Evaluation and Analysis of Financial Performance of Listed Companies in Hebei Province Based on Factor Analysis

Li Rongping[1], Gai Tian[2,*]

[1]School of Economics and Management, Hebei University of Science and Technology, Shijiazhuang, China

[2]School of Economics and Management, Hebei University of Science and Technology, Shijiazhuang, China

*529966413@qq.com

Keywords: listed companies, financial performance, comprehensive evaluation, factor analysis, empirical analysis.

Abstract: According to the influencing factors of corporate financial performance, an evaluation index system consisting of 12 indicators in four aspects: profitability, operating ability, development ability and solvency has been constructed; Determined to use the factor analysis method to evaluate the financial performance of listed companies in Hebei Province, and divided listed companies into different types according to the evaluation results, and summarized the characteristics of their financial performance, that is to say, the overall level of financial performance of the company is poor and there are some differences and imbalances, the profitability is good but the financial risk tolerance is poor, and the production and operation conditions are weak;Finally, targeted countermeasures and suggestions to promote the healthy development of listed companies in Hebei Province are put forward.

1. Introduction

With the continuous improvement and development of the market economy, market competition has become increasingly fierce, and enterprises are also facing serious challenges. In the market environment which is dominated by listed companies, the performance of listed companies directly affects the development level and direction of the regional economy, and determines the rationality and orderliness of the overall market resource allocation.

The earliest foreign financial performance evaluation was only factor analysis and proportional analysis. Now financial performance has gradually evolved to combine a certain theory or a certain policy and other comprehensive factors to analyze its impact on the results of financial performance evaluation, and build a financial performance evaluation index system. Using various statistical methods to conduct related research. In China, the theory of corporate performance evaluation has gradually been taken shape since 2000.In the researches of enterprise performance evaluation methods, such as balanced scorecard, EVA, analytic hierarchy process, factor analysis etc. are more concerned by scholars at home and abroad.

The existing researches mainly focuses on the performance research of a certain industry on the Growth Enterprise Market, and there is less research on the listed companies in Hebei Province. Based on above analysis, this article uses factor analysis to measure and analyze the financial performance of listed companies in Hebei Province, summarize the characteristics of their financial performance, and put forward targeted countermeasures and suggestions.

2. Construction of Financial Performance and Evaluation Index System

2.1 Financial performance and influencing factors

Financial performance reflects whether the strategy implemented and executed by the enterprise can contribute to the business performance of the enterprise. It can comprehensively express the composition of the company's cost control effect, asset management effect, capital source allocation effect, and return on equity.

  DOI: 10.25236/emss.2021.050

The influencing factors of corporate financial performance are multifaceted, including national policies, industry background, capital structure, R&D investment, and economic situation. Among them, the factor that most directly reflects corporate financial performance is corporate capital structure. The capital structure of an enterprise generally includes profitability, operating capability, development capability and debt solvency.

Profitability: Reflects the economic value added of an enterprise in a certain period, and measures the growth of the enterprise. On the whole, return on net assets, profit rate on costs and expenses, return on total assets and basic earnings per share are the main evaluation indicators of profitability.

Operating capacity: Promote enterprises to strengthen asset management and improve asset utilization efficiency. On the whole, the total asset turnover rate, current asset turnover rate and inventory turnover rate are the main evaluation indicators of operating capability.

Development ability: It is the potential ability of an enterprise to expand its scale and strengthen its strength. On the whole, the growth rate of net profit and the growth rate of operating profit are the main evaluation indicators of development capability.

Solvency: It is the main manifestation of the economic strength and financial status of an enterprise, and it is also an important yardstick to measure the soundness of the business. On the whole, cash flow ratio, current ratio and quick ratio are the main evaluation indicators of debt solvency.

2.2 The framework and content of the enterprise financial performance evaluation index system

According to the influencing factors of financial performance, and in accordance with the principles of representativeness, scientificity, systematization and comparability, this article establishes a Hebei listed enterprise financial performance evaluation index system composed of 4 elements and 12 specific indicators, as shown in Table 1.

Table 1. Evaluation Index System of Financial Performance of Listed Enterprises in Hebei

category	Specific indicators
Profitability	Return on Equity(X1)
	Ratio of profits to cost and expense(X2)
	Return on Total Assets Ratio(X3)
	Basic earnings per share(X4)
Operating capacity	Total Assets Turnover(X5)
	Current Assets Turnover(X6)
	Inventory Turnover(X7)
Development ability	Net profit growth rate(X8)
	Operating profit growth rate(X9)
Solvency	Operating Cash Flow Ratio(X10)
	Current Ratio(X11)
	Quick Ratio(X12)

3. Determination of Financial Performance Evaluation Model of Listed Enterprises in Hebei Province

To evaluate the financial performance of listed companies in Hebei Province, in order to more comprehensively and intuitively reflect the financial performance relationship between companies, multiple complex evaluation indicators are classified into several types of main elements, and factor analysis is more appropriate.

The basic principle of factor analysis is to transform multiple variables with certain correlations into a few factors with a small number through dimensionality reduction. These factors have strong explanatory properties and can effectively simplify data. By extracting the correlation coefficient between the variables contained in the factor, the score of each factor is calculated and then the original variable is replaced, so that the data of each enterprise is at the same latitude, which is more

conducive to comparing the performance relationship between enterprises.The factor analysis model is as formula (1):

$$X_p=a_{p1}F_1+a_{p2}F_2+\cdots+a_{pm}F_m+\varepsilon_p \quad (1)$$

Before using SPSS software to perform factor analysis, due to the difference in the nature and magnitude of each index, it is necessary to first perform dimensionless processing on the index. The formula used is shown in formula (2):

$$Aij=(xij-ximin)/(ximax-ximin)\times 0.6+0.4 \quad (2)$$

4. Empirical Evaluation and Analysis of Financial Performance of Listed Companies in Hebei Province

As of 2020, there are 61 listed companies in Hebei Province. The relevant financial data of the companies has been collected through Wind database and Choice financial terminal.46 remaining after excluding ST companies and companies with incomplete information,using SPSS26.0 software to perform factor analysis on the 2019 data of listed companies in Hebei Province.

4.1 Main calculation steps and results

In the first step, KMO and Bartlett test. The appropriateness of KMO measurement sampling is between 0-1, the closer to 1, the more suitable for factor analysis, and generally greater than 0.5 indicates that factor analysis can be performed. The significance is less than 0.05, indicating that the data conforms to the normal distribution, and you can proceed to the next step. The calculation results are shown in Table 2.

Table 2. KMO and Bartlett test in 2019

Kaiser-Meyer-Olkin Measure of sampling adequacy	0.726
Bartlett test of spherical Approx.Chi-Square	633.724
df	66
Sig.	0.000

The second step is to extract common factors. According to the requirement of characteristic root>1, three common factors are extracted, and the calculation results are shown in Table 3.

It can be seen from Table 3 that the cumulative variance contribution rate of the extracted three common factors reached 81.596%, which can explain most of the information of the original variables.

Table 3. Total Variance Explained in 2019

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.87	40.66	40.66	4.87	40.66	40.66
2	2.59	21.59	62.25	2.59	21.59	62.25
3	2.32	19.34	81.59	2.32	19.34	81.59
4	0.67	5.65	87.25			
5	0.58	4.89	92.14			
6	0.26	2.19	94.33			
7	0.22	1.89	96.22			
8	0.22	1.86	98.09			
9	0.15	1.25	99.34			
10	0.04	0.40	99.75			
11	0.02	0.20	99.95			
12	0.01	0.04	100.00			

The third step is the naming of common factors. The maximum variance method is used to perform orthogonal rotation of the factor load matrix. From the component matrix after rotation in 2019,Component 1 is mainly determined by four variables: return on equity, ratio of profits to cost

and expense, return on total assets ratio, and basic earnings per share, named as profitability factor(F1).Component 2 is mainly determined by operating cash flow ratio, current ratio and quick ratio, which is named solvency factor(F2).Component 3 is mainly determined by five variables: total assets turnover, current assets turnover, inventory turnover, net profit growth rate, and operating profit growth rate, and is named as the operating development capability factor(F3).

The fourth step is to calculate the comprehensive score. Based on the component score coefficient matrix, a score calculation model of three factors can be obtained. Then the standardized value of the original variable data is brought into the score calculation model to obtain the score of each factor. Next combine the scores of each factor with the variance contribution rate, and further calculate the comprehensive financial performance results of the enterprise. As is shown in formula (3):

$$F=(35.31\%F_1+25.915\%F_2+20.36\%F_3)/81.59\% \quad (3)$$

According to the formula of comprehensive financial evaluation, the ranking of comprehensive financial performance of listed enterprises in Hebei Province can be obtained, as shown in Table 4.

Table 4. Financial Performance score and ranking of listed enterprises in Hebei Province

enterprise	profitability		solvency		operating development		comprehensive competitiveness	
	score	rank	score	rank	score	rank	score	rank
Jianxin	4.76	3	3.31	1	-0.30	34	3.03	1
Yangyuan	4.84	1	2.05	2	-0.32	36	2.66	2
Jingao	4.77	2	1.40	42	0.44	3	2.62	3
Sanfu	4.40	9	2.02	3	0.06	11	2.56	4
Huizhong	4.52	6	1.99	4	-0.33	37	2.50	5
Chengde Lolo	4.57	4	1.77	7	-0.16	26	2.50	6
ZCHG	4.43	7	1.68	10	0.09	9	2.47	7
Jidong Cement	4.53	5	1.53	22	-0.08	19	2.43	8
Kangtai	4.35	12	1.82	5	-0.25	30	2.40	9
Sitong	4.38	10	1.52	24	0.03	13	2.39	10
Yiling	4.29	15	1.81	6	-0.19	27	2.38	11
Huida	4.36	11	1.61	13	-0.15	24	2.36	12
HBIS Resources	4.42	8	1.73	8	-0.41	42	2.36	13
Kailuan	4.24	19	1.50	30	0.15	7	2.35	14
Xinao	4.34	13	1.45	36	0.02	14	2.34	15
Sanyou	4.20	21	1.35	45	0.30	4	2.32	16
Laobaigan	4.31	14	1.51	27	-0.15	25	2.30	17
Jidong equipment	3.95	41	1.44	37	0.51	2	2.30	18
Zijin Guowei	4.25	18	1.64	12	-0.27	32	2.29	19
Great Wall Motor	4.13	26	1.50	28	0.10	8	2.29	20
Chenguang	4.27	16	1.46	34	-0.12	23	2.28	21
Xinxing pipe	4.17	23	1.45	35	0.04	12	2.28	22
Lucky Film	4.14	24	1.61	14	-0.11	21	2.27	23
Longxing	4.06	30	1.43	38	0.20	5	2.26	24
Colin	4.18	22	1.54	20	-0.20	28	2.24	25
Jointo Energy	4.05	32	1.40	41	0.18	6	2.24	26
Cangzhou Pearl	4.08	27	1.52	25	-0.03	16	2.24	27
Changshan	4.21	20	1.55	19	-0.34	38	2.23	28
He Steel Group	4.07	28	1.39	43	-0.00	15	2.20	29
Tonghe	4.25	17	1.58	16	-0.57	46	2.20	30
Boshen	4.05	31	1.57	17	-0.22	29	2.19	31
Lingyun	3.98	36	1.43	39	0.06	10	2.19	32
China power	4.05	33	1.59	15	-0.25	31	2.19	33
Jizhong Energy	3.95	39	1.54	21	-0.04	17	2.19	34
Huabei	4.07	29	1.42	40	-0.12	22	2.18	35
Huijin	4.13	25	1.49	31	-0.34	39	2.17	36
Changshan Textile	3.99	35	1.47	33	-0.10	20	2.17	37
Cangzhou Dahua	3.80	43	1.68	9	-0.07	18	2.16	38

Jikai	3.98	37	1.66	11	-0.40	41	2.15	39
Juli Sling	3.96	38	1.51	26	-0.27	33	2.12	40
Baobian	4.02	34	1.47	32	-0.36	40	2.11	41
Combustion	3.95	40	1.50	29	-0.47	43	2.07	42
Huasi	3.89	42	1.55	18	-0.52	44	2.05	43
Dongxu	3.64	44	1.53	23	-0.31	35	1.98	44
ZJBC	2.20	46	1.38	44	0.99	1	1.64	45
Jiawei	2.85	45	1.23	46	-0.54	45	1.49	46

4.2 Comprehensive evaluation and analysis

In 2019, the average score of financial performance of listed enterprises in Hebei Province was 2.27, and the range was 1.54.Among the 46 listed companies, 23 companies have an above-average score, accounting for 50% of the total number of companies. Jianxin shares ranked first, with a comprehensive performance score of 3.04, well above the average; There were 23 enterprises below average, accounting for 50% of the total number of enterprises, of which Jiawei Xinneng ranked last, with a comprehensive performance score of 1.49.

According to K-means clustering analysis method, 46 enterprises in Hebei Province and their financial performance evaluation results are divided into five categories as follows:

The first category is the enterprises with the highest financial performance: There is only one enterprise in Jianxin, with an average score of 3.04 points, accounting for 2.17% of all enterprises. It belongs to heavy industry. The overall development of the enterprise is good, with strong profitability and solvency.

The second category is companies with higher financial performance: Including Yangyuan, Jingao, Sanfu, Chengde Lolo,ZCHG and Jidong Cement seven enterprises,The average score is 2.54 points and the range is 0.24 points, accounting for 15.22% of all companies,Except for Yangyuan and Chengde Lolo, the other 5 companies are belong to heavy industries.On the whole, the development is more balanced and the profitability is strong. The company attaches importance to the development of the industrial chain and R&D capabilities to reduce investment costs;The solvency development is uneven. Yangyuan, Sanfu, Huizhong and Chengde Lolo rank in the top 7. They attach importance to the liquidity of funds and have strong solvency, while the remaining companies have poor solvency.But the operating development ability is relatively weak and unbalanced.

The third category is enterprises with average financial performance:Including Kangtai, Sitong, Yiling, Huida,HBIS Resources, Kailuan, Xinao, Sanyou, Laobaigan, Jidong equipment, Zijin Guowei, Great Wall Motor, Chenguang, Xinxing pipe, Lekai film, Longxingl, Colin, Jiantou Energy, Cangzhou Pearl, Changshan and He Steel Group, a total of 21 enterprises.The average score is 2.31 points, the range is 0.2 points, accounting for 45.65% of all enterprises.In addition to yiling, laobaigan, Zijin Guowei, Changshan, the other 17 enterprises are all heavy industry, overall good and balanced.Its profitability develops well and is less affected by the economic situation, so it can maintain its stable development.The development of debt paying ability is poor, mainly affected by the cash flow ratio;It has good operating development capabilities and emphasizes product marketing and brand effects.

The fourth category is companies with low financial performance:There are 15 enterprises, including Tonghe, Boshen, Lingyun, China Power, Jizhong Energy, Huabei, Huijin, Changshan Textile, Cangzhou Dahua, Jikai, Jili Sling, Baobian, Combustion, Huasi and Dongxu.Its average score is 2.15 points, range is 0.22 points, accounting for 32.61% of all enterprises.In addition to Jizhong Energy, Cangzhou Dahua, Boshen, China Power, Jikai, Tonghe and Dongxu, the other eight enterprises are all light industries.On the whole, the development is weak.Although they have a certain degree of solvency, their profitability and operating development ability are relatively poor.Affected by Sino-US trade and national deleveraging measures, these enterprises have suffered a sharp decline in profits. Therefore, more attention should be paid to the development of industries, universities and research institutes to improve their R&D capabilities and quality advantages.

The fifth category is the enterprises with the lowest financial performance: including JZBC and

Jiawei. Its average score was 1.57 points, with a range of 0.15 points, accounting for 4.35% of all enterprises. The overall development is weak, except for the ability of operating development, the development of other abilities of the enterprise is poor. This is mainly due to the difficulty of capital liquidity caused by the industrial expansion of enterprises in 2019, and the sharp decline of net profit.

5. Conclusion

Based on the factor analysis method to evaluate the financial performance of listed enterprises in Hebei Province, the results show that:(1)The overall development of financial performance of listed enterprises in Hebei Province is poor and unbalanced. There are only 8 enterprises with high financial performance, accounting for 17.39% of all enterprises; The average financial performance of 21 enterprises, accounting for 45.65% of the total enterprises; There are 17 enterprises with poor and worst financial performance, accounting for 36.96% of the total.(2)Most of the enterprises with high financial performance score belong to heavy industry, while those with low financial performance score belong to light industry.(3)From the perspective of factor analysis, profitability has a great impact on the financial performance of enterprises. Listed enterprises in Hebei Province generally have problems such as unreasonable investment in innovation, unsuitable marketing strategy for the development of the industry background, poor solvency and so on.

Each enterprise should combine the national strategy, the industry background and own enterprise characteristic to improve their financial performance.

They should continue to develop and improve the profitability of the enterprise. Pay attention to the development of industry university research, improve the innovation mechanism, form a complete industrial chain, improve the production efficiency and product quality.

They should pay attention to the development of enterprise's solvency. While promoting research and development projects, they should pay attention to their capital operation, strengthen cash flow management, adjust business strategies, and strengthen risk and risk control management to meet the requirements of long-term development of enterprises.

They should improve the business development ability of enterprises, expand the development of enterprises. While advancing the development of production, education and research, it is necessary to analyze the shortcomings of the enterprise in the industrial structure and marketing strategy, continuously adjust the business development model of the enterprise, improve the quality of the product, and make the enterprise develop more stable and healthy.

References

[1] Fanny Wang. Financial performance evaluation of Internet listed companies based on factor analysis [J]. Assets and finance of administration, 2020(16):20-22.

[2] Dawn, Xiong Wei. Performance Evaluation of listed cosmetic companies based on factor analysis and cluster analysis [J].Accounting Newsletter, 2020(14):96-99.

[3] Zhang Ying, Chan Po. Performance evaluation and influencing factors of listed companies in China S Sports Industr——An empirical study on DEA-Tobit based on panel data[J].Journal of the Wuhan Institute of Physical Education, 2016, 50(12):34-41.

[4] Huo Jianglin. Growth performance evaluation of Gem high-tech listed companies [J]. Statistics and Decision, 2020,36(17):185-188.

[5] Du Zhiping, Zhang Meng. Performance evaluation of cross-border e-commerce logistics enterprises [J].Statistics and Decision, 2020, 36(21):181-184.

[6] Xu Xiaohan, Liu Jiwei. Financial Performance Evaluation of Listed Companies——Taking the Pharmaceutical Manufacturing Industry in Northeast China as an Example [J].Chinese Business, 2021(01):98-100.

[7] Chen Siyuan. Financial Performance Evaluation of Listed Companies Based on Factor Analysis [J].Logistics engineering and management, 2020, 42(11):153-156.

[8] Xinni Wang, Xinyi Gu, Rui Xie, et al. Evaluation of the Financial Performance of China's Agricultural Listed Companies Based on Factor Analysis. 2020, 2(6)

[9] Maximiliano González, Alexander Guzmán, Carlos Pombo, et al. Family firms and financial performance: The cost of growing. 2012, 13(4):626-649.

[10] Victor-Octavian Müller. Do Corporate Board Compensation Characteristics Influence the Financial Performance of Listed Companies. 2014, 109:983-988.