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Financial Risk Evaluation of Listed Forestry Enterprises Based on Factor Analysis

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ABSTRACT
In this paper, 34 forestry listed companies were selected as the analysis sample, and their major financial indicators in 2018 were analyzed by factor analysis score, and the financial risk evaluation indicator system of forestry listed companies was constructed to identify the main factors affecting the financial risk of forestry enterprises. By scoring and ranking the degree of financial risk of listed forestry enterprises, the risk prevention recommendations are made, which provide theoretical reference and methodological guidance for improving the risk and performance evaluation system of forestry enterprises.
Keywords: *Factor analysis, forestry listed company, financial risk*

1. INTRODUCTION

Forestry is an important basic industry of the national economy, a complex industrial group involving the primary, secondary and tertiary industries of the national economy, and the mainstay of ecological civilization construction. However, due to the long investment period, high risk, high uncertainty and other characteristics of forestry production, the financial operating situation of forestry enterprises is generally worrying compared with other enterprises. Specifically, in 2017, the average EPS of the listed A-share companies was $0.67, current ratio was 2.5727, inventory turnover ratio was 64.6291, year-on-year revenue growth rate was 34.53%; the average EPS of the 28 listed forestry companies was $0.25, current ratio was 2.6786, inventory turnover ratio was 3.1681, year-on-year revenue growth rate was 17.81%. It can be seen that compared with other A-share listed enterprises, the profitability, operating and solvency of forestry listed enterprises are significantly lower than the average value of A-share enterprises.Listed forestry enterprises are the 'leaders' of forestry enterprises, so we selected 34 listed companies as research objects to explore the financial risks of forestry listed companies and their evaluation system, which can help forestry listed companies find potential financial risks and establish financial early warning mechanisms .

As the basic unit of social and economic activities, enterprises face various risks at all times. The forms of corporate risk are operating risk, financial risk and capital market risk [1]. Fully recognizing risks and managing risks is a prerequisite for sustainable development of an enterprise. Companies facing financial difficulties often exhibit similar financial characteristics. For example: net assets are negative and cash flow is negative, so you can evaluate and predict financial risk in a reasonable way.

Financial risk evaluation is a method of summarizing corporate financial data, and establishing statistical models or other models. This method can analyze the future business behavior, so as to discover potential financial risks in advance.The current research on financial risk evaluation models mainly includes: (1)univariate analysis. Beaver first proposed the univariate analysis method, and believed that the most effective variables to distinguish the financial risk are the financial guarantee rate and the rate of return[2]. (2)multivariate analysis. Altman used a multivariate analysis method to select multiple variables from five aspects of liquidity, operating capacity, solvency, profitability, and capital structure to build a Z-score model. Z value evaluates the magnitude of the financial crisis, which is inversely proportional to financial risk[3]. This method is widely used to evaluate the financial risks of listed companies. Factor analysis is also an important part of multivariate analysis[4].Huang believes that the factor analysis method can comprehensively analyse corporate financial risks, and help corporate management to grasp the possibility of financial risks immediately [5]. The analysis by Xie and Yan shows that the performance of most forestry listed companies is actually not optimistic, and there are major risks in operating[6]. Yuan takes wood processing enterprises as the research object, and evaluates and analyzes the specific indicators describing the benefits of the enterprise based on factor analysis[7]. He finds that although the overall benefits of listed companies are acceptable, they are not optimistic. (3)logistic model. Ohlson established a logistic model to predict corporate bankruptcy. The result shows that company size, liquidity, capital structure and operating performance are important variables that significantly affect the probability of corporate bankruptcy[8] . (4)neural network model.Odom and Sharda proved the test of sample companies and that the financial warning effect of the transfer neural network model is better than the traditional model. Due to its strong

self-adaptation ability, it can analyze both quantitative and qualitative indicators [9, 10].

In this paper, we build a comprehensive benefit evaluation model to analyzes the benefits of listed forestry enterprises in 2018. Then， we conduct a concrete analysis of the evaluation results and put forward corresponding suggestions.

2. METHODOLOGY

2.1. Definition of variables

The operating performance of listed forestry companies is not only reflected in the financial indicators of profitability, but the operating ability, solvency，liquidity and growth ability are all financial indicators reflecting the level of operating performance. As a result, 12 representative indicators are selected to reflect the financial risks in the above five aspects. Particularly, we select earnings per share(X_1), return on net assets(X_2), return on total assets (X_3) and operating profit margin(X_4) as the profitability index;ratio of operating cash flow to total debt(X_5)and to interest-bearing debt(X_6) as liquidity index; the current ratio(X_7) and debt to asset ratio(X_8) as the solvency index; inventory turnover ratio(X_9),current asset turnover ratio(X_{10}) and total asset turnover ratio(X_{11}) as the operating capacity index; increase rate of main business revenue(X_{12}) as growth index. This paper defines the indicators of which higher values indicate better business conditions or lower risk as 'positive indicators' and the opposite as 'negative indicators'. Of the 12 financial indicators selected, 11 are positive and 1 is negative (i.e. X_8 debt to asset ratio)

2.2. Sample selection and data sources

With reference to Chen Xi[11], 34 listed forestry companies are selected. The 2018 financial data of 34 sample companies are selected from the CSMAR financial database for factor analysis using SPSS software.

3. EMPIRICAL ANALYSIS

3.1. Feasibility test

First, the KMO and Bartlett metrics are used to test whether the original data is suitable for factor analysis. The KMO value is an indicator that shows the comparison result of the correlation coefficient value and the partial correlation coefficient value. A KMO value between 0.5 and 1 indicates that the data is suitable for factor analysis. If it is less than 0.5, it indicates that the factor analysis is not suitable. In this study, the KMO value is 0.620;The observation value of Bartlett's sphericity test is 373.383, of which df value is 66 and the Sig. is 0.000. The corresponding probability p is close to 0, which is less than the significance level of 0.05. Therefore, the null hypothesis of the Bartlett sphericity test is rejected, and the sample data is suitable for factor analysis.

3.2. Factor analysis

3.2.1. Factor extraction and naming

The principal component factor method is used for factor extraction. As shown in the Table 1, the cumulative variance contribution rate of the first four public factors is 81.596%, which can explain the information contained in the original variables, and the factor analysis effect is ideal. After the rotation, the cumulative contribution rate of the four factors does not change, and the eigenvalue and contribution rate change, which means it does not affect the commonality of the original variables, but redistributes the factors to explain the variance of the original variables and changes the variance contributions of the factors, so that factors are easy to explain.

By establishing a component load matrix and using the varimax method for factor rotation, the rotated component matrix is obtained(Table 2). In the main factor 1 (F_1), the load of X_1(earnings per share), X_2(return on net assets), X_3(return on total assets), X_4(operating profit margin) are 0.851, 0.929, 0.941, 0.934, far greater than the load of other indicators, so F_1 is mainly reflected by X_1, X_2, X_3, X_4, called 'profit factor'; Similarly, F_2, F_3 and F_4 are named 'operating factors', 'solvency factors', and 'growth factors' .

3.2.2. Factor scoring model

According to the factor scoring coefficient matrix (Table 3), the scoring model of four factors is obtained. Using the factor scoring model, we can calculate the score of each sample on the common factor and the
comprehensive score of the factor, and then sort and evaluate their financial risk. At the same time, the weighted average of the variance contribution rate corresponding to each factor can be used to obtain a comprehensive score F.

$F_1=0.258X_1+0.273X_2+0.279X_3+...-0.002X_{12}$
$F_2=-0.038X_1-0.039X_2-0.064X_3+...+0.073X_{12}$
$F_3=-0.074X_1-0.038X_2+0.004X_3+...+0.030X_{12}$
$F_4=-0.041X_1+0.024X_2+0.000X_3+...+0.701X_{12}$
$F=0.381F_1+0.322F_2+0.170F_3+0.126F_4$

Table 1 Principle components

Explained total variance									
Ingredients	Initial eigenvalue			Extract square sum load			Rotate square sum load		
	Total	Variance percentage	Cumulative percentage	Total	Variance percentage	Cumulative percentage	Total	Variance percentage	Cumulative percentage
1	5.185	43.206	43.206	5.185	43.206	43.206	3.733	31.107	31.107
2	2.060	17.163	60.369	2.060	17.163	60.369	3.156	26.296	57.403
3	1.436	11.969	72.338	1.436	11.969	72.338	1.669	13.910	71.313
4	1.111	9.259	81.596	1.111	9.259	81.596	1.234	10.283	81.596
5	0.626	5.217	86.813						
6	0.565	4.704	91.518						
7	0.347	2.896	94.414						
8	0.261	2.174	96.588						
9	0.220	1.830	98.418						
10	0.155	1.292	99.710						
11	0.032	0.265	99.975						
12	0.003	0.025	100.000						

Table 2 Rotated component matrix

Financial indicator	Ingredient			
	F_1	F_2	F_3	F_4
X_1	0.851	0.285	0.063	-0.042
X_2	0.929	0.304	0.123	0.032
X_3	0.941	0.243	0.197	-0.003
X_4	0.934	-0.012	0.213	0.043
X_5	0.394	0.518	-0.135	-0.536
X_6	0.022	0.644	0.327	-0.326
X_7	0.114	-0.327	0.867	-0.037
X_8	-0.172	-0.345	-0.786	0.009
X_9	0.245	0.790	0.119	-0.133
X_{10}	0.226	0.823	-0.231	0.182
X_{10}	0.258	0.829	0.020	0.239
X_{12}	0.109	0.160	-0.058	0.852

Table 3 Component score coefficient matrix

Financial indicator	Ingredient			
	F_1	F_2	F_3	F_4
X_1	0.258	-0.038	-0.074	-0.041
X_2	0.273	-0.039	-0.038	0.024
X_3	0.279	-0.064	0.004	0.000
X_4	0.319	-0.164	0.008	0.030
X_5	0.086	0.114	-0.172	-0.446
X_6	-0.150	0.263	0.216	-0.217
X_7	-0.024	-0.114	0.543	0.033
X_8	0.115	-0.147	-0.515	-0.071
X_9	-0.067	0.279	0.069	-0.077
X_{10}	-0.037	0.290	-0.132	0.153
X_{11}	-0.065	0.301	0.037	0.222
X_{12}	-0.002	0.073	0.030	0.701

3.2.3. Ranking

According to the comprehensive score of the above factors, we are able to classify and evaluate the financial risks of each sample company. The higher the company's score, the stronger the financial ability and the smaller the financial risk. Substituting each variable into the model, we can obtain the composite score F and ranking of 34 public forestry companies on 4 public factors (Table 4).

3.2.4. Comprehensive evaluation and analysis

From the calculation results of the factor score, it can be seen that, out of the 34 sample companies, 17 companies have a negative comprehensive factor score, which shows that the overall financial risk of listed forestry companies is relatively large. Through the empirical results of factor analysis and the review of sample enterprise annual reports, the author found that the financial risks of forestry enterprises can be summarized as follows.

Firstly, low profits. The annual net profit of 11 forestry listed companies in the sample decreased compared with the same period of 2017. Among them, the net profit of Pingtan Development, which ticker is 000663, decreased by 19.8 times compared with the same period of 2017, Huatai shares, which ticker is 600308, decreased by 2.5 times, and Zhibang Furniture(ticker is 603818) decreased by 1.2 times. The author reviewed the financial statements of these three companies from 2013 to 2018, and found that the decline in net profit was not a short-term phenomenon. In 2014, all three companies had a net profit decline, which may be related to the stock market environment. However, in other years, while net profit growth rate is positive, almost all of them are less than 0.5. This has become the current satiation of the financial quality of listed forestry companies. Secondly, small assets. The total assets of Kangxin building materials(ticker is 600265) are 369 million yuan, gold cabinets(ticker is 603226) are 1.065 billion yuan, and Shangpin housing (ticker is 300729) is 1.16 billion yuan. Thirdly, unreasonable capital structures. Most of the listed forestry companies are state-owned enterprises, and the debt to asset ratios are relatively high. Among the 17 sample companies with a negative overall score, the debt to asset ratio of Kangxin Building Materials is 91%, and the ratios of four companies(Oupai Furniture, Zhibang Furniture, Pingtan Development, and Fujian Jinsen) are around 70%. More than half of companies with debt to asset ratios exceeding 50%, facing serious financial risks. Lastly, poor asset liquidity. There are improper fund management and scheduling problems, which contributes to the weak inventory turnover and other current assets turnovers. Once there are not enough realizable assets to repay debts, companies will face a financial crisis.

4. CONCLUSION

This paper uses data from 34 listed forestry companies in 2018 to conduct a comprehensive performance evaluation of listed forestry companies by factor analysis method, and draws the following conclusions: the overall financial risk of listed forestry companies is relatively large.The profitability of them is weak, and most of them are in a loss situation. Their operating capacity is not strong, and their operating efficiency is not high. In addition, they have the characteristics of small capital scales and weak asset liquidity.

Therefore, the following suggestions are proposed: (1) forestry companies should establish a sense of risk and improve the early warning level of financial risks. (2)Companies are supposed to optimize the capital structure. Enterprises should strengthen the management of current assets, and enhance the liquidity of enterprise assets.(3) accelerate the upgrading of the forestry industry.

Table 4 Forestry listed companies sample factor comprehensive score and sort

Ticker	Score	Ranking	Ticker	Score	Ranking	Ticker	Score	Ranking
002751	0.948	1	002798	0.191	13	002679	-0.308	25
603818	0.672	2	600308	0.19	14	000815	-0.312	26
603816	0.664	3	603208	0.159	15	600963	-0.332	27
603326	0.643	4	600103	0.156	16	603801	-0.366	28
002240	0.497	5	002078	0.052	17	600265	-0.392	29
000910	0.468	6	300616	-0.018	18	002631	-0.402	30
603600	0.359	7	002043	-0.049	19	600978	-0.542	31
603389	0.358	8	600321	-0.059	20	603833	-0.554	32
601996	0.351	9	300729	-0.109	21	600076	-0.581	33
603180	0.305	10	600103	-0.11	22	000592	-2.118	34
603661	0.303	11	002012	-0.127	23			
000663	0.261	12	000488	-0.198	24			

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