Financial Performance Evaluation of Listed Companies in China's Electric Power Production Industry

-- Based on Factor Analysis

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Abstract

Since the start of 2021, international energy prices have risen sharply, and domestic power supply is tight, leading to the recent phenomenon of power rationing in some places. In this paper, 45 listed companies in the power production industry in China's A-share market are selected as samples. Based on the public financial data of listed companies in the power production industry from 2016 to 2020, 12 financial indicators are determined from four aspects of debt paying ability, operating ability, profitability and development ability, and factor analysis is adopted for systematic analysis. Through the analysis of financial data, judge the current problems faced by the power production industry and put forward solutions. The results show that profitability, solvency, development capacity, operating capacity are average. The policy suggestions put forward in this paper include three aspects: The common development of power transmission and coal transportation, digitalization and cleanliness, and rational use of financial funds.

Keywords

Electric Power Production Industry; Factor Analysis; Financial Performance; The Listed Company.

1. Introduction

In 2021, electricity consumption demand will maintain rapid growth. The power consumption of the primary industry will continue to increase rapidly under the promotion of rural power network transformation, the proportion of air conditioning load in household electricity consumption will continue to rise, and the peak-valley difference of power industry load caused by industrial structure upgrading will continue to increase. At the same time, under the situation that the proportion of installed new energy power generation continues to rise, the phenomenon of insufficient peak adjustment capacity of power system in certain periods will be further intensified. In addition, driven by the deepening of supply-side structural reform, domestic coal supply and demand will remain in a tight balance, and there will be great pressure to ensure thermal coal supply in some regions and in some periods of time. Under the overlapping and interactive influence of multiple factors, it is expected that the overall balance of power supply and demand in China, and the power supply in local areas during peak hours will be tight, and the power supply and demand in peak hours will be tight.

Financial performance is currently widely used by the company's financial status evaluation tool, mainly used to reflect the implementation process and implementation of the company's development strategy. Many domestic scholars have made meaningful attempts to study financial performance.Liu Junqi et al. evaluated the financial performance of enterprises by using TOPSIS method through the combination of theory and demonstration; Zhang Yan et al.

established the business performance evaluation system by using BSC method; Zhang Shuangwen et al. explored the relationship between stakeholders and the financial performance of enterprises; An Xiaoying et al. based on factor analysis, Selected real estate, transportation, construction, medicine, paper, logistics and other listed companies as samples, the empirical analysis of financial performance evaluation.

2. Financial Performance Evaluation Index System and Data

2.1. Initial Index System

Table 1. Financial performance evaluation indicators

Evaluation content	Index content	Computational formula	Index properties
Profitability	Asset Turnover(V1) Return on Equity(V2) Gross Margin(V3)	Net profit/total average assets After-tax profit/net assets Operating margin/main business income	Positive Positive Positive
Solvency	Iquidity ratio(V4) quick ratio(V5) asset-liability ratio(V6)	Current assets/current liabilities Quick assets/current liabilities Total liabilities/total assets	Moderation Moderation Moderation
Operation capacity	Current Asset Turnover (V7) Total Asset Turnover (V8) Accounts receivable turnover(V9)	Main business income/average total current assets Sales revenue/Total assets Sales revenue/Average accounts receivable	Positive Positive Positive
Development ability	Growth rate of Total Assets (V10) Growth rate of Operating Income (V11) Growth rate of Operating Profit (V12)	Current year asset growth/Total assets at the beginning of the year (Turnover of current period - turnover of previous period)/turnover of previous period Current year's profit growth/last year's total operating profit	Positive Positive Positive

Financial indicators are selected according to the principles of integrity, priority, hierarchy, accuracy, comparability, measurability and independence. The evaluation indexes in this paper mainly include four aspects: solvency, profitability, operation capacity and development capacity. According to the index framework, 12 key indicators were selected for evaluation. The 12 selected financial indicators are analyzed and classified, and the solvency, profitability, operating capacity and development capacity are set up as the first level, while the subordinate financial indicators are set up as the second level, forming the core of financial performance evaluation and building the overall framework. The selected financial indicators are ratio relative indicators to avoid errors caused by different measurement formulas or units; Indicators at the same level should be independent of each other as far as possible to reduce the impact of index correlation on data analysis.

Table 1: Profitability evaluation enterprise asset utilization efficiency, respectively their own capital profit and enterprise profit ability, selection of gross margin index because rather than profitability indicators such as gross margin can better reflect the status of enterprise in the industry, enterprises of high gross profit margin shows its high value-added products, pricing or cost advantage, to facilitate the analysis and understanding of industry; Two short-term debt paying indexes and one long-term debt paying index are selected. The three subordinate indexes of operating capacity can evaluate the asset utilization rate, the ratio between asset investment scale and sales level and the liquidity of assets. Development capacity evaluates the capital accumulation capacity, growth status and the change of operating profit.

2.2. Data Selection

Fifty A-share listed electric power production companies are selected as the research objects. In order to avoid the influence of abnormal data, the average value of financial data of the samples from 2016 to 2020 is processed and studied (data is selected from ifinD flush).

3. Financial Performance Evaluation

3.1. Data Preprocessing

(1)Forward Processing. The appropriate indicators are processed forward, including liquidity ratio, quick ratio and asset-liability ratio in solvency, using the formula

$$X' = 1/(1 + |X - A|)$$

Where, X is the original data of the index; Is the data after the forward transformation; A is the theoretical optimal value of X, and the theoretical optimal value of liquidity ratio, quick ratio and asset-liability ratio is 2,1 and 0.5 respectively.

(2)Standardized Treatment. Unified sample data range, excluding the impact caused by data size differences, SPSS 26.0 was used for standardized processing of all data after forward transformation, and the obtained data was directly used for subsequent financial performance analysis.

3.2. Applicability Test and Principal Component Determination

(1) Correlation Test. KMO value test and Bartlett test were performed by SPSS26.0. KMO value was 0.529, indicating that the degree of correlation between indicators was fair. Sig value is 0, indicating significant difference, which meets the general requirements of factor analysis.

(2) Factor Extraction and Contribution Rate. Among the 12 indicators, the information integrity of return on equity is the highest, while the information integrity of operating income growth rate is the lowest (see Table 2). Under principal component analysis, four factors with eigenvalues greater than 1 were selected as the main factors, and the cumulative variance contribution rate was 70.228%, which met the standard of information loss of more than 40%. To better balance the proportions of each factor, the sum of squares is rotated (see Table 3).

(3) Factor Naming and Interpretation. In order to better understand the meaning of each principal factor and analyze practical problems, the four extracted principal factors were rotated by orthogonal rotation method with maximum variance (See Table 4).

F1 has a high correlation with return on equity and return on assets. Return on equity mainly measures the efficiency of using shareholder funds and the income level of shareholder equity, which is directly proportional to the income generated by investment. The rate of return on assets reflects the profitability and utilization efficiency of assets. Both indicators can represent the profitability of the company, and the correlation degree is greater than 0.8, so F1 is named

as the profitability factor. F2 has a high correlation with liquidity ratio and quick ratio, both above 0.95, indicating the level of the enterprise's current assets that can be used to realize or repay debts. F2 is related to the company's debt paying ability and reflects the company's short-term debt paying level. Therefore, F2 is named as the debt paying ability factor. F3 has a high correlation with total asset turnover and current asset turnover. Total asset turnover is generally combined with sales profit to measure asset utilization efficiency. Both this index and current asset turnover are directly proportional to asset investment benefit, which is used to evaluate the asset utilization rate of enterprises. The two indicators are related to the operating capacity of the company. The correlation degree of total asset turnover is greater than 0.8, so F3 is named as the operating capacity factor. F4 has a high correlation with the growth rate of total assets and operating income. Total asset turnover is the main index to analyze the capital accumulation and development space of an enterprise. The growth rate of operating income mainly reflects the increase or decrease of main business income. Both indicators reflect the development capability of the company, and the correlation degree is greater than 0.8. F4 is named as the development capability factor.

(4) Factor Score and Comprehensive Score were Calculated. Component score coefficient matrix was obtained by SPSS26.0 treatment (see Table 5)

Table 2. Communality

Index	Initial	Extract
V1	1.000	0.952
V2	1.000	0.955
V3	1.000	0.594
V4	1.000	0.396
V5	1.000	0.647
V6	1.000	0.636
V7	1.000	0.869
V8	1.000	0.816
V9	1.000	0.800
V10	1.000	0.779
V11	1.000	0.175
V12	1.000	0.809

Table 3. Total Variance Explained

Initial Eigenvalues			Sum of squares of rotational loads		
Total	Percentage of variance	Accumulation %	Total	Percentage of variance	Accumulation %
2.688	22.397	22.397	2.375	19.793	19.793
2.408	20.068	42.465	2.186	18.213	38.006
1.853	15.439	57.904	2.090	17.418	55.424
1.479	12.324	70.228	1.776	14.804	70.228

Table 4. Rotational Component Matrix

Index	Profitability Factor (F1)	Solvency Factor (F2)	Operational Capacity Factor (F3)	Developmental Capacity Factor (F4)
V1	0.970	-0.039	-0.095	-0.010
V2	0.971	-0.053	-0.093	-0.009
V3	0.212	0.737	0.062	-0.032
V4	-0.145	0.547	-0.212	0.176
V5	-0.018	0.781	0.148	-0.119
V6	0.197	-0.037	-0.772	0.000
V7	-0.008	-0.250	0.874	0.205
V8	0.137	-0.723	0.469	0.235
V9	-0.101	0.036	0.125	0.879
V10	0.022	-0.139	-0.041	0.870
V11	0.043	0.002	0.273	0.315
V12	-0.595	-0.349	-0.574	0.056

Table 5. Component Score Coefficient Matrix

Index	Profitability Factor (F1)	Solvency Factor (F2)	Operational Capacity Factor (F3)	Developmental Capacity Factor (F4)
V1	0.414	-0.036	-0.075	0.028
V2	0.415	-0.042	-0.075	0.027
V3	0.078	0.349	0.062	0.043
V4	-0.057	0.267	-0.094	0.167
V5	-0.025	0.370	0.122	-0.021
V6	0.105	-0.056	-0.395	0.076
V7	-0.019	-0.061	0.408	0.019
V8	0.061	-0.305	0.176	0.040
V9	-0.021	0.098	-0.016	0.516
V10	0.037	0.004	-0.110	0.516
V11	0.020	0.039	0.106	0.164
V12	-0.231	-0.181	-0.293	0.042

With the component scoring coefficient as the corresponding coefficient, score functions of four factors F1,F2,F3 and F4 are obtained, as shown in the following equation

$$F1 = 0.414V1 + 0.415V2 + 0.078V3 - 0.057V4 - 0.025V5 + 0.105V6 - 0.019V7 + 0.061V8 \\ -0.021V9 + 0.037V10 + 0.020V11 - 0.231V12 \tag{1}$$

$$F2 = -0.036V1 - 0.042V2 + 0.349V3 + 0.267V4 + 0.370V5 - 0.056V6 - 0.061V7 - 0.305V8$$

$$+0.098V9 + 0.004V10 + 0.039V11 - 0.181V12 \tag{2}$$

$$F3 = -0.075V1 - 0.075V2 + 0.062V3 - 0.094V4 + 0.122V5 - 0.395V6 + 0.408V7 + 0.176V8$$

$$-0.016V9 - 0.110V10 + 0.106V11 - 0.293V12 \qquad (3)$$

$$F4 = 0.028V1 + 0.027V2 + 0.043V3 + 0.167V4 - 0.021V5 + 0.076V6 + 0.019V7 + 0.040V8$$

$$+0.516V9 + 0.516V10 + 0.164V11 + 0.042V12 \qquad (4)$$

Based on the above score function, the comprehensive score function of financial performance is obtained after linear weighted average with the variance contribution rate of each factor (see Table 3) as the coefficient.

$$F = (0.22397F1 + 0.20068F2 + 0.15439F3 + 0.12324F4)/0.70228 \qquad (5)$$

Substitute the financial data of the sample company into (5) to obtain the score ranking and comprehensive score ranking of each factor of the sample company. The comprehensive score of the company is proportional to the level of financial performance, and the enterprise with high score has better operation condition.

Table 6. Main factors and financial performance scores of listed companies in China's electric power production industry

Conpany	Principal factor and financial performance				
	F1	F2	F3	F4	F
Huaneng International	-0.4990	0.1341	-0.4118	-0.1664	-0.2406
Shanghai Electric Power	-0.5832	-0.4146	-0.5766	-0.1335	-0.4547
Zhejiang Power	0.2353	0.9173	0.4551	-0.0582	0.4270
Huaneng Hydropower	-0.3679	-0.7116	0.2994	-0.2983	-0.3072
Huaneng Hydropower	-0.4144	-0.1015	-0.0509	-0.4845	-0.2574
Zhejiang Xineng	-0.2674	-1.3029	-0.2023	-0.1631	-0.5307
Guangzhou Development	-0.0657	0.9696	0.1038	-0.3688	0.2142
Guangzhou Development	0.8474	3.6373	0.0354	0.3165	1.3730
Three Gorges	-0.3178	1.3715	0.2532	3.8293	1.0182
Yongtai Energy	-0.3102	0.2193	0.9809	0.5891	0.2827
Zhongmin Energy	-0.0131	-1.1306	1.1157	0.8916	0.0745
Lianmei Holdings	0.8789	-0.8276	2.1235	-0.2874	0.4602
Jiangquan Industrial	1.1849	2.1898	1.0822	-0.0708	1.2291
Gangui Electric Power	-0.3716	-0.4465	0.6719	-0.0964	-0.1153
Guandong Electric Power	-0.6100	1.9142	0.0696	-0.6042	0.2617
Jinshan Stock	-0.7469	-0.0689	-0.8112	-0.2178	-0.4744
Fuling Power	-0.2422	0.2639	1.0369	-0.4259	0.1514
Funeng Stock	-0.1423	0.0531	0.3926	-0.1879	0.0231
Xichang Electric Power	-0.2322	0.166	-0.8552	-0.0873	-0.2300

Tianfu Energy	-0.0325	-0.2748	-1.5979	-0.0049	-0.4410
Jingneng Electric Power	-0.4964	0.3189	-0.4315	0.0322	-0.1564
Shenneng Share	-0.0405	-0.0897	0.2181	-0.7824	-0.1279
Leshan Electric Power	-0.0620	0.6260	0.5912	-0.4347	0.2128
Chuantou Energy	0.1716	-0.9425	1.1408	-0.2227	-0.0029
Dalian Thermal Power	-0.0754	-0.2979	-1.3324	-0.3050	-0.4556
Huadian Energy	-1.0710	0.3405	-1.8187	-1.1134	-0.8395
Huayin Electric Power	-0.4553	0.3353	-1.6272	0.0100	-0.4054
Tongbao Energy	0.4559	1.8047	0.8917	-0.4350	0.7808
Guodian Electric Power	-0.5919	-0.3340	-0.2931	-0.3377	-0.4079
Jin Kaixineng	0.2477	-1.0773	-0.5226	5.2353	0.5750
Inner Mongolia Huadian	-0.3841	-0.2183	-0.1876	-0.5093	-0.3155
Meiyan Jixiang	6.3193	-0.7097	-1.3222	-0.3678	1.4573
SDIC Power	-0.5590	-0.3974	0.1191	-0.0562	-0.2755
Yangtze Power	-0.1134	-1.0218	1.7494	-0.2833	0.0067
Three Gorges Energy	-0.2468	-1.2098	0.2467	0.0356	-0.3639
Chenchen Electric International	-0.1053	-0.1023	-1.8746	-0.0805	-0.4891
Guang 'an Aizhong	-0.0433	0.1079	0.0047	-0.1708	-0.0119
Ningbo Energy	-0.2196	1.6387	0.1920	0.3034	0.4937
Wenshan Electric Power	0.2871	0.5842	0.6808	-0.9102	0.2484
Energy-saving wind power	0.0409	-1.2439	-0.0504	-0.1674	-0.3828
Jiaze New Energy	0.1570	-1.2483	-0.0908	-0.3700	-0.3915
Tianfu Energy	-0.0325	-0.2748	-1.5979	-0.0049	-0.4410
Jingneng Power	-0.4964	0.3189	-0.4315	0.0322	-0.1564
Baoxin Energy	0.3627	-0.1449	1.5065	0.1478	0.4314
Silver Star Energy	-0.0616	-0.9409	-1.1509	-0.3668	-0.6059

4. Conclusion and Suggestion

(1) Power Transmission and Coal Transport Develop Together

China's traditional energy transportation mode is mainly coal transport, that is, through railway, sea, combined transport and other ways to transport coal to the load center, and then power generation in the load center power plant online. The load centers are mainly concentrated in the eastern region. Over the years, environmental problems such as acid rain and smog have worsened in central and eastern China due to massive coal burning. The environment in eastern China does not allow for further development of coal-fired power plants.

The transmission mode is to build large thermal power plants in coal producing areas and transfer electricity to load centers through uHV transmission networks. At the same time, the supercritical units in large thermal power plants in the technical level of environmental protection, not worse than the current natural gas units in environmental protection, less impact on the environment. The local conversion of coal to electricity can give play to the resource advantages of western China, and the key is that transmission has less adverse impact

on the environment than coal transportation. In terms of transportation cost, according to the 2011 coal price level, the economic efficiency of transmission mode is better than that of coal transmission mode.

(2) Digitalization and Cleanliness

In recent years, China's electric power industry has witnessed rapid development and substantial growth in industry scale. Under the influence of 5G, Internet of Things and other high and new technologies, China's electric power industry has entered a new period of transformation and upgrading, and plans such as "ubiquitous Internet of Things for power" and "microgrid" have emerged one after another.

From September to October 2019, KPMG United National Grid Energy Research Institute Co., Ltd. conducted a questionnaire survey on a number of Chinese power industry experts and industry practitioners on the future development direction of electricity, competition pattern, challenges faced by power enterprises and coping strategies. The survey results show that the surveyed experts and practitioners of the electric power industry believe that China's electric power industry mainly has five development directions of digitalization, cleanliness, transparency, internationalization and electrification, among which digitalization and cleanliness will be the main development direction of China's electric power industry in the future.

(3) Rational Use of Financial Funds

From the financial point of view, enterprises should improve the level of capital operation, the implementation of tracking management of capital, strengthen the scheduling and use of capital, so as to reduce capital occupation, optimize the capital structure, rational allocation of capital, accelerate capital turnover, reduce the cost of financing. Financial personnel should do a good job in cost forecasting, decision-making and cost planning in advance, cost control and accounting in the event, and cost assessment and analysis after the event, so as to excavate the potential of cost reduction and benefit from the height of management.

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