crisis and promote economic growth. Domestic demand is stimulated to increase internal investment; deposit-reserve ratio and lending and deposit rates are lowered to improve export rebate rate of the commodities; Reform in value-added tax is carried out in order to bring more profit for the company; The plan of home appliance going rural is deeply implemented to ease the negative effect of home appliance enterprise exports falling.

6) The reducing of international purchasing power promotes the competitiveness of the products in China. Household disposable income of developed country will clearly decline in the coming years under the influence of crisis. The low price of China's electronic information products is better cater to consumer expanding demand for cheap goods in developed country.

Specific measures adopted to cope with financial crisis in China's electronic manufacturing industry

Facing the crisis, we should resolve the difficulties bravely, withstand pressure, keep a cool head and seize the opportunity to adjust development strategies and formulate suitable measures.

(a) Countermeasures on enterprise level

Evolution of the company shall be realized, the administration of enterprises shall be strengthened, the cost of production shall be cut, enterprise management and production efficiency shall be promoted and the market competitiveness of enterprises shall be improved.

Enhancement of company's capital control and integration of company strength shall be carried out to improve the ability of dealing with financial risk. This is not only a difficulty but also an opportunity to reorganization the company when facing financial risks. And the electronics manufacturing industry can take this opportunity to integrate the resources, comb the service, control the production, collect money, adjust development strategy of the company and look new profit point of the future development, wipe off non-core assets to improve increase the efficiency of the company's resource.

Exploitation of overseas market. On the one hand, the development of the domestic market shall be accelerated and widen, expanding the internal demand of electronic products; on the other hand, the potential market of the overseas developing countries shall be explored aiming at sailing surplus products.

(b) Countermeasures on industrial level

1）Different countermeasures shall be adopted according to three influencing factors. As for the electronics manufacturing cyclical problem, investment orientation of the company shall be guided; cultivation of new industry growth point makes full use of the enterprise resource, as for the economic fluctuation problem, China should speed up the development of information and expand the domestic market demand; Combine the information development with the industrialization to promote industrialization development and industrial convergence, increasing risk resistance ability of the industry; Electronic information industry development shall be transformed from investment-driven to investment and consumption driven together. As for the influence of global financial crisis, we should stimulate the internal demand and at the same time guide the enterprises to exploit emerging markets; making use of the relative safety of the financial environment in China attracts international capital investment in China's electronic information industry; Formulate measures for the support of key enterprises, reducing the harm of crisis to the industry.

2）Take advantage of economic and industrial adjustment to create a healthy industry system. And this opportunity can be used to upgrade the electronic manufacturing industry, introduce advanced technology and talents, promote management system of electronic manufacturing industry and carry out information transformation in internal management of electronic manufacturing industry.

3）Pay attention to the development trends of the global IT industry and electronic manufacturing enterprises, and encourage domestic enterprises to carry out the integration of global resources. Setting up large-scale electronic information industry investment fund shall be supported by the country, and meanwhile innovation is encouraged.

CONCLUSION

The applicability and accuracy of Z model in China's electronic manufacturing financial data analysis has been studied in this paper, and adjust Z model to suit for company situation and national condition in China. On the basis of the modified Z model study of China's electronic manufacturing industry financial risk, the result is concluded by mass data analysis as follow: the development of china's electronic manufacturing has been lowered after the financial crisis in 2008 and the possibility of financial risk appears bigger with many companies facing economic crisis. This study puts forward countermeasures against risks and China's electronic manufacturing industry should grasp its own advantages to seek for the opportunity. Generally speaking, the rare chances are coming after the risk.

The results in this study can be used for reference on resolving financial problem, and help electronic manufacturing industry find their financial issues and adjust enterprise development strategy timely. While in this study some shortcomings are still existed such as shallow study on the electronic manufacturing industry and the study methods still can be improved. From now on emphasis will be put on the study methods of financial risk, exploring more efficient and scientific methods.

ACKNOWLEDGEMENTS

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