

Financial Risk Analysis of Steel Enterprises Based on Z-score Model-Taking Gansu Jiugang Hongxing as an Example

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Abstract. Iron and steel enterprises, as one of the important pillar industries of China's manufacturing industry, play an important role in the national economic development. Based on the current development situation, iron and steel enterprises still have many deficiencies in the management and coping with financial risks. Therefore, this paper in Gansu province Jiugang Hongxing, for example, key analysis of Jiugang Hongxing financial risk existing in the process of operation problems, from the solvency, operating ability, profitability, three aspects of Jiugang Hongxing financial risk evaluation, using Z-score model assessment Jiugang Hongxing overall financial risk degree, in view of the cause of Jiugang Hongxing financial risk problems, put forward the strategy to deal with financial risk, aims to provide reference for the sustainable development of steel industry and reference role.

Keywords: Financial Risk, Z-score Model, Jiugang Hongxing, Financing Channel, Cost Management.

1. Research background

Iron and steel industry is the main pillar industry of the world's basic manufacturing industry, and its products are widely used in construction, vehicles, shipbuilding, household appliances, petrochemical and other fields. The development level of the iron and steel industry is the main standard of the industrialization level of a developed country. The world steel industry market presents a regional focus characteristic, China's steel production accounts for more than half of the world, China's steel industry is also an important part of the country's economic development, its development status has attracted much attention. In August 2022, China Iron and Steel Association issued the *Carbon Neutralization Vision and Low-carbon Technology Roadmap for the Steel Industry*, which clearly put forward the "two-carbon" technology path of China's iron and steel industry. By 2050, China's steel industry will achieve a total carbon dioxide emission reduced by 85% compared with 2020, the implementation of the double-carbon plan and the proposal of environmental protection policies, indicating that the steel industry will face more severe risks and challenges in environmental protection. In recent years, the output of China's iron and steel industry has shown a fluctuating growth trend. According to the National Bureau of Statistics, China's cumulative crude steel output in 2018 reached 928.3 million tons, up 6.6% year on year; and 996.3 million tons in 2019, up 7.1% year on year. China's COVID-19 production in 2020. At present, the situation of China's steel industry is still not optimistic, the steel industry, overcapacity, weak market demand, leading to a decline in the steel industry profits. In addition, iron and steel enterprises in the mining and research and development process of large funds, the enterprise financial pressure is greater, resulting in the iron and steel enterprises in the daily operation process has greater financial risks. Therefore, it is necessary to study the financial risk of the steel enterprises to reduce the financial development of the enterprises.

Zhao Xiangzhong and Zhang Ying studied the current financial situation of listed companies in Jiugang Hongxing by means of factor analysis, set the risk level of the enterprise from the operation factor, profit factor and debt repayment factor, established a comprehensive evaluation model of financial risk of listed companies in Jiugang Hongxing, and put forward suggestions and improvement measures based on the actual situation of Jiugang Hongxing [1]. Wang Junpeng used the factor analysis method to evaluate the financial risks of listed logistics enterprises, and put forward

solutions from four aspects: investment strategy, asset management, accounts receivable management and capital control [2]. Wang Xuefeng proposed and used the TOPSIS analysis method of entropy CRITIC synthesis and empowerment to study the financial risks of large real estate enterprises under different business models such as Vanke, Country Garden and Evergrande, constructed a perfect risk evaluation system, and objectively analyzed the causes of financial risks [3].

To sum up, domestic scholars have had a certain degree of research on the definition, causes and countermeasures to financial risks, but the research on the risks and countermeasures faced by the steel industry is still insufficient and comprehensive. This article first from the solvency, operating ability, profitability, three dimensions of Jiugang Hongxing financial risk of horizontal and longitudinal comparative study, then use Z-score model of Jiugang Hongxing overall financial risk evaluation, finally for the cause of Jiugang Hongxing financial risk, put forward a series of feasible countermeasures. Through the analysis of this case company, it can not only dig into the financial risk problems existing in the development of Jiugang Hongxing, but also further improve the management awareness of Jiugang Hongxing to actively deal with financial risks, so as to provide theoretical data support for the research work of financial risks in other domestic steel industries.

2. Important concepts and theoretical basis

2.1. The concept of financial risk

Financial risk can be divided into a broad sense and a narrow sense. The narrow sense of financial risk mainly refers to the financing risk caused by enterprises due to their debts and poor business activities [4]; In a broad sense, financial risk mainly refers to the possibility that business activities are affected by uncertain factors and the deviation of expected goals, which tends to view problems from the overall situation of the enterprise [5]. The broad sense of financial risk is more general, so this paper studies the financial risk, using the financial risk in the broad sense. The main reasons for the financial risks of enterprises include the lack of perfect and systematic financial management system, the awareness of financial risk prevention needs to be further enhanced, and the lack of rigor and science in financial decision-making [6]. Enterprises should take measures such as improving the financial fund management system, optimizing the organizational structure of the financial fund management, and implementing the intelligent financial risk management system to effectively deal with the financial risks [7]. In order to realize the effective financial management of enterprises, it is necessary to take the sources and characteristics of risks, properly analyze financial risks and put forward reasonable risk prevention measures [8]. Enterprises should strengthen financial risk management, identify, evaluate, control and monitor their financial risks, which is conducive to reduce the occurrence probability and influence degree of financial risks, and ensure the stable operation and sustainable development of the enterprise [9].

2.2. Z-score model

American scholars Altman (1968) using multiple linear evaluation method, create Z-score model, Z-score model is using five different individual indicators, asset liquidity ability, accumulated profitability, profitability, debt paying ability and operating ability, after a weighted variable comprehensive index, to evaluate enterprise financial risk degree and comprehensive operation[10].

The Z-value model is presented as follows:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5 \quad (1)$$

$$X_1 = \text{Working capital/Total assets} \quad (2)$$

$$X_2 = \text{Retained earnings/Total assets} \quad (3)$$

$$X_3 = \text{Profit before interest and tax/Total assets} \quad (4)$$

$$X_4 = \text{Market value of equity} / \text{Book value of total liabilities} \quad (5)$$

$$X_5 = \text{Operating income} / \text{Total assets} \quad (6)$$

The size of Z value is inversely proportional to the degree of financial risk of the company, that is, the smaller the Z value, the greater the financial risk of the company; the greater the Z value, the smaller the financial risk of the company. The evaluation criteria of the Z-value model is shown in Table 1; when the Z value is less than 1.20, there is a risk of bankruptcy, indicating that the enterprise is a crisis enterprise; the area between Z value is greater than or more than 1.20 or less than 2.90 is called “gray area”, indicating that the enterprise belongs to a risk-type enterprise; the Z-value is greater than 2.90, indicating that the test enterprise is in a safe area with good financial condition, and no bankruptcy risk belongs to the stable enterprise.

Table 1. Z-value evaluation criteria

Interval division	Interval evaluation	Evaluation
$Z < 1.20$	Bankruptcy zone	Crisis type
$1.20 \leq Z \leq 2.90$	Gray zone	Risk type
$Z > 2.90$	Safe zone	Robust type

3. Case study design

3.1. Case selection instructions

JIUGANG Hongxing overview. Gansu Jiugang Hongxing Iron and Steel Co., LTD. (hereinafter referred to as “JIUGANG Hongxing”) started in 1958, is a steel joint enterprise planned and constructed during the “first Five-Year” period of China, and also the largest diversified modern enterprise in the earliest construction period in northwest China, and both black and non-ferrous enterprises. After 63 years of construction and development, Jiugang Hongxing has initially formed six industrial sectors: iron and steel, non-ferrous metals, electric power, manufacturing, producer services and modern agriculture. Jiugang Hongxing has won the National May Day Labor Medal, National Advanced Unit and other honorary titles. In the new era, Jiugang Hongxing takes the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, bases on the new development stage, implements the new development concept, constructs a new development pattern, and focuses on the main line of “improving quality and efficiency, transformation and upgrading, upgrading the industrial foundation and the modernization of the industrial chain”.

Description of case selection of Jiugang Hongxing. In this article, Jiugang Hongxing was selected as the research object. On the one hand, Jiugang Hongxing, as one of the important steel production enterprises in China, has a certain popularity and influence, and has a certain market share and competitive advantage in the steel industry. As a listed company, Jiugang Hongxing's financial data can be relatively easy to obtain. As a representative enterprise in the steel industry, Jiugang Hongxing is faced with various typical financial risks in its operation process, such as capital pressure and market fluctuations. Through the in-depth analysis of its financial risks, the common financial risk factors and coping strategies in the industry can be summarized. On the other hand, through the analysis of the financial statements of Jiugang Hongxing, it can be roughly concluded that under the background of supply-side structural reform, the financial risk degree of Jiugang Hongxing in 2018-2022 is getting higher and higher, with the great probability of facing bankruptcy crisis, which has attracted wide attention in the steel industry. Therefore, this paper chooses Jiugang Hongxing as the case study object has certain representative and warning.

3.2. Case analysis technology and evidence data collection

Based on the existing financial risks and research results, this paper identifies financial risks from the three dimensions of Jiugang Hongxing solvency, operating capacity and profitability, forming a

theoretical framework for financial risk data research. Secondly, based on the background of The Jiugang Hongxing business strategy analysis, this paper calculates the Z value of The Jiugang Hongxing in 2018-2022 and evaluates the financial risk degree according to the Z-score model proposed by Altman (1968)[10]. Finally, according to the financial risk problems faced by Jiugang Hongxing and the causes of financial risks, we put forward measures to deal with the financial risks.

4. Risk identification of financial data of Jiugang Hongxing

This paper selects Gansu Jiugang Hongxing as the reference for the risk identification of financial data in Gansu iron and steel industry. Through the longitudinal and analysis of Jiugang Hongxing, the risk of its financial data is summarized. In order to effectively identify the financial risks of enterprises, this paper selects two steel enterprises of Nangang and Fangda Special Steel and Jiugang Hongxing for horizontal comparison. Through horizontal analysis and comparison, it can more effectively help Jiugang Hongxing to identify financial risks, and then help Jiugang Hongxing reduce the degree of financial risks and promote the development of enterprises. The three companies have similarities in enterprise size, solvency, operating ability, profitability and other aspects, and have strong comparability.

4.1. Solvency analysis

Debt repayment ability refers to whether the enterprise has the ability to pay cash and repay debt, which is the key to the healthy survival and development of the enterprise. Table 2 is the index of the solvency analysis of Jiugang Hongxing in 2018-2022. It can be seen that the current ratio of Jiugang Hongxing continued to rise by 0.16 in 2018-2021, showing a positive trend. In 2022, the current ratio affected by the epidemic decreased to 0.46, down by 0.13 compared with the previous year. The quick ratio increased in 2018-2020, but due to the downward economic pressure fell to 0.25 in 2021 and continued to decline to 0.23 in 2022. The overall balance sheet ratio fell by 6.27% in 2018-2021, and rose again to 72.3% in 2022. Through analysis, the establishment of subsidiary of operating capital; in addition, China's iron ore acquisition mainly depends on import, and iron ore is the main raw material of steel, the increase of steel cost, bring capital pressure to the enterprise, the Hongxing short-term debt pressure increased, debt repayment risk increased.

Table 2. Financial indicators related to the solvency of Jiugang Hongxing from 2018 to 2022

Year	2018	2019	2020	2021	2022
Current ratio	0.43	0.45	0.51	0.59	0.46
Quick ratio	0.22	0.24	0.27	0.25	0.23
Asset-liability ratio	73.39%	70.03%	70.21%	67.12%	72.30%

4.1.1. Current ratio

The current ratio is the ratio of current assets and current liabilities, that is, the ability of an enterprise to repay current debts with current assets. The data in Table 3 show that the fluctuation range of The Hongxing current ratio showed an overall upward trend, rising by 0.03. The fluctuation ratio of Nangang and Fangda Special Steel Co. also increased in 2018-2022, with a slight loss in the middle, but the overall value is still about 0.5 higher than that of Jiugang Hongxing. Compared with the average of the steel industry, Jiugang Hongxing's current ratio is about 0.4 below the average. This shows that Jiugang Hongxing liquidity is relatively insufficient, with poor short-term solvency, easy to appear debt crisis.

Table 3. Current ratio of Jiugang Hongxing, Nangang Stock and Fangda Special Steel from 2018 to 2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	0.42	0.45	0.51	0.59	0.46
Nangang Stock	0.77	0.93	1.07	0.95	0.84
Fangda Special Steel	1.79	1.42	2.25	1.56	1.16
The average value of the steel industry	0.88	0.89	0.95	0.89	0.77

4.1.2. Quick ratio

The quick ratio, also known as the acid test ratio, is a financial measure of a company's short-term solvency. Compared with the current ratio, the quick ratio is more stringent about the degree of financial risk. The data in Table 4 show that the Hongxing quick ratio increased by 0.05 from 2018 to 2020, which dropped to 0.23 in 2022 compared with 2021 due to the impact of the epidemic. Compared with Nangang and Fangda Special Steel, Jiugang Hongxing still has a gap of about 0.3 and 1.0; Compared with the average steel industry, Hongxing has a gap of about 0.3. This shows that Jiugang Hongxing short-term asset liquidity is poor, short-term solvency is poor, in the process of operation, it is very likely to appear the capital chain fracture.

Table 4. Quick ratio of Jiugang Hongxing, Nangang Stock and Fangda Special Steel from 2018 to 2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	0.22	0.24	0.27	0.25	0.23
Nangang Stock	0.54	0.63	0.74	0.65	0.64
Fangda Special Steel	1.39	1.19	1.93	1.41	0.97
The average value of the steel industry	0.59	0.58	0.65	0.59	0.53

4.1.3. Asset-liability ratio

The asset-liability ratio evaluates the dependence of the company on the debt by calculating the ratio between the total liabilities and the total assets. As can be seen from Table 5, Nangang and Fangda Special Steel in 2018-2022, the asset-liability ratio of Jiugang Hongxing decreased from 73.39% to 67.12% during 2018-2021, but the asset-liability ratio rose to 72.30% in 2022. Compared with Nangang and Fangda Special Steel, the asset liability ratio is about 20% higher; and the average asset liability ratio of the steel industry, it is also about 20% higher. The research shows that Jiugang Hongxing in the internal financing, the financing method is not reasonable, too much borrowing, resulting in the company's asset-liability ratio is high, the capital structure is not reasonable, the debt pressure is large, the debt solvency is weak, the financial risk is relatively large.

Table 5. Asset-liability ratio of Jiugang Hongxing, Nangang and Fangda Special Steel from 2018 to 2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	73.39%	70.03%	70.21%	67.12%	72.30%
Nangang Stock	51.91%	49.72%	49.59%	53.06%	58.83%
Fangda Special Steel	29.96%	47.03%	31.15%	51.24%	53.00%
The average value of the steel industry	54.29%	53.42%	53.08%	54.34%	56.51%

4.2. Analysis of operation capacity

The operating capacity of an enterprise mainly refers to the efficiency and benefit of the operating assets of an enterprise. The efficiency of the operating assets of an enterprise mainly refers to the turnover rate or turnover speed of the assets. As can be seen from Table 6, the inventory turnover rate of Jiugang Hongxing from 2018 to 2022 showed a fluctuating downward trend, the inventory turnover days increased to 56.31, and the total asset turnover rate decreased to 1.08, down 0.06 compared with

2018. The asset liquidity is poor, indicating that the operating capacity of Jiugang Hongxing is poor. The research shows that, compared with Nangang Stock and Fangda Special Steel, the early warning index set by Jiugang Hongxing does not conform to the actual situation of the company, and the index system cannot be set according to the current situation of the company. Jiugang Hongxing's production application and sales range is wide, and the market operation relationship is relatively complex, so it is very necessary to set the corresponding financial early warning management indicators for each business activity, and ensure that the designed crisis early warning indicators are practical.

Table 6. Financial indicators related to operating capacity of Jiugang Hongxing from 2018 to 2022

Year	2018	2019	2020	2021	2022
Inventory turnover rate	6.61	7.56	5.53	5.74	6.39
Inventory turnover days	54.42	47.60	65.02	62.64	56.31
The total asset turnover rate	1.14	1.78	0.91	1.16	1.08

4.2.1. Inventory turnover ratio

Inventory turnover reflects the speed and efficiency at which the company transforms its inventory into sales revenue annually by comparing the relationship between company sales and average inventory. As can be seen from Table 7, the inventory turnover rate of Jiugang Hongxing has decreased from 6.61 in 2018 to 6.39 in 2022, showing an overall downward trend, indicating that the capital utilization efficiency of Hongxing is low. Compared with Nangang and Fangda Special Steel, the inventory turnover is lower than the average of the steel industry. The research shows that the coordination ability of Jiugang Hongxing supply chain is poor, which increases the risk of inventory backlog and unsales, the efficiency of capital use is low, and the operating capacity is poor.

Table 7. Inventory turnover ratio of Jiugang Hongxing, Nangang Stock and Fangda Special Steel from 2018 to 2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	6.61	7.56	5.53	5.74	6.39
Nangang Stock	7.79	7.79	7.41	8.83	8.20
Fangda Special Steel	10.55	9.48	9.63	12.31	13.04
The average value of the steel industry	7.91	7.99	8.04	9.45	9.47

4.2.2. Inventory turnover days

The day of inventory turnover is an auxiliary index of inventory turnover, which reflects the circulation speed of enterprise inventory. As can be seen from Table 8, the inventory turnover days of Jiugang Hongxing increased by 1.9 from 2018 to 2022, indicating that the inventory management efficiency showed a downward trend. Compared with Nangang Group and Fangda Special Steel, there is a difference in inventory turnover days; compared with the average of steel industry, Jiugang Hongxing inventory turnover days are higher than the average of steel industry. It shows that the inventory management efficiency of Jiugang Hongxing is low, the operating capacity is still a large gap compared with the industry average, the liquidity capacity is poor, and the operating capacity needs to be improved.

Table 8. Inventory turnover days of Jiugang Hongxing, Nangang Stock and Fangda Special Steel in 2018-2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	54.4	47.6	65.0	62.6	56.3
Nangang Stock	46.1	46.2	48.5	40.7	43.8
Fangda Special Steel	34.1	37.9	37.3	29.2	27.6
The average value of the steel industry	53.3	55.4	59.2	46.6	48.6

4.2.3. Total asset turnover days

The number of days of total asset turnover is an important financial indicator, which refers to the time required for an enterprise to complete an investment. As can be seen from Table 9, the total asset turnover days of Jiugang Hongxing in 2018-2022 decreased by 9.8 and 85.7 respectively in 2019 and 2021, while the other three years showed an upward trend, indicating that the asset utilization efficiency of Jiugang Hongxing is low. Compared with Nangang Steel and Fangda Special Steel, there is also a gap between the average value of the steel industry. It shows that Jiugang Hongxing is poor and the operating capacity needs to be improved, which is not conducive to the sustainable development of the enterprise.

Table 9. Total assets turnover days of Jiugang Hongxing, Nangang and Fangda Special Steel in 2018-2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	315.5	305.7	394.0	308.3	332.2
Nangang Stock	325.5	318.3	310.1	257.6	347.3
Fangda Special Steel	189.9	264.0	289.1	280.8	305.9
The average value of the steel industry	308.2	279.0	392.3	304.1	330.7

4.3. Profitability analysis

The profitability of an enterprise, also known as the profitability, refers to the profits obtained by an enterprise through production and operation in a certain period of time. The stronger the profitability of the enterprise, the higher the management level and market competitiveness of the enterprise. As can be seen from Table 10, the return on equity of Jiugang Hongxing increased by 2.39 in 2018-2021, but decreased to -22.41% in 2022. After research, due to the impact of the domestic epidemic in 2022, the raw fuel prices required by the company's production have maintained a high level. The Hongxing wholly-owned subsidiary of Jiugang Hongxing is affected by the continuous rise of imported ore prices, rising fuel prices and other factors, and the performance decline in 2022 is large, leading to a large year-on-year decline in the company's overall operating performance. In the face of the current complex and severe operating situation, the company forced the cost to decline significantly, realized the fourth quarter of 2022 significant losses, resulting in Jiugang Hongxing net return on assets to negative.

During 2018-2020, the gross profit margin decreased by 0.45%; the operation improved in 2021 and increased by 2.52% compared with 2020 gross profit margin; and the gross profit margin once again decreased by 10.07% in 2022 due to the epidemic and the changing investment environment. From 2018 to 2021, the net interest rate increased generally, increasing by 0.64%; due to the epidemic, the net interest rate dropped to negative again in 2022, indicating that the market competitiveness of enterprises is weak, which is not conducive to the improvement of enterprise value.

Table 10. Index related to profitability of Jiugang Hongxing from 2018 to 2022

Year	2018	2019	2020	2021	2022
Return on equity	9.45%	10.12%	3.99%	11.84%	-22.41%
Gross profit rate	11.04%	10.84%	10.59%	13.11%	3.04%
Net interest rate	2.42%	2.66%	1.04%	3.06%	-5.55%

4.3.1. Return on equity

Return on equity is of great significance to evaluate the profitability, capital utilization efficiency, risk level, business strategy and competitiveness of a company. It can be seen from Table 11 that its return on equity showed an upward trend from 2018 to 2021, with an overall increase of 2.39%. Due to the increase of outbound investment and the impact of the epidemic, it decreased to -22.41% in 2022. Compared with Nangang and Fangda Special Steel, the Jiugang Hongxing ROE is negative; about 19% from the average steel industry. This means that Jiugang Hongxing can not effectively use

the funds invested by shareholders to achieve higher profits, the enterprise profitability is poor, and the financial risk is greater.

Table 11. Return on equity of Justeel Hongxing, Nangang and Fangda Special Steel in 2018-2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	9.45%	10.12%	3.99%	11.84%	-22.41%
Nangang Stock	29.36%	14.75%	11.68%	14.04%	7.46%
Fangda Special Steel	57.67%	25.98%	27.64%	28.59%	9.17%
The average value of the steel industry	23.20%	9.23%	8.43%	13.71%	-3.92%

4.3.2. Gross profit rate

Gross profit margin reflects the value added part of a commodity after production conversion internal system. As can be seen from Table 12, the gross profit margin of Jiugang Hongxing was generally upward trend from 2018 to 2021, up by about 2.07%, and significantly decreased by 10.07% in 2022. Compared with Nangang, Fangda Special Steel and the industry average, there is also a gap of about 4%. It shows that Jiugang Hongxing needs to optimize product internal control, enhance profitability, reduce financial risks and improve the competitiveness of enterprises.

Table 12. Gross profit rate of Jiugang HongxingHongxing, Nangang Stock and Fangda Special Steel in 2018-2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	11.04%	10.84%	10.59%	13.11%	3.04%
Nangang Stock	20.11%	13.28%	10.91%	12.14%	10.75%
Fangda Special Steel	32.87%	24.68%	22.71%	19.99%	8.44%
The average value of the steel industry	16.27%	11.44%	10.48%	11.28%	4.57%

4.3.3. Net profit ratio

Net interest rate refers to the net income of each unit of sales revenue after deducting all costs, taxes and interest expenses. As can be seen from Table 13, the net interest rate overall increased to 3.06% in 2018-2021. The net interest rate will fall to -5.55% in 2022 due to the reform of state-owned enterprises,tax increase and other factors. Compared with Nangang and Fangda Special Steel, Jiugang Hongxing has a low net interest rate in the past five years; there is a 4.66% gap from the average of the steel industry. According to the analysis, Jiugang Hongxing attaches great importance to environmental awareness. In 2022, Jiugang Hongxing paid environmental protection tax of 10.14 million yuan, and steel carbon emissions (carbon emission intensity) decreased by 1% year on year. However, the increase in environmental protection costs leads to a decrease in net profit, low operating efficiency of Jiugang Hongxing, poor ability to maintain profitability, and the core competitiveness is weak.

Table 13. Net interest rates of Jiugang HongxingHongxing, Nangang Shares and Fangda Special Steel from 2018 to 2022

Year	2018	2019	2020	2021	2022
Jiugang Hongxing	2.42%	2.66%	1.40%	3.06%	-5.55%
Nangang Stock	10.86%	7.01%	6.00%	5.53%	3.29%
Fangda Special Steel	16.96%	11.14%	13.00%	12.73%	3.86%
The average value of the steel industry	7.58%	3.81%	3.73%	4.99%	-0.89%

5. Analysis and evaluation based on Z-score model of financial risk of Jiugang Hongxing

Based on the Z-score model created by American scholar Altman (1968), the Z value data of Jiugang Hongxingfrom 2018-2022 is shown in Table 14[10]. As can be seen from Table 14 and Figure 1, the 2018-2020 is generally stable, reaching the lowest value of 0.83 in 2020, which can be assessed

as a financial crisis enterprise; the Z value in 2021 is 1.38, but still in the gray area, in 2021 is the best in five years, and can be assessed as a financial risk enterprise; and the lowest value is 0.72 in 2022, a financial crisis enterprise. From 2018 to 2022, the Z-value of The Hongxing is in the bankruptcy range in 2018,2019,2020 and 2022. It is a crisis-oriented enterprise, in a gray area and a risk-oriented enterprise. Generally, the Z-value of The Hongxing shows a fluctuating downward trend in the past five years. It shows that in recent five years, the financial risk of Jiugang Hongxing has increased, and the financial situation is still within the bankruptcy range, the gap between the distance and the safety area is very large, and the bankruptcy risk is high.

Table 14. Calculation process of Z-score model of Jiugang Hongxing 2018-2022

Year	2018	2019	2020	2021	2022
Current assets	120.1	119.5	139.3	142.3	107.3
Current liabilities	279.1	263.9	271.7	238.6	230.2
Working capital	-159.0	-144.4	-132.4	-96.3	-122.9
Total assets	397.8	395.9	414.5	419.2	404.0
$X_1 = \text{Working capital}/\text{Total assets}$	-0.39	-0.36	-0.31	-0.22	-0.30
Undistributed profit	-38.1	-25.7	-21.3	-7.8	-32.6
Retained earnings	-25.4	-13.1	-7.98	6.89	-17.87
$X_2 = \text{Retained earnings}/\text{Total assets}$	-0.06	-0.03	-0.01	-0.01	-0.04
Total profit	10.99	12.44	5.18	14.88	-24.76
Financial expenses	8.73	7.66	6.78	6.33	5.22
EBIIT	19.91	20.10	11.91	23.41	-22.72
$X_3 = \text{Profit before interest and tax}/\text{Total assets}$	0.05	0.05	0.02	0.05	-0.05
Owner's Equity	105.4	118.1	123.2	137.9	111.9
Total liabilities	291.9	277.2	291.0	281.4	292.1
$X_4 = \text{Market value of equity}/\text{Book value of total liabilities}$	0.36	0.42	0.42	0.49	0.38
Operating income	454.3	467.4	370.2	486.7	446.1
$X_5 = \text{Operating income}/\text{Total assets}$	1.14	1.18	0.89	1.16	1.10
Z-value	0.95	1.11	0.83	1.38	0.72
Interval evaluation	Bankruptcy zone	Bankruptcy zone	Bankruptcy zone	Gray zone	Bankruptcy zone

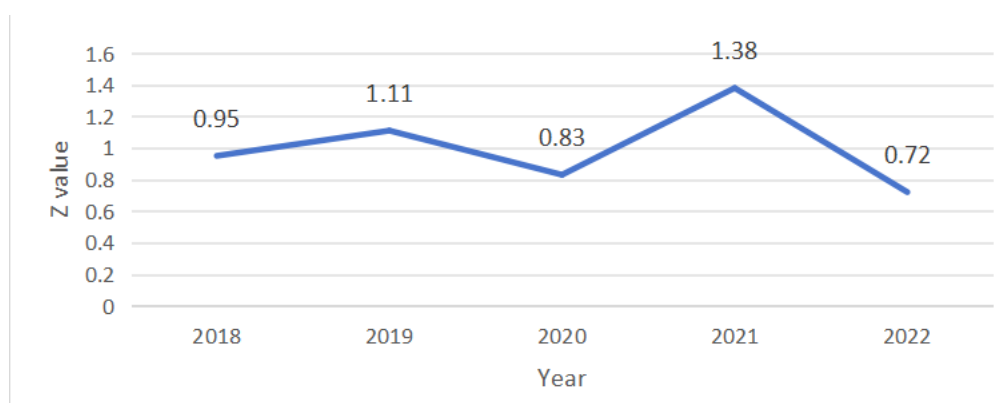


Figure 1. 2018-2022 Jiugang Hongxing overall financial risk degree change trend

6. Suggestions to reduce the financial risk of Jiugang Hongxing

6.1. We will improve the financial management and early-warning system

The establishment of a perfect risk management system is the basis to avoid financial risks. Fully combine the enterprise production and operation and the external environment to build a perfect financial risk control mechanism, to ensure the scientific nature and timeliness of the enterprise financial risk management. Risk identification, assessment, monitoring and response mechanisms should be established, as well as regular risk assessment and emergency drills[11].^[11]Promote zero base budget to improve the efficiency of budget program. At the same time, to formulate a good early warning mechanism for the use of funds, set early warning indicators, and build an early warning system. Jiugang Hongxing should combine the actual situation of enterprise development, constantly organize and improve the financial risk management system to achieve the combination of internal regulation and external prevention, make preparations for financial risks in advance, and calmly deal with financial risks.

6.2. Strengthen cost management

Cost management in the steel industry is crucial for financial risk avoidance. Enterprises should strengthen cost control and management, improve production efficiency, and reduce energy consumption and logistics costs. China's iron ore resources are less, and the raw materials of the steel industry mainly rely on imports. Affected by the trade friction war, the import cost rises, leading to the reduction of the profit margin of the industry[12].^[12]Cost budget is the key to cost management. By making a reasonable cost budget, it can guide the operation decision of enterprises and realize the cost control and reduction[13]. Jiugang Hongxing should reasonably formulate the cost distribution rules, the company's procurement and supply department should establish a good relationship with suppliers, carry out a large number of procurement, reduce the risk of rising raw material purchase cost, reduce the cost, and improve the competitiveness of products.

6.3. Expand financing channels

The expansion of financing channels can make enterprises better cope with market fluctuations and risks and challenges. When a problem occurs in a certain financing channel, enterprises can obtain financial support through other channels to ensure the normal production and operation. The financing method used by Jiugang Hongxing is inappropriate, resulting in the company's high asset-liability ratio and great debt pressure. A single financing channel has long been unable to adapt to the growing scale of the steel industry, the steel industry to take the road of diversified financing is imperative. Iron and steel enterprises should actively explore diversified financing methods, such as equity financing, bond financing, asset securitization, etc., to reduce the dependence on single financing methods. Through diversified financing methods, enterprises can better meet their own capital needs and reduce financing costs.

6.4. Reduce environmental protection costs

In order to actively respond to the environmental requirements, strengthen environmental management, reduce the environmental cost pressure is one of the important challenges facing the current steel industry. For traditional old steel enterprises like Jiugang Hongxing, it should adjust energy structure, use clean energy to improve resource utilization efficiency and realize sustainable development; optimize production process to reduce energy consumption and pollutant emission, reduce environmental protection expenditure and increase net interest rate; actively introduce advanced environmental protection equipment to improve pollution treatment efficiency and reduce operating cost.

6.5. Actively respond to external risks

During the epidemic period, due to traffic control and insufficient raw material supply and other factors, steel prices were unstable, reflecting the problems of the steel industry in transportation, logistics and raw material supply. When the steel industry downstream industry consumption decreases, the steel industry will increase inventory or production reduction. Therefore, Jiugang Hongxing should pay attention to external risks and formulate plans to respond to emergencies in advance.

7. Conclusion

This paper evaluates the financial risk of Jiugang Hongxing, and makes a case study on the development status of Hongxing under the background of the prevailing green development concept. First of all, referring to various financial indicators, we studied and analyzed the financial data of The Hongxing in 2018-2022 from three dimensions and evaluated its financial risks. It is concluded that The Hongxing has problems such as high asset-liability ratio, low capital flow ratio, poor profitability and weak solvency. Secondly, the Z-score model method is used to calculate and evaluate the current financial risks faced by Jiugang Hongxing, and it is concluded that the financial situation of Jiugang Hongxing is still within the bankruptcy range, with high financial risk degree and high bankruptcy risk. Thirdly, from the five aspects of improving the financial management early warning system, strengthening cost management, expanding financing channels, reducing environmental protection costs, and actively put forward suggestions to help Jiugang Hongxing to timely deal with financial risks, reduce the degree of financial risks, and reduce the probability of bankruptcy.

References

- [1] Zhao Xiangzhong, Zhang Ying. Comprehensive evaluation of financial risk of listed companies in Jiugang Hongxing based on factor analysis method [J]. Accounting communication, 2016, (14): 32 - 35.
- [2] Jun-peng wang. Financial risk evaluation of listed logistics enterprises based on factor analysis method - Take Xinning Logistics as an example [J]. Logistics Engineering and Management, 2022, 44 (09): 140 - 143.
- [3] Xue-feng wang. Financial risk evaluation of large real estate enterprises under multiple shocks -TOPSIS analysis based on entropy value CRITIC [J]. Accounting Monthly, 2023, 44 (12): 94 - 99.
- [4] Jia-lu sun. Financial risk analysis of Greenland Group [J]. Cooperative Economy and Technology, 2024, (03): 114 - 116.
- [5] Li Zhigao. A Research on financial risk management of real estate projects [D]. Zhejiang University, 2023.
- [6] Ma Haoliang. Discussion on the causes and prevention and control measures [J]. Volkswagen Investment Guide, 2023, (20): 95 - 97.
- [7] Lin Jing. Analysis of the financial fund management risk and preventive measures of state-owned enterprises [J]. China market, 2023, (21): 143 - 146.
- [8] Xu Zhefeng. On enterprise financial risk and its prevention [J]. Journal of Shanxi University of Finance and Economics, 2010, 32 (S2): 252.
- [9] Luo Yiduo. Research on financial risk prevention measures for real estate enterprises [J]. Accounting study, 2023, (34): 40 - 42.
- [10] Kim J. B., Li Y., Zhang L. Corporate Tax Avoidance and Stock Price Crash Risk: Firm-level Analysis [J]. Journal of Financial Economics ,2011,100 (3): 639 - 662.
- [11] Xiong Zhengyi. Construction of internal control system of enterprise financial management and measures to deal with risks [J]. Chinese and foreign entrepreneurs, 2017, (27): 112 +114.
- [12] He Shuang, white ice. Research on financial risk assessment of Listed companies in China's steel industry [J]. Productivity Research, 2022, (10): 150 - 154.
- [13] Ren ping. Research on the important application of fine management in the cost control of manufacturing enterprises [J]. Accounting study, 2022 (9): 112 - 114.