

# Literature Review on Financial Risks of New Energy Vehicle Enterprises

Lihui Wang\*, Dongwei Shi, Han Chen

School of Management, Sichuan University of Science & Engineering, Zigong 643000, Sichuan, China

\* Corresponding author

**Abstract:** In recent years, new energy vehicle enterprises have been affected by many factors, such as the impact of the epidemic, rising raw material prices and subsidies withdrawal, and the development of enterprises has faced severe challenges, and the problem of internal financial risks has come to the fore. This paper summarizes the relevant literature on the financial risks of new energy vehicle enterprises, the screening of early warning indicators and the assignment method, with a view to providing scholars with in-depth research and innovation on the financial risk early warning indicator system of new energy vehicle enterprises, and providing theoretical guidance for new energy vehicle enterprises to resist financial risks.

**Keywords:** New energy vehicle enterprises, Financial risk, Early warning indicators.

## 1. Introduction

In the context of global carbon neutrality, new energy vehicles have become an inevitable trend in the development of the automobile manufacturing industry. China clearly proposed at the 77th session of the United Nations General Assembly that it should always adhere to the general direction of low carbon without wavering, promote the transformation and upgrading of energy resources, strengthen ecological and environmental protection, and enhance the green development capacity of developing countries. In July 2022, the Ministry of Industry and Information Technology (MIIT), the National Development and Reform Commission (NDRC) and the Ministry of Ecology and the Environment (MEE) announced the development of new energy vehicles, which have the advantages of cleanliness, low cost, low emissions and high energy efficiency, and are a key breakthrough for the automotive industry to solve the energy transition problem and achieve the dual goals of "carbon peaking" and "carbon neutrality". In July 2022, the Ministry of Industry and Information Technology, the National Development and Reform Commission and the Ministry of Ecology and Environment jointly issued the "Implementation Plan for Achieving Carbon Peaks in the Industrial Sector", which proposed: "Increase the supply of green and low-carbon products in the transportation sector. The Ministry of Industry and Information Technology (MIIT), the National Development and Reform Commission (NDRC) and the Ministry of Ecology and Environment (MEE) jointly issued the "Implementation Plan for Carbon Peaking in the Industrial Sector", which proposed: "Increase the supply of green and low-carbon products in the transportation sector. Subsequently, the Ministry of Industry and Information Technology held a series of conferences on "Industrial and Information Technology Development in the New Era", which emphasized that new energy vehicles are the main direction for the transformation and upgrading of the global automobile industry and green development, as well as a strategic choice for the high-quality development of China's automobile industry. At present, China's new energy vehicle industry is in the stage of rapid expansion of development, 2022, China's new energy vehicle sales of up to 6.887 million

units, has ranked first in the world for eight consecutive years production and sales scale.

However, the development of new energy vehicle enterprises still faces many challenges. On the one hand, the cost pressure on new energy vehicle companies has increased due to the decline in subsidies for new energy vehicles, the global chip shortage and the sharp rise in upstream raw material prices for batteries. On the other hand, the construction of supporting infrastructure for new energy vehicles is still immature, with problems such as "difficult" and "slow" charging coming to the fore, making consumer acceptance of new energy vehicles more limited. In addition, factors such as the dotted outbreak of the epidemic, the long payback period of the new energy vehicle industry and the increasingly fierce competition in the industry have also made the survival pressure on new energy vehicle companies high. The construction of a sensitive and accurate financial risk early warning indicator system, the early perception of risks and the timely revision of development strategies are necessary for the sustainable development of enterprises. This paper summarises the literature on the financial risk of new energy automotive enterprises, the screening of financial risk early warning indicators and the assignment methods at home and abroad, with a view to providing insights for new energy automotive enterprises to do a good job in financial risk early warning.

## 2. Research on the Financial Risks of New Energy Vehicle Enterprises

By combing through the relevant foreign literature, we found that only a few foreign scholars have conducted research on the financial risks of new energy vehicle enterprises, and mainly focused on the impact of industry policies and costs on financial risks.

Bo Z (2014) used the Hotelling model to analyse the impact of fiscal policy on the new energy vehicle industry in Japan and showed that the level of government tax cuts and R&D subsidies for the industry were significantly associated with the financial risk faced by the industry. Erin H. Green et al (2014) stated that policies for the new energy vehicle industry should not focus on mainstream markets and that industry that

focuses on mainstream markets policies have proven to be inefficient and should focus on niche markets to create more economic benefits and improve the financial security of firms. Aguilar Susanna D (2015) argues that the tight supply and high cost of key materials needed to manufacture new energy vehicles hinders the growth of the new energy vehicle industry and that firms should adopt appropriate risk management strategies to mitigate the supply chain risk of raw materials. Aybike Ongel (2019) uses the total cost of ownership method to compare the life-cycle costs of new energy vehicles with those of conventional vehicles and shows that the life-cycle costs of new energy vehicles are significantly lower than those of conventional vehicles. He points out that this advantage helps to increase the market penetration of new energy vehicles and reduces the probability of financial crises for companies.

Scholars in China point out that the new energy vehicle industry, as a new industry, faces many challenges in the process of development, and needs to carefully analyse the financial risks of the industry, find the causes of the risks and achieve precise prevention in order to promote the sustainable and healthy development of the industry.

Ma Shanxia and Liu Xilin (2019) calculated and analyzed the financial risk level values of 15 new energy automotive companies using the Z scoring model, and the results showed that the financial situation of the companies was deteriorating and they were facing greater financial risks. Kelei Ma and Xiaoxia Ke (2019) analyzed the operating conditions of 28 new energy vehicle companies as a research sample with the help of factor analysis, and the results showed that new energy vehicle companies have unreasonable capital structure and incomplete cash flow management, which weaken the anti-risk ability of the enterprises. He Jiongmei (2021) conducted an empirical study of 36 new energy vehicle companies using the F-score model, which showed that the withdrawal of industry subsidies has exacerbated the financial risk of the industry. Li Liang (2021) points out that the current financial risks of the new energy automobile industry mainly come from three aspects: first, the dependence on imports of key raw materials, the fluctuation of exchange rate and the rise of interest rate increase the uncertainty of the industry development; Second, the investment cost of the new energy automobile industry is high and the payback period is long, so the enterprise is facing greater financial pressure; Third, the gradual decline of industry subsidies and the improvement of technical restrictions on subsidies force the industry to shift from policy-oriented to market-oriented, but the market competitiveness of products is still insufficient. Zhao Zheng (2022) believes that the new energy vehicle industry has problems such as insufficient chip supply, unreasonable vehicle-pile ratio and poor low-temperature performance. He points out that the technical innovation of vehicle chips should be accelerated, the core competitiveness of domestic chips should be improved, the use of home charging piles should be encouraged, the layout of public charging piles should be rationalised, fast charging piles should be actively developed, all-climate power batteries should be developed and the efficiency of the battery thermal management system should be improved. Li Yan (2022) argues that the new energy vehicle industry is facing greater financial pressure in the development process due to the intensification of subsidy withdrawal, insufficient financing channels and unreasonable debt size, pointing out that new energy vehicle enterprises should broaden financing channels, optimize the financing

term structure, strengthen the management of funds, build a financial risk early warning system and improve the corporate governance mechanism to help achieve the dual carbon goal.

### **3. Research on Early Warning Indicators for Financial Risks**

Through the continuous exploration of scholars, the selection of early warning indicators has undergone an evolution from a single financial indicator, to a more comprehensive financial indicator system, and then to a more scientific combination of financial and non-financial indicators.

#### **3.1. Early warning risk on financial indicators**

Firzpatrick (1932) examined the risk warning ability of 13 financial indicators for a sample of 19 firms and found that the profit margin on equity and the debt ratio on shareholders' equity had the lowest misjudgment rate. Ohlson (1980) selected 9 financial indicators, such as asset-liability ratio, liquidity ratio and asset income ratio, and built a Logistic financial risk warning model. The study found that enterprise size, enterprise performance, capital structure and liquidity ability are closely related to the financial security of enterprises. Wang Jian (2022) selected 11 financial indicators, such as current ratio, return on net assets and total assets growth rate, from four financial directions: solvency, operational capacity, profitability and operating capacity, and constructed a financial early warning indicator system for electric power companies.

#### **3.2. Financial indicators combined with non-financial indicators for early warning risks**

De (2013) argues that a company's financial risk is significantly related to non-financial indicators such as external economic environment and political factors. De Mooij (2017) et al. pointed out that non-financial indicators such as price-to-earnings ratio, stock price and issue volume of listed companies can be used as measures of financial risk. Xiong Yi and Zhang Youtang (2019) introduced four types of non-financial indicators, including indicators of the degree of surplus management, market price, governance structure and auditor-related indicators, and constructed a new financial risk early warning model based on the F-score model. Zhang Youtang (2020) introduced financial indicators as well as non-financial indicators for financial risk early warning, which improved the accuracy of risk early warning. Wang Baodong and Zhang Lin et al. (2022) pointed out that incorporating non-financial information into the financial risk early warning system could effectively compensate for the shortcomings of traditional financial information. The paper introduced ESG variables into the logistic financial risk early warning model and found that the early warning model incorporating ESG variables had a higher accuracy rate compared to the traditional model.

### **4. Study on the Method of Assigning Weights to Financial Risk Early Warning Indicators**

Financial risk early warning index weighting methods are divided into subjective methods and objective methods, among which, the objective method of principal component analysis and factor analysis are widely used, the subjective

method of analytic hierarchy process and gray relational degree method are also favored by the academic and business circles.

Umesh S. Mahtani and Chandra Prakash Garg (2018) used fuzzy hierarchical analysis to analyse the influencing factors of financial risk and ranked the importance of each influencing factor, while sensitivity analysis was used to test the robustness of the method and concluded that the method was robust. Li Sha (2019) used principal component analysis method to re-screen the initially selected financial indicators and construct a financial risk early warning indicator system for manufacturing enterprises. Qi Jiayong and Cai Yongbin (2019) selected a sample of 76 listed real estate enterprises and constructed a linear model by screening 12 financial indicator variables through factor analysis, and the results showed that low-risk real estate enterprises were more influenced by profitability and solvency. Chen Youxian (2022) used the grey correlation method to assign weights to nine financial indicators such as expenditure to income ratio and earnings per share and six non-financial indicators such as interest rate risk and market cycle rate, and used the grey system to predict the financial risk of enterprises. Wang Jiahong (2022) used principal component analysis to determine the weights of four financial indicators, including fixed asset turnover ratio, current asset turnover ratio, net assets per share and operating income per share. Guo Yuzhong and Li Tianshu (2022) constructed a financial risk assessment system applicable to public hospitals by assigning weights to 19 financial indicators in five major categories based on hierarchical analysis.

## 5. Literature Review

At present, in the research on the financial risk of new energy vehicle enterprises, foreign scholars mainly focus on the impact of a certain factor on the financial risk of the industry, while domestic scholars focus more on the comprehensive research on the causes and measures of financial risk. However, from a comprehensive perspective, the research literature on the financial risks of new energy vehicle enterprises is still very scarce. In terms of research on financial risk early warning indicators, scholars at home and abroad have changed from choosing a single financial indicator to predict the financial risk of enterprises to constructing a financial risk early warning indicator system based on multiple dimensions such as profitability, operating capacity, solvency and development capacity, etc. The selection of indicators has become increasingly scientific and precise, but only a few scholars have considered the influence of non-financial indicators on financial risk, and the research on the construction of financial risk early warning indicator system There is still room for improvement. On the method of assigning financial risk early warning indicators, the subjective method of assigning indicators mainly relying on experts' experience and the objective method of assigning indicators based on real data are both widely used, and new energy vehicle enterprises should choose the method of assigning indicators in accordance with the specific conditions of the enterprise, so as to prevent the financial risks of the enterprise while saving people, money and materials.

In conclusion, scholars at home and abroad have rich research results on the screening and assignment of financial risk early warning indicators, which can provide reference for new energy vehicle enterprises to carry out financial risk early warning. Of course, new energy vehicle enterprises also have

their own special characteristics, such as the current stage is greatly affected by the subsidy withdrawal policy, emphasizing technology research and development, etc. Scholars can incorporate government subsidies, technology research and development investment ratio and other characteristic indicators into the financial risk indicator system to establish a more reasonable and scientific financial risk early warning indicator system, so as to predict the financial risk of new energy vehicle enterprises more accurately.

## Acknowledgment

Adaptability Research of Disciplinary Background and Knowledge Integration Ability to the Learning of Accounting Transfer Majors of College Students of Sichuan University of Science & Engineering (JG-2212)

## References

- [1] Bo Z. Empirical study on Japan's fiscal policy to promote the development of emerging industries: Take new energy vehicles as example[C]// International Conference on Management Science & Engineering. IEEE, 2014.
- [2] Green Erin H, Skerlos Steven J, Winebrake James J. Increasing electric vehicle policy efficiency and effectiveness by reducing mainstream market bias[J]. *Energy Policy*, 2014,65:562-566.
- [3] Aguilar, Susanna D. Electric vehicle (EV) storage supply chain risk and the energy market: A micro and macroeconomic risk management approach[D]. Illinois Institute of Technology, 2015.
- [4] Aybike Ongel, Erik Loewer, Felix Roemer, Ganesh Sethuraman, Feng qi Chang, Markus Lienkamp.Economic Assessment of Autonomous Electric Microtransit Vehicles[J]. *Sustainability*, 2019, 11:648.
- [5] Ma Shanxia, Liu Xilin. Empirical study on financial crisis warning of listed companies of new energy automobile industry [J]. *China Collective Economy*, 2019(27):41-42.
- [6] Ma Kelei, Ke Xiaoxia. Analysis and evaluation of business performance of new energy automobile industry [J]. *China Business Theory*, 2019(10):162-163.
- [7] HE Jiongmei. Analysis on financial risk of Listed companies in new energy automobile industry [J]. *Modern Business*, 2021 (07): 165-168.
- [8] LI Liang. Research on financial risk and management control of new energy vehicle industry [J]. *Modern Economic Information*,2021(2):115-116.
- [9] ZHAO Zheng. Research on Development status and Challenges of Chinese New energy Vehicles under dual-carbon Goal [J]. *Business Economics*, 2022(08): 46-47+52.
- [10] LI Y. Research on financial risk of new energy vehicle enterprises [J]. *Industry & Technology Forum*, 2022, 21 (14):240-241. (in Chinese)
- [11] Fitzpatrick B. A comparison of rations of successful industrial enterprises with those of failed firms[J]. *Certified Public Accountant*, 1952,10(2) : 598-605.
- [12] Altman E I, Haldeman R G, Narayanan PZETA analysis:a new model to identify bankruptcy risk of corporations[J]. *Journal of Banking and Finance*, 1977, 1:29-54.
- [13] Ohlson J A. Financial Ratios and the Probabilistic Prediction of Bankruptcy[J]. *Journal of Accounting Research*,1980,18 (1):109-131.

- [14] Wang Jian. Research on financial risk early warning index system of Electric power Company [J]. Finance and Accounting Learning, 2022(13):33-35.
- [15] De Jong P. Risk Ratios, Odds Ratios, and the Rare Disease Assumption [J]. Social Science Electronic Publishing, 2013 (2):10.
- [16] De Mooij, Ruud A, Hebous S. Curbing Corporate Debt Bias[J]. Imf Working Papers, 2017(14):20-21.
- [17] Xiong Yi, Zhang Youtang. Research on financial risk early warning of listed companies based on F score [J]. Risk Management, 2019,(1):113-115.
- [18] Zhang Youtang. Research on early warning and Monitoring of Financing risk of Listed companies in Information Equipment Manufacturing Industry [J]. Finance and Accounting Monthly. 2020,(14).
- [19] Wang Baodong, Zhang Lin, Ma Zhongbao. Application of ESG rating in enterprise financial risk warning [J]. Investment and Entrepreneurship, 2022, 33(12):36-38.
- [20] Umesh S. Mahtani, Chandra Prakash Garg. An analysis of key factors of financial distress in airline companies in India using fuzzy AHP framework[J]. Transportation Research Part A Policy and Practice, 2018 (117): 87-102.
- [21] Li Sha. Financial risk prediction for listed companies using IPSO-BP neural network[J]. International Journal of Performability Engineering, 2019, 15(04), 1209-1219.
- [22] Qi Jiayong, CAI Yongbin. Research on financial risk evaluation of real estate listed companies [J]. Finance and Accounting Communication: Zhong, 2018 (9): 114-118.
- [23] Chen Youxian. Financial risk assessment method based on grey system theory [J]. Microcomputer Applications, 2022, 32 (4) : 139-136. 38 (7) : 43-47.
- [24] Wang Jiahong. Financial risk analysis of Midea Group's merger and acquisition of Kuka Company [J]. Commercial Accounting, 2022(15): Calculation, 2022(15):71-77.
- [25] Guo Yumeng, Li Tianshu. Construction of financial risk evaluation system of public hospitals based on Analytic Hierarchy Process[J]. China Health Economics, 2022, 41(9): 88-90.