Research on Financial Risk Early Warning of New Energy Vehicle Enterprises Based on the Z-score Model: A Case Study of BAIC BluePark

Yujia Deng

School of Accounting, Hunan University of Finance and Economics, Changsha, Hunan, China
D18229748727@outlook.com

Abstract. For the country's economy to grow in a sustainable and environmentally friendly manner, China has issued relevant policies to promote progress in new energy, which has created favorable development conditions and rare opportunities for new energy vehicle enterprises. However, due to the development of the new energy vehicle industry market and changes in policies, enterprises will face varying degrees of financial risks. As one of the first enterprises in China to layout the new energy vehicle industry, BAIC BluePark has effectively driven the new energy vehicle industry to a new level. Therefore, the article selects BAIC BluePark as the research object, uses the Z-score model and relevant financial indicators to conduct early warning evaluation calculation, analyzes the significant financial risks in BAIC BluePark, and proposes corresponding risk control measures for the risks, which has certain reference significance for similar new energy vehicle enterprises. This study can provide a theoretical basis and practical guidance for improving the financial risk management of the new energy vehicle industry, and is of great significance for promoting the stable and sustainable development of the entire industry under the background of green transformation.

Keywords: Z-score model, New energy vehicles, Financial risk.

1 Introduction

China solemnly proposed carbon peak and carbon neutrality goals in September 2020, with plans to achieve them in stages by 2030 and 2060, known as the "dual carbon" goals. Based on the current situation, the green economy has been deeply integrated into the high-quality development layout of China's economy [1]. With the gradual improvement of relevant policies, the importance of new energy vehicles in the automotive industry has become increasingly prominent, attracting the attention of many investors and consumers. It cannot be ignored that the development of new energy vehicle enterprises will still face risks such as adjustments to new energy subsidy policies, intensified market competition, and a decline in average product prices, which greatly restrict the sustained operation and growth of enterprises [2].

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Therefore, new energy vehicle companies need to pay close attention to financial risks, effectively control emerging financial risks, and promote sustainable development of the enterprise. The research focus on financial risk warning at home and abroad is mostly focused on the real estate and pharmaceutical fields. The development of new energy vehicle enterprises is closely related to ecological environment protection, scientific and technological progress, and other aspects. Effectively preventing financial risks of new energy vehicle enterprises not only promotes the construction of an environmentally friendly society, but also promotes the optimization and upgrading of China's energy consumption structure [3].

As an early explorer in China's new energy vehicle industry, BAIC BluePark New Energy Technology Co., Ltd. focuses on the research and development, manufacturing, and sales of new energy vehicles, actively laying out the entire electric vehicle industry chain [4]. The company has established brands such as Jihu and Beijing Automotive, and has achieved success in the domestic market. It is actively expanding into international markets.

This article focuses on the financial risk issues of BAIC BluePark from the perspective of the Z-score model. Firstly, by collecting company annual report data and applying the Z-score model for early warning evaluation calculation, key indicators related to financing, operation, and investment risks are extracted as the data source for analysis. Next, present the warning levels of the Z-score model from 2019 to 2023, and conduct trend analysis on the data of X1-X5 and related indicators of financing, operation, and investment risks to determine which part of the risk comes from. Finally, based on the results of data analysis, the causes of risk formation are fundamentally analyzed, and targeted response strategies and optimization suggestions are proposed.

2 Financial Risk Identification of BAIC BluePark

The dataset for this article is sourced from Dongfang Wealth Network, Yingwei Wealth Information, and Juchao Information Network. Its data content is obtained from regular reports and official announcements of listed companies, and it has good authority and verifiability.

2.1 Financing Risk

BAIC BluePark mainly relies on debt financing and equity financing as its main fundraising channels. In the past five years, the proportion of cash received from borrowing by BAIC BluePark to cash from financing activities has been 85.94%, 93.12%, 62.16%, 97.41%, and 62.17%, respectively. Its main financing channel is borrowing. A single financing method will not only increase the difficulty of raising funds for enterprises, but also bring repayment pressure to enterprises that need to repay principal and interest on schedule.

Whether a company has financing risks can often be reflected by its ability to repay debts. It is generally believed that a current ratio of 2 is reasonable, and a normal quick ratio of 1 is maintained. As shown in Table 1, the current ratio of BAIC BluePark has shown a downward trend and has not yet reached a reasonable value. The quick ratio has dropped to 0.71, which is lower than the normal value, indicating that BAIC

BluePark's ability to repay short-term debts is gradually declining. From industry experience, a debt to asset ratio of 40% to 60% is a relatively healthy range for enterprises, while the debt to asset ratio of BAIC BluePark is always above 70%, indicating a significant proportion of funds raised through debt. In order to maintain normal development, BAIC BluePark often uses borrowing methods. As the debt scale continues to expand, but its repayment efforts are small, it will face the potential risk of defaulting on maturing debts.

Table 1. Risk Analysis Indicators for BAIC BluePark Fundraising from 2019 to 2023.

index	2019	2020	2021	2022	2023
current ratio	1.50	1.36	1.31	0.91	0.80
quick ratio	1.31	1.17	1.24	0.74	0.71
asset liability ratio(%)	70.15	73.91	70.10	79.90	77.41

2.2 Investment Risk

The development of the new energy vehicle industry is closely related to the adjustment of national policies and the level of technological development, and therefore faces certain potential investment risks [5]. As shown in Table 2, although the sales gross profit margin and operating profit margin of BAIC BluePark have fluctuated, they are still negative, indicating that they will still be in a loss making state in 2023, due to significant increases in cost investment in sales, management, and research and development. The return on total assets has decreased year by year from 0.18% to -17.38%, indicating that the company's ability to create profits from assets is somewhat lacking. This is due to the increased investment in research and development of core components and marketing by BAIC BluePark after its shell listing in 2018, as well as the emergence of many new energy vehicle companies and the shrinking market share of BAIC BluePark. As a result, the implemented business strategy has not been effective, and it has been in a loss making state for several consecutive years. Its profitability is at a low level in the industry, and the investment return rate is difficult to meet expectations, leading to increasing investment risks.

Table 2. Investment Risk Analysis Indicators of BAIC BluePark from 2019 to 2023.

index	2019	2020	2021	2022	2023
operating margin(%)	-0.70	-124.41	-59.55	-57.02	-37.35
gross margin(%)	9.30	-28.82	0.81	-5.20	-7.97
return on total assets(%)	0.18	-12.62	-12.68	-15.52	-17.38

2.3 Operating Risk

Whether a company has hidden operational risks is to some extent influenced by financial credit and inventory management. As shown in Table 3, the total asset turnover rate decreased to 0.27 times in 2022. Although it rebounded slightly in 2023, it was lower than the industry average of 0.74 times, indicating that the company has not fully utilized its total assets. This is due to the current reduction in people's consumption, but

the fierce competition in the new energy vehicle market has squeezed its market share. The decline in sales of BAIC BluePark directly led to slow growth in operating income. The accounts receivable turnover rate has been declining since 2019 and has improved to 2.45 times in 2023, but far below the industry average of 10.46 times. This indicates that the collection speed of BAIC BluePark's accounts receivable is downstream of the industry, and there is a high risk of bad debts, which will affect the normal turnover of cash flow. The inventory turnover rate decreased from 6.69 times to 6.49 times, especially in 2020 when it dropped significantly to 1.38 times, indicating that the company may have accumulated a large amount of inventory due to a decrease in demand and inappropriate sales strategies that year.

Table 3. Risk Analysis Indicators for BAIC BluePark Operations from 2019 to 2023.

index	2019	2020	2021	2022	2023
total asset turnover	0.45	0.10	0.21	0.27	0.46
accounts receivable turnover rate	1.23	0.27	0.56	0.98	2.45
inventory turnover rate	6.69	1.38	3.24	4.60	6.49

3 Financial Risk Assessment of BAIC BluePark Based on Z-score Model

3.1 Introduction to Z-score Model

The Z-score model was proposed by American scholar Altman in 1968 and is a financial analysis tool for predicting the risk of corporate bankruptcy [6, 7]. This model is different from the commonly used univariate analysis method, based on multivariate statistical methods. By analyzing the financial statement data of the enterprise and assigning different weights to each indicator, a Z-score comprehensive score is obtained to evaluate the possibility of the enterprise facing financial difficulties.

The calculation process of the Z-score model is shown in equation (1).

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.999X5 \quad (1)$$

This model divides the financial risks of enterprises into three levels: when Z<1.81, the enterprise is in a high-risk area and has a higher possibility of bankruptcy; When 1.81⩽Z<2.99, the enterprise is in a gray area, facing certain financial difficulties and an unstable situation; When Z⩾2.99, the enterprise is considered financially healthy and has low bankruptcy risk.

The meaning and calculation method of Z-score model indicators are shown in Table 4.

Table 4. Meaning and Calculation Method of Z-score Indicator.

Independent variable name	Variable calculation formula	The ability of variables to reflect
X1	Working capital (current assets - current liabilities)/total assets	Reflecting the liquidity and short-term solvency of the enterprise
X2	Retained earnings (undistributed profits+surplus reserves)/total assets	Reflecting the cumulative profitability of the enterprise
X3	EBIT (total profit+financial expenses)/total assets	Reflect the asset profitability of the enterprise
X4	Market value of shareholder equity (market value per share × total share capital)/total liabilities	Reflecting the stability of a company's financial structure
X5	Operating revenue/total assets	Reflecting the asset operation efficiency of the enterprise

3.2 Establishment of BAIC BluePark Z-score Model

The Z-score model can comprehensively consider the financial situation and operating results of a company. As shown in Table 5, the Z-score model of BAIC BluePark from 2019 to 2023 was all lower than the high-risk zone boundary value of 1.81, indicating that the enterprise has significant financial risks.

Table 5. Z-score model of BAIC BluePark from 2019 to 2023.

independent variable	2019	2020	2021	2022	2023
X1	0.26	0.18	0.15	-0.06	-0.13
X2	0.00	-0.15	-0.30	-0.55	-0.74
X3	0.01	-0.13	-0.12	-0.16	-0.16
X4	0.49	0.94	1.57	1.02	1.43
X5	0.40	0.12	0.22	0.30	0.46
Z value	1.02	0.25	0.53	-0.44	-0.39

Among them, X1 can reflect the liquidity and short-term solvency of the enterprise. As shown in Figure 1, X1 shows a decreasing trend. The decline was significant in 2022, from 0.15 to a negative value of -0.06, and reached -0.13 in 2023. Based on the analysis of financial statements, current assets showed an overall downward trend, while current liabilities increased year by year from 2021 to 2023, exceeding the value of current assets in 2022. This is because BAIC BluePark did not fully consider its own situation, excessively expanded its business scale and was eager to seize market share, which increased its debt. However, its sales ability was lacking, resulting in a smaller than expected return of funds and an increasingly tight cash flow to maintain daily operations. The continuous decrease in X1 in the past 5 years indicates that BAIC BluePark's short-term debt repayment ability is gradually weakening, and there is greater pressure to repay its debts.

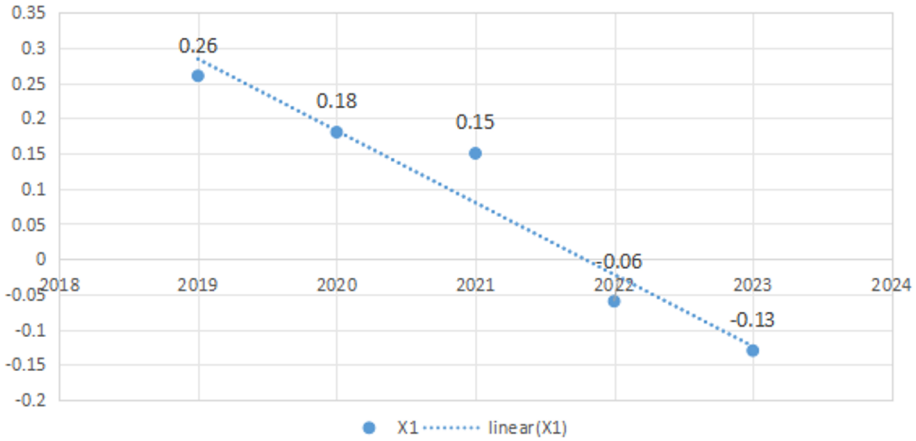

Fig. 1. X1 Value Trend Chart (Picture credit: Original).

X2 can reflect the accumulated profits per unit of assets of a company, reflecting the company's cumulative profitability [8]. As shown in Figure 2, X2 decreased from 0 in 2019 to -0.74 in 2023, as the company's undistributed profit decreased from -189 million yuan to -22.78 billion yuan, indicating that the company was in a loss making state in 2019. The continuous decline of X2 in the past 5 years indicates that the profitability of BAIC BluePark is poor, lacking sustainable competitive advantages, and the investment return rate is lower than expected.

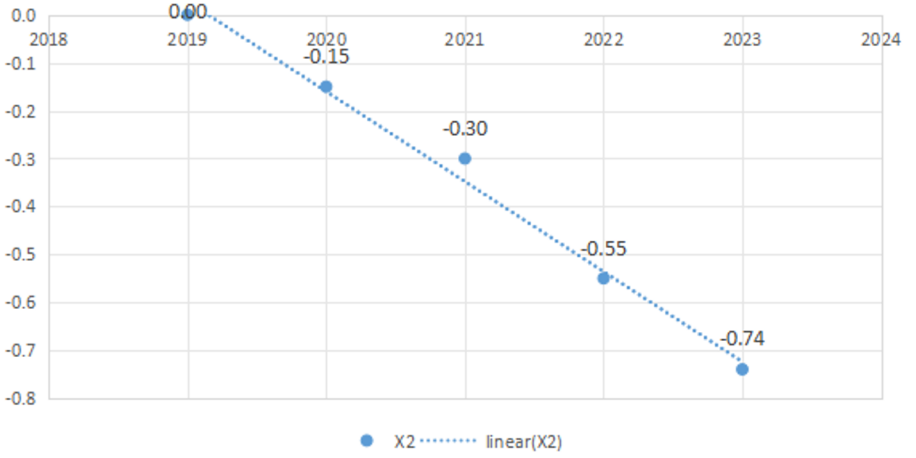

Fig. 2. X2 Value Trend Chart (Picture credit: Original).

In the Z-score model, X3 has the highest weight proportion and is the key to risk assessment. As shown in Figure 3, X3 shows a downward trend and has been negative for four consecutive years since 2019, indicating a decrease in the company's ability to

generate profits and insufficient utilization of funds. The main reason is that the company's pre tax profit decreased from 327 million yuan to -4.931 billion yuan, and it will still be in a loss until 2023, without improvement. This phenomenon is due to the withdrawal of subsidies for new energy vehicles and the emergence of new enterprises in 2020, which intensified market competition and escalated price wars. In order to promote product high-end development, BAIC BluePark continued to invest in technology research and development, resulting in increased costs. In 2022, it was also affected by the rise in upstream raw material prices and the increase in costs of components such as power batteries, further squeezing profit margins.

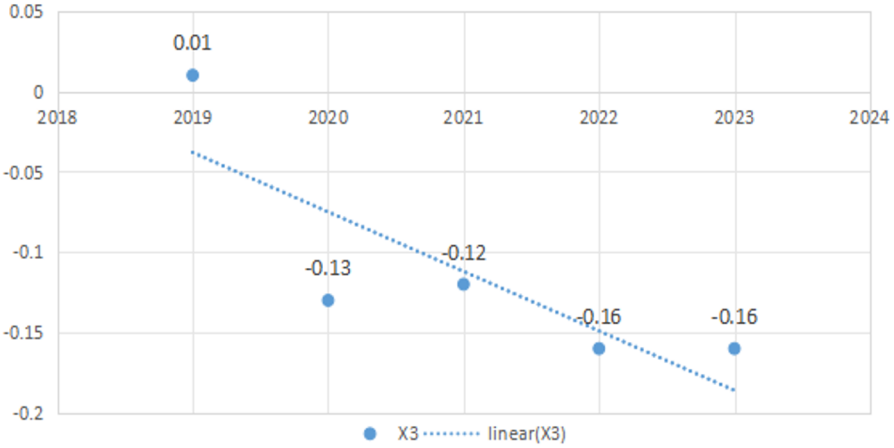

Fig. 3. X3 Value Trend Chart (Picture credit: Original).

X4 measures the reliability of a company's basic financial structure. As shown in Figure 4, the value of BAIC BluePark X4 is fluctuating, reaching a maximum of 1.57 and a minimum of only 0.49. From this, it can be seen that the financing structure of BAIC BluePark lacks stability, and the gap between the market value of shareholder equity and total liabilities is relatively small. This is due to the failure to convert investment into economic benefits in a timely manner, slow revenue growth, and sustained huge losses that have led to a continuous decline in the market value of shareholder equity. In addition, the asset liability ratio of BAIC BluePark has been at a high level, maintaining high debt operations for a long time, resulting in a narrowing gap between the total debt and the market value of shareholder equity. However, a reasonable capital structure often requires a significantly higher proportion of equity funds than debt funds, in order to provide protection for creditors' funds [9].

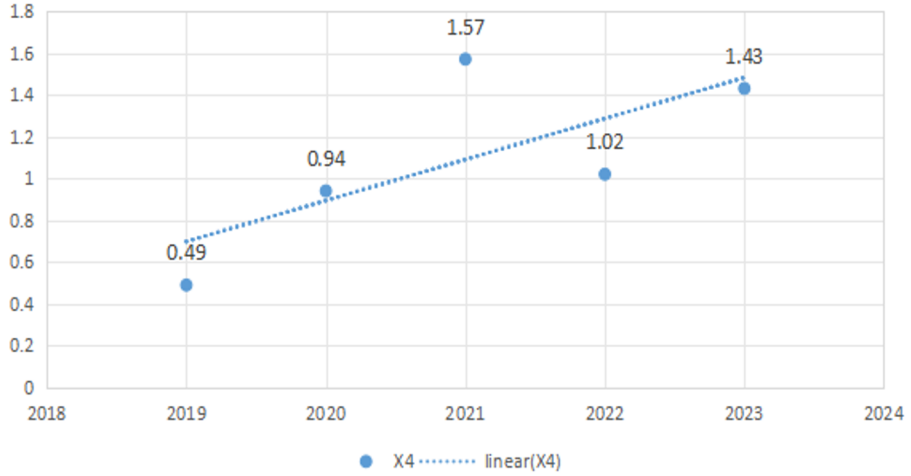

Fig. 4. X4 Value Trend Chart (Picture credit: Original).

4 Financial Risk Control Measures of BAIC BluePark

BAIC BluePark regards debt financing as its main financing channel, resulting in a large amount of borrowing and excessive debt repayment pressure, which in turn increases the company's financing risk. Enterprises should adopt ways to broaden their financing channels and optimize their capital structure to improve this dilemma. They should raise funds through public and non-public stock issuances, reasonably increase the proportion of social capital in their equity structure, and combine financing methods based on their advantages and disadvantages to reduce financing risks. By adjusting the structure and scale of interest bearing liabilities, enhancing the liquidity of funds, improving the debt paying ability of enterprises, and providing financial support for the normal operation of enterprises.

Implementing strict cost and expense control strategies can effectively improve the operational efficiency of enterprises and promote the enhancement of overall profitability [10]. Faced with the continuous increase in R&D investment in new products, BAIC BluePark should scientifically control the allocation of costs and effectively supervise the implementation of cost and expense control systems. On the basis of ensuring product quality and performance, it should broaden the range of price adjustments, avoid a significant decrease in profits due to price reductions, and present accurate cost data information to the leadership to make reasonable decisions.

The accounts receivable management work of BAIC BluePark has improved in the past three years, but there is a significant gap compared to the industry average. Therefore, it is necessary to improve the accounts receivable system and reduce the risk of bad debts. Establish a customer credit evaluation system in advance, implement differentiated credit sales strategies based on different customer credit ratings, track payment

progress in real-time, and adjust accounts receivable management based on the customer's recent financial situation. When facing the failure to collect accounts receivable in a timely manner, various collection methods should be adopted, actively negotiating with customers, and if necessary, judicial means can be taken to safeguard legitimate interests.

Establish a scientific financial risk warning and control mechanism, regularly evaluate the financial health status, timely and accurately identify financial risks, and develop solutions. Using diversified risk assessment models, conduct in-depth analysis of market risks and risks caused by new energy policy adjustments. In addition, establish a sound financial management system, strengthen financial audits and daily supervision of branch offices, and prevent the occurrence of financial fraud.

5 Conclusion

This study is based on the Z-score model to conduct early warning research on the financial risks of BAIC BluePark. BAIC BluePark is at high risk and has a high possibility of bankruptcy under the evaluation of the Z-score model. Through trend analysis and calculation of various variables of Z-score model and related indicators of financing, investment and other risks, it was found that the reasons for the high financial risk of BAIC BluePark are unreasonable capital structure and lax cost control. To effectively resolve these difficulties, it is necessary to establish a comprehensive response strategy, such as optimizing capital structure, strengthening cost and expense control, and building a systematic risk management system to identify and prevent potential financial risks. In addition, always pay attention to the dynamics of new energy policies and market environment, in order to adjust business strategies in a timely manner and effectively prevent potential financial risks. With the rapid rise of the new energy vehicle industry, the financial risks faced by enterprises have become increasingly complex. In the future, it is necessary to further deepen the research and exploration of risk assessment and prevention mechanisms.

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