

Beifang Huachuang Financial Risk Study - Based On The "Z-Score" Model

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Abstract. In this context of global economic turmoil, high-tech manufacturing companies such as Beifang Huachuang are facing potential financial risks. Beifang Huachuang company's financial risk is examined in this study using the Z-Score methodology. By collecting the financial data and related indicators of Beifang Huachuang Company from 2019 to 2023, bringing them into the Z-Score model, and obtaining the specific values, to determine the financial risk level of Beifang Huachuang Company. After calculation, the Z-Score value of Beifang Huachuang indicates that it has low financial risk and is in a safe zone with a solid financial position. Although through the Z-Score model this paper concludes that in these five years, Beifang Huachuang is in a position of low financial risk in the context of the general social and economic environment and peer competition, Beifang Huachuang lacks the stability of market value and total liabilities resulting in an unstable X4 value, and it is the direction of Beifang Huachuang's future improvement to develop its market value steadily and minimize its total liabilities in order to achieve a stable X4 value.

Keywords: Financial risk; Z-value model; Listed companies.

1. Introduction

In today's turbulent global economic background, the economic downturn has led to the further aggravation of financial risks. For high-tech manufacturing enterprises such as Beifang Huachuang, market fluctuations competitive pressure, and other factors are affecting the financial risk of Beifang Huachuang Company, so how to scientifically assess the enterprise's financial risk and effectively avoid it has become a common concern of the academia and the industry. This paper takes Beifang Huachuang Company as the research object, gathers its financial information for the 2019-2023 financial report, balance sheet and income statement, and thoroughly evaluates and analyzes its financial risk using the Z-Score approach. The calculation results show that the Z-scores of Beifang Huachuang from 2019 to 2023 are 4.30, 6.02, 8.91, 3.06, and 4.08, respectively. Therefore, this research comes to the valid conclusion that Beifang Huachuang's financial risk is in the safe zone. This study expands the scope of application of the Z-Score model, which has not been used specifically in assessing the financial risk of high-tech manufacturing firms until now, which makes this study effective in filling the gap in this area. The conclusions of this study have far-reaching significance for the case companies, helping them to effectively avoid financial risks and improve their financial soundness.

2. Literature Review

The risk level of the listed firms will be evaluated in this study using the Z-Score model, understanding the Z-value model is extremely important in this study, the following are the concepts related to the Z-value model.

2.1. Definition of the Concept of Financial Risk

The Z-Score model was first proposed by Edward Altman in 1968 as a way of assessing the level of risk of a company, calculated and analyzed through the collection of financial indicators of the company [1]. Based on these theories, R. Charles Moyer, a professor of finance, tested the Z-Score model in 1977 and found that the Z-value varies for different types of firms, and that it is flexible

enough to be adapted to different environments by changing the weights of bankruptcy factors [2]. At the same time, Edward Altman also made several modifications to the original model to adapt to different economic environments and different types of companies.

2.2. Introduction to the "Z-Score" Model

Edward Altman proposed a variable model called the Z-Score model in 1968; he was a famous economist. By looking at American businesses that are insolvent and those that are not, he used bankrupt enterprises as an experimental sample, used five business ratios as the terms expressing bankruptcy factors in the formula and weighted them, and finally, the bankruptcy probability as well as the degree of financial danger of the enterprises can be calculated.

$$Z=1.2X1+1.4X2+3.3X3+0.6X4+0.996X5 \quad (1)$$

The coefficients of the five bankruptcy factors contained in the formula are weighted coefficients derived by Edward Altman through statistical analysis and regression analysis. The terms working capital and total assets (X1), retained earnings and total assets (X2), EBITDA and total assets (X3), total market value of shareholders' equity and total liabilities (X4), and sales revenue and total assets (X5) are used. After calculating the specific Z-value, determine the interval in which the Z-value is located, the smaller the Z-value is, the greater the possibility of the company's bankruptcy, and on the contrary, the greater the possibility of the company's bankruptcy is smaller. Edward Altman suggests three times that a corporation is in danger of going bankrupt when the Z-Score is less than 1.8. A corporation is said to be in the gray area when its Z value is over 1.8 but below 2.675, meaning it is challenging to determine with certainty whether or not it is bankrupt. When the Z value is higher than 2.675, it means that the business is safe and that there is little chance of bankruptcy because its liquidity, solvency, profitability, and other factors are all in good shape, and that there is a little chance of bankruptcy.

2.3. Literature Review

2.3.1 Relevant Foreign Studies

Jodi L. Bellovary, Mr. Jodi L. Bellovary Don E. Giacomino (2007). A useful analysis that contrasts the original and modified Z-Score models comes to a conclusion that despite the Z-Score model's shortcomings in terms of industry and firm type, the calculated results are more accurate. At the same time, he poses the question, "Why does today's society choose to continue to develop new bankruptcy prediction models?" In response, he maintained that for the majority of businesses, the Z-Score model might be the first option for predicting bankruptcy, and that future study should focus on how to implement these models [3].

Erik Wetter , Karl Wennberg (2009). By studying data from start-ups, it is argued that the weighting of each bankruptcy factor in the Z-score model for predicting start-ups, which are companies with less financial data, may lead to a large error in the final result. Therefore, it should develop quantitative measurements [4].

Sanobar Anjum (2012). Argues that despite its limitations in dealing with different industries and types of companies, the Z-Score model has been the preferred choice for predicting financial performance, and that the Z-Score model has evolved and been extended in a number of versions to suit different environments [5].

Salimi, Anwar Y (2015). Through research, it is argued that the Z-Score model can still predict the likelihood of bankruptcy in modern companies, although the Z-Score model was controversial before, and many believe that the Z-Score model can no longer predict corporate bankruptcy as accurately as it did in the 1960s, through research on the data in recent years, the Z-Score model is still is a viable predictor [6].

2.3.2 Relevant Domestic Studies

Liu shu lian (1996). Believes that the Z-Score model is a multifunctional model, through the study of a specific company, the Z-Score model can not only be used as a model for analyzing and predicting the bankruptcy of a company, but also reflect a company's solvency, profitability, and operating capacity [7].

Zhou xing rong, Mao kai yong (2003). By practicing the Z-Score model, it is believed that the Z-Score model has many limitations. As far as China and the United States are concerned, the final Z-value will differ depending on how the two nation's debt business models differ from one another. The different economic control of enterprises in China and the United States leads to different bankruptcy boundaries in the two countries. Therefore, when applying the Z-Score model to calculate the listed companies in different countries, the weights of the bankruptcy factors of the Z-Score model should be modified according to the situation of different countries [8].

Hu lei (2008). Argues that for China's SME boards, the Z-Score model can fully predict the company's financial risk and bankruptcy possibility and help SME boards to take precautionary measures in advance. However, the only drawback is its timeliness, the Z-value only represents the company's future bankruptcy possibility or current financial risk in a short period of time, not in the long term or even permanently. In addition, the authenticity of the financial data will also affect the final Z-value [9].

Zhou jian tao, Pang wen feng (2009). By assessing the financial risk of listed companies, it is argued that although there are some limitations in the Z-score, such as the limitation on the type of company and the duration of existence. Nonetheless, Z-Score volatility can still be used to determine the company's initial level of financial risk [10].

Lei yan li, Hong li jun et al. (2022). By using the modified Z-Score model to calculate the financial risk of 20 A-share feed listed companies in China, it is found that the Z-Score model has a certain degree of flexibility, and a slight modification can effectively solve the criticism of its limitations, which is of great help to managers and investors [11].

2.3.3 Review of Research

The above domestic and foreign scholars, through their research on the Z-Score model, concluded that the Z-Score model possesses a certain degree of flexibility and versatility, so this paper can still use the Z-Score model to calculate the bankruptcy likelihood of a company, no matter whether it is before or in modern times. These findings help this study to prove that this study uses a credible calculation model and that the calculation of Z-value of bankruptcy likelihood of the listed Beifang Huachuang company is relatively correct and accurate in this study. Although the Z-Score model has now been realized to cope with the deformation of formulas under several industries and company types, one could argue that there is a gap in the application of the Z-Score model for publicly traded enterprises like Beifang Huachuang, a high- tech manufacturing firm that has recently come to prominence. This study can solve the gap of Z-Score model in this field and provide reference and help for later scholars' research.

3. Financial Risk Analysis of Beifang Huachuang

3.1. Introduction and Background of Beifang Huachuang

The case company of this study is Beifang Huachuang, one of the leading enterprises in high-tech manufacturing industry, founded on September 28, 2001, which was formed by the strategic merger of Qi Xing Dian Zi company and the Bei Fang Wei Dian Zi company, and in 2016, Qi Xing Dian Zi company realized the strategic reorganization with Bei Fang Wei Dian Zi company through the issuance of shares for the purchase of assets and the collection of matching funds, which paved the way for the follow-up. In 2017, Beifang Huachuang ushered in the rapid development stage, while introducing several strategic investors, and capital began to be introduced, realizing the integration state of industry and capital, until today, Beifang Huachuang is in the stage of performance growth

and innovation. With more than 12,000 employees and more than 100 types of products, it owns the global semiconductor equipment market. As of June 30, 2024, Beifang Huachuang had total assets of 60.021 billion, market value of 194.969 billion, net worth of 27.885 billion, total operating income of 12.335 billion in the first half of the year and working capital of 20.323. The reason why Beifang Huachuang was chosen as a case study is that Beifang Huachuang is a leading company in the high-tech manufacturing industry, and it has a representative role in this field, and it has a warning and demonstration role for other companies in the same industry. It also has a warning and demonstration effect on other companies in the same industry, which helps the development of other companies in the same industry. At the same time, its financial data is transparent and easy to search. Also, because the high-tech manufacturing industry is relatively late in the rise of other industries, it has great research value.

3.2. Data Sources

The values of X1 to X5 in this study's Z-Score model for Beifang Huachuang are taken from various financial data of Beifang Huachuang from 2019 to 2023, specifically, current assets, current liabilities, total assets, retained earnings in the balance sheet, net income, market value, net worth, total liabilities, and sales.

4. Results of the Financial Crisis Assessment of Beifang Huachuang

By calculating the Z-value of Beifang Huachuang for these five years, this research can make a preliminary judgment about whether it is in a safe zone or not. Based on Table 1 below, this study can observe the increasing or decreasing trend of X1 to X5 over time.

4.1. Longitudinal Comparison of the Same Enterprise over Time

First of all, to compare the different periods of the Beifang Huachuang longitudinally, this study through the query of the Beifang Huachuang 2019 to 2023 each relevant financial data, respectively, calculated the value of X1 to X5 in these five years and the corresponding years of the Z value, so as to derive the following table 1.

Table 1. Financial Data and Z-value Table of Different Years of Beifang Hua Chuang

Particular Year	X1	X2	X3	X4	X5	Z-value
2023	0.36	0.17	0.09	4.52	0.41	4.08
2022	0.38	0.12	0.07	3.11	0.35	3.06
2021	0.36	0.1	0.04	13.16	0.31	8.91
2020	0.18	0.11	0.04	8.62	0.35	6.02
2019	0.27	0.11	0.04	5.66	0.3	4.3

The Z value and X1-5 value items of Beifang Huachuang during these five years are detailed in Table 1 above, by observing these data, this paper observes that the X1-5 values of Beifang Huachuang are in an upward trend, and the Z values are all in a safe zone. However, the shortcoming is the X4 value, observing the X4 value in the five years of Beifang Huachuang, this study found that the X4 value is relatively unstable, the X4 value in 2021 is substantially higher than the other four years of X4 value, leading to this phenomenon is because of the high market capitalization of Beifang Huachuang in 2021, the year Beifang Huachuang increased its market value, the total amount of liabilities was minimized, resulting in a very high X4 value, and the latter years of the market value to return to its previous state, the X4 value is also relatively high. In the following years, the market capitalization returns to its previous state, and the X4 value becomes smaller accordingly. Overall, Beifang Huachuang has been in a mostly upward and positive safety trend for the past five years. Beifang Huachuang needs to maintain its position and minimize its current and non-current liabilities to achieve a more stable upward trend.

4.2. Horizontal Comparison of Different Enterprises in the Same Time Period

Secondly, this study will select another similar listed company in the same industry to make a side-by-side comparison of different enterprises in the same period with Beifang Huachuang . Similar to the previous steps, this study inquires all the relevant financial data from the listing of the case enterprise in 2022 until September 30, 2024, and calculates the X1 to X5 values for different periods and the Z values for the corresponding years, which leads to the following Table 2.

Table 2. Financial data and Z-value of Hua Hai Qing Ke from 2022 to September 30th, 2024

Particular Year	X1	X2	X3	X4	X5	Z-value
2024 (as of 9/30)	0.49	0.19	0.07	8.03	0.22	6.12
2023	0.55	0.16	0.09	8.29	0.28	6.43
2022	0.59	0.1	0.07	7.89	0.21	6.02

In this study, Hua Hai Qing Ke (listed in 2022) is selected as another case study company to study the cross-sectional comparison of the financial indices and financial risk rating of two different enterprise companies in the same industry for the years 2022 and 2023. The X1 to X5 values and the Z-values of the corresponding years from 2019 to 2023 of Beifang Huachuang are detailed in Table 1 above, and the X1 to X5 values and the Z-values of the corresponding years from 2022 to September 30, 2024, of Hua Hai Qing Ke are detailed in Table 2 above. After calculating the Z-values of Beifang Huachuang for the years 2022 and 2023, the Z-values of Beifang Huachuang are 3.06 and 4.08, and the Z-values of Hua Hai Qing Ke for the years 2022 and 2023 are 6.02 and 6.08, respectively. This study concludes that both listed companies in the same industry are in the low probability of bankruptcy zone in 2022 and 2023, and the financial risk level of Beifang Huachuang Company is in a more dangerous zone in these two years compared to that of its counterpart company, Hua Hai Qing Ke Company. By observing the data of both, this study finds that the root cause of this phenomenon is because the values of bankruptcy factors X1 and X4 of Hua Hai Qing Ke are much larger than that of Beifang Huachuang, even though the value of X5 of Hua Hai Qing Ke is smaller than that of Beifang Huachuang, and the weights of the X1 and X4 items in the formula are higher, which lead to the fact that Beifang Huachuang is in a more risky zone in the past two years compared to that of Hua Hai Qing Ke. In order to be in a safer financial risk zone, Beifang Huachuang needs to increase its current assets and reduce its current liabilities as much as possible, increase its market capitalization, and reduce its total liabilities, including both current and non-current liabilities, in order to lower the financial risk to the business.

5. Analysis of the causes of the financial crisis of Beifang Huachuang

By calculating the Z-value of the case companies in recent years, it is concluded that the financial risk of Beifang Huachuang is in a safe zone from 2019 until 2023, and the specific insolvency factor X-value of Beifang Huachuang from 2019 to 2023 is detailed in Table 1 above.

(1) Excessive Total Debt and Unstable Financial Structure. Even though the financial risks are all in the safe zone, the Z value of Beifang Huachuang in 2022 is lower as compared to others, indicating that the financial risks are higher in this year as compared to other years. What leads to this phenomenon is the value of X4, the value of X4 in 2022 is significantly lower than that of other years. The bankruptcy factor X4 reflects whether the basic financial structure of the firm is stable or not, which indicates that the financial structure of Beifang Huachuang in 2022 is relatively unstable, the case firm should try to increase the market value of the stock and reduce the current and long term debt so that it can stabilize the financial structure of the firm and make the value of X4 increase.

(2) Unstable market values. Beifang Huachuang's financial risk in 2021 is significantly lower than in other years, and this phenomenon is also rooted in the X4 value, from 2019 to 2023, Beifang Huachuang's X4 value in 2021 is the highest among these five years. By checking the various financial indicators of Beifang Huachuang in these five years, the market value of Beifang Huachuang

in 2021 is the highest in these five years, and the total liabilities are also the lowest in the same level of indicators, which leads to its X4 value is much higher than the other years, which indicates that the corporate financial structure of Beifang Huachuang in 2021 is quite stable. The X4 value of Beifang Huachuang in 2019, 2022, and 2023 is lower in comparison to the other years, which makes the Z-value unstable, and by observing this this paper finds that the Z-values of these three years are lower than those of 2020 & 2021.

(3) Excessively low working capital. In 2020, the financial risk rating of NLT is in the safe zone, however, its X1 value is the lowest in these five years, and increasing the X1 value can make NLT less financially risky on this basis. The reason for its lower X1 compared to other years is lower current assets and higher current liabilities.

6. Countermeasure Suggestions to Enhance the Level of Financial Risks in Beifang Huachuang

The above factors may cause Beifang Huachuang to experience a financial crisis or create an unstable risk level. By examining the data that may lead to financial risk in Beifang Huachuang, this study gives the following recommendations.

(1) Because of the low X4 value in 2022, which leads to low Z value, it is recommended to continue its operation mode in 2021, seize the growth opportunities, try to increase the market value of the stock, increase the numerator value of X4 value, and try to reduce the current liabilities and long-term liabilities in order to reduce the denominator value of the X4 value in order to increase the X4 value, and finally the Z value will be increased, and the reduction of liabilities will make the company's financial structure more stable.

(2) Unstable market value will lead to unstable Z-value, the control of market value is very important, it is recommended to maintain the innovation of product manufacturing and the research and development of the product itself, to attract more investment, which can be used to increase the capital operation of the enterprise. At the same time to strengthen the management of the enterprise to improve the efficiency and competitiveness of the enterprise. These factors can directly or indirectly affect the market value. Try to increase the market value and stabilize the total debt.

(3) The X1 value of Beifang Huachuang is low in 2020 relative to other years, this is due to its low numerator value, it is recommended to increase the numerator value by increasing current assets and minimizing current liabilities to increase the X1 value, it is especially important to increase the current assets, there is less chance that it will not be able to pay its debts if it has more current assets. Beifang Huachuang can increase its current assets by implementing a pay-as-you-go collection model to its customers.

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