

Analysis of financial competitiveness of listed aviation enterprises

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Abstract: with the rapid development of the airport economy in China, the air transport industry has received special attention, and the competitiveness of enterprises has increased accordingly. The analysis of the financial competitiveness of enterprises is conducive to obtaining the deficiencies in the development of enterprises and improving their competitive advantages. A taking air transport enterprise as an example, this paper uses factor analysis method to analyze the financial indexes of the listed enterprises in the airport. The results show that the competitiveness of air transport enterprises is generally good and the scores are positive, but the profitability and other financial indicators need to be improved.

1. Introduction

With the rapid development of China's economy, the airport economy relying on the comprehensive advantages of large hub airports, as the carrier, has an increasing influence on the economy and society, which promotes the new economic pattern of capital, technology and manpower agglomeration of industrial enterprises in the surrounding area of the airport, and the air transport industry shows a remarkable development trend. All the way in the national "area", "structural reform" supply side policies, airport economic zone to build the international aviation hub, improving the comprehensive transportation system, realize high cohesion in a variety of ways to enhance the ability of transfer and distribution of stream of people, logistics, building perfect functions, radiation global international aviation hub, have contributed to the airport as the core of the rapid development of air transport enterprises, enhance the core competitiveness of enterprises. Financial competitiveness is the core of enterprise competitiveness, is the foundation and guarantee of enterprise growth. In this paper, the financial index method is used to analyze the factors of the listed air transport enterprises in the airport, and the financial competitiveness of the listed companies is quantitatively analyzed and comprehensively evaluated.

In terms of financial competitiveness, Rapaport (1998) pointed out that only by creating competitive advantages can enterprises maximize the interests of shareholders. Wang cuichun (2008) pointed out that the financial competitiveness represents the comprehensive level of the financial strategy, financial resources and the enterprise's own financial execution ability during the entire operation process from the founding to the development and growth of the enterprise. Yang weilu (2011) and full-text ting (2011) both adopted factor analysis method to construct the financial competitiveness evaluation system from multiple perspectives such as operation ability and development ability, and analyzed and put forward Suggestions based on the sample data of listed agricultural companies. Liu huanfeng (2009) constructed a relatively complete comprehensive financial competitiveness evaluation system from five perspectives of profitability, debt paying ability, operation ability, development ability and investment value. Chen Meng (2017) to port as an example, the listed company from the profit ability, operation ability, debt paying ability and development ability 4 class 17 financial comprehensive index evaluation system is put forward to analyze financial competitiveness, Yang tao (2018) using empirical, profitability and airport traffic is pointed out that the dual characteristics of China's airport industry profitability and public welfare, the measure of the airport industry performance of listed companies should not only focus on profitability and the financial performance of listed airport level is not so optimistic as its business development. Through the analysis from different perspectives of experts and scholars on financial

competitiveness, it is concluded that financial competitiveness is the main manifestation of enterprise competitiveness, which is derived from the enterprise's resistance to external competition in its own development process.

2. Empirical Analysis

2.1 Construction of competitive financial evaluation index

(1) Selection of financial indicators. Enterprise financial competitiveness is mainly reflected in profitability, operating efficiency and business development. Using the accounting index method, the author USES the semi-annual report, annual report and other accounting statement data of listed companies to calculate quantitatively such accounting indicators as the profitability, debt paying ability, business ability and development ability of enterprises. From the perspective of quantitative evaluation criteria, the author compares the competitiveness of enterprises through the test and judgment of model data. The financial indicators select the annual financial statement data of listed airport air transport enterprises, and analyze their competitiveness by constructing the financial indicators of the evaluation system from a total of 11 indicators data from the four aspects of profitability, debt paying ability, operation ability and development ability.

(2) Factor analysis model construction. Using factor analysis method is the core of each other with less independent factor to reflect the most information of original variables, the multiple accounting index variables for enrichment, information extraction and comprehensive overlap in the variable into a few representative factors, proposes a few principal components, and no significant linear relationship between the principal components, will not result in a great lack of information of original variables.

The mathematical model was established, and p variables of each standardized treatment were set as $x_1, x_2, x_3 \dots x_p$, each original variable is represented by a linear combination of k factors ($k < p$), namely $f_1, f_2, f_3 \dots f_k$, the mathematical model of factor analysis is expressed as:

$$\begin{aligned} x_1 &= a_{11}f_1 + a_{12}f_2 + \dots a_{1k}f_k \\ x_2 &= a_{21}f_1 + a_{22}f_2 + \dots a_{2k}f_k \\ x_p &= a_{p1}f_1 + a_{p2}f_2 + \dots a_{pk}f_k \end{aligned}$$

Is expressed by matrix as: $X = AF + \varepsilon$, Where F is the factor and A is the factor loading matrix, a_{ij} ($i=1, 2, \dots p; j=1, 2, \dots k$) is factor loading, ε is the special factor, Represents the part of the original variable that cannot be explained by factors.

This paper uses principal component analysis (PCA) to model and financial index to analyze corporate financial competitiveness. Assuming the financial competitiveness of the company is Y , Y is the linear combination of multiple principal components, Y_i is the principal component obtained through principal component analysis, the weight of each principal component is α_i , and the number of principal components is n . The company's financial competitiveness Y can be expressed as:

$$Y = \alpha_i \sum_{i=1}^n Y_i, \quad i = 1, 2, 3 \dots n$$

(3) Sample selection and data sources. According to the industry classification of listed companies released by China securities regulatory commission, there are 46 a-share listed airport air transport enterprises in Shanghai and Shenzhen. 46 listed companies are taken as research objects, and the 2015-2017 annual report data in Wind database and CSMAR database are taken as samples for financial index analysis. ST, *ST and companies with incomplete data were excluded. In addition, for enterprises closely related to airport economy, listed companies related to land transportation and logistics were excluded. Finally, 12 companies were selected as effective samples.

2.2 Data Processing

Excel and SPSS 20 software were used for data statistics, and factor principal component analysis was conducted according to the indicators of competitive financial system.

1) KMO and Bartlett test values are the basis for judging whether variables can be used for factor analysis. Bartlett sphericity test is used to test whether the correlation coefficient matrix of the original variable is the identity matrix. When the value of the variable is too large, it means that the null hypothesis is rejected, which is suitable for factor analysis. The function of KMO statistics is to investigate whether the partial correlation coefficient between the original variables is very small. When $KMO > 0.5$, it is generally considered that factor analysis can be carried out.

Table 1. KMO and Bartlett's test

Kaiser-meyer-olkin measure of sample adequacy		0.635
Bartlett's test for sphericity	Approximately chi-squared	145.402
	df	55
	Sig.	0

As can be seen from table 1, the KMO value is 0.635, which is suitable for factor analysis according to the KMO metric standard provided by Kaiser. Bartlett's sphericity test has an approximate chi-square of 145.402 and Sig value of 0, which is less than the significance level and meets the requirements of factor analysis.

2) Common degree of variables in factor analysis, the common degree of variables of most original variables is high (higher than 0.85), and only one index of liquidity ratio is slightly lower than 0.8, which indicates that the extracted factors can reflect most information of original variables, only a small part of information is lost, and the effect of factor analysis is good.

3) Extract the common factors of principal components and name them

Table 2. Total variance interpretation

Component	Initial Eigenvalue			Extract sum of squared and loadings			Rotate sum of squared and loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.939	44.901	44.901	4.939	44.901	44.901	3.719	33.812	33.812
2	3.129	28.441	73.342	3.129	28.441	73.342	3.147	28.605	62.417
3	1.097	9.968	83.31	1.097	9.968	83.31	1.911	17.369	79.786
4	0.729	6.625	89.935	0.729	6.625	89.935	1.116	10.149	89.935
5	0.466	4.232	94.168						
6	0.262	2.378	96.545						
7	0.217	1.972	98.517						
8	0.112	1.016	99.533						
9	0.034	0.311	99.843						
10	0.017	0.157	100						
11	8.99E-06	8.17E-05	100						

As can be seen from table 2, four principal components were extracted in this principal component analysis, and the cumulative variance contribution rate of the four principal components reached 89.935%, greater than 85%, which reflected that the original variables had less information loss, and the principal component analysis had better effect. The extracted four principal component factors could fully describe the financial competitiveness of enterprises.

Table 3. Rotation component matrix

	Component			
	1	2	3	4
Net profit margin x_3	0.971	0.034	-0.089	-0.117
ROE x_1	0.906	0.005	0.338	-0.079
Rate of return on total assets x_2	0.710	0.648	0.017	-0.016
Current Ratio x_5	-0.028	0.858	-0.080	-0.193
DAR Asset-liability ratio x_4	0.353	-0.814	0.298	0.159
TAGR x_8	0.030	-0.152	0.931	0.083
Increase rate of main business Revenue x_9	0.277	-0.002	0.883	0.040
NPGR x_{10}	0.232	-0.074	0.882	0.261
Growth rate of net assets x_{11}	0.280	-0.250	0.782	-0.358
Turnover of Account Receivable x_6	0.076	-0.371	0.043	0.885
Asset Turnover Ratio x_7	0.211	-0.395	0.474	0.695

The orthogonal rotation of the factor loading matrix with the maximum variance method makes the factors have explanatory naming. As shown in table 3, the net profit rate, the return on equity and the rate of return on total assets constitute the first principal component, which is named as profitability. Liquidity ratio, asset-liability ratio constitute the second principal component, named solvency; The growth rate of total assets, growth rate of operating income, growth rate of net profit and growth rate of net assets constitute the third principal component, which is named development capacity; Accounts receivable turnover, asset turnover constitute the fourth principal component, named as operating capacity. According to the extracted four main components of the enterprise competitiveness accounting index system.

Table 4. Component scoring coefficient matrix

	Component			
	1	2	3	4
X_1	0.256	-0.006	-0.01	-0.133
X_2	0.233	0.239	-0.07	0.106
X_3	-0.013	0.375	0.119	0.142
X_4	0.083	-0.271	-0.023	-0.061
X_5	-0.025	0.308	0.112	0.031
X_6	-0.045	0.1	0.033	0.868
X_7	0.128	-0.053	0.119	0.107
X_8	0.361	-0.099	-0.299	-0.039
X_9	0.256	0.014	-0.043	-0.009
X_{10}	-0.213	0.228	0.698	0.35
X_{11}	-0.09	-0.057	0.484	-0.404

Regression method was used to estimate the score coefficient of factors, as shown in the score coefficient matrix of each principal component in table 4, and the score function of each principal component was constructed. Y_1, Y_2, Y_3, Y_4 were scored as follows:

$$Y_1 = 0.256x_1 + 0.233x_2 - 0.013x_3 + 0.083x_4 - 0.025x_5 - 0.045x_6 + 0.128x_7 + 0.361x_8 + 0.256x_9 - 0.213x_{10} - 0.09x_{11}$$

$$Y_2 = -0.006x_1 + 0.239x_2 + 0.375x_3 - 0.271x_4 + 0.308x_5 + 0.1x_6 - 0.053x_7 - 0.099x_8 + 0.014x_9 + 0.228x_{10} - 0.057x_{11}$$

$$Y_3 = -0.01x_1 - 0.07x_2 + 0.119x_3 - 0.023x_4 + 0.112x_5 + 0.033x_6 + 0.199x_7 - 0.299x_8 - 0.043x_9 + 0.698x_{10} + 0.484x_{11}$$

$$Y_4 = -0.133x_1 + 0.106x_2 + 0.142x_3 - 0.061x_4 + 0.031x_5 + 0.868x_6 + 0.107x_7 - 0.039x_8 - 0.009x_9 + 0.35x_{10} - 0.404x_{11}$$

The financial competitiveness of each company is comprehensively evaluated from the four dimensions of profitability, debt paying ability, operation ability and development ability. According to the varying degrees of the variance contribution rate of the principal component to the original variable information, the comprehensive score Y is calculated by taking the variance contribution rate of the principal component as the weight, and the financial competitiveness function can be obtained:

$$Y = (0.44901Y_1 + 0.28441Y_2 + 0.09968Y_3 + 0.06625Y_4) / 0.89935.$$

Table 5. Factor Scores

	Y ₁	Y ₂	Y ₃	Y ₄	Y
Shenzhen Airport	-5.011	15.558	35.113	21.979	7.131
Zhongxin Haizhi	11.476	-11.197	-12.962	-6.155	0.269
Huaxia Airlines	34.742	-6.215	27.157	7.293	17.022
Baiyun Airport	16.928	4.482	1.602	11.688	9.809
Shanghai Airport	6.894	21.895	22.029	14.271	12.464
Southern Airlines	-1.280	-0.899	41.634	46.986	6.432
Eastern Airlines	7.291	-10.7885	22.192	26.320	4.161
Hna Holdings	15.002	-8.233	5.334	31.808	7.033
Xiamen Airport	10.788	7.739	1.630	46.986	10.320
Spring Airlines	15.760	2.304	6.967	80.953	13.789
Air China	3.306	-4.775	24.434	30.289	4.569
Jixiang Airlines	17.207	3.839	36.727	48.463	15.689

From the perspective of profitability factor Y₁, China airlines, Jixiang airlines and Baiyun airport ranked top, while Shenzhen airport ranked bottom. The poor profitability of Shenzhen airport may be related to the competition in the surrounding areas. WenYa et al. (2010) believed that Shenzhen airport was located between Guangzhou Baiyun airport and Hong Kong airport, so it was attacked in the competition to a certain extent and its advantages were not prominent.

As can be seen from the score of solvency Y₂ factor, Shanghai airport, Shenzhen airport, Xiamen airport and Baiyun airport rank first, mainly because the airport is the core of airport economic zone, with low debt and good financial risk control.

According to the development ability Y₃ of growth rate of total assets, growth rate of operating income, growth rate of net profit and growth rate of net assets, Jixiang airlines ranks first, indicating that the company has a good financial growth ability in the past three years and has a very perfect financial strategic plan for the future. Its strong profitability and strong ability to grow make its financial competitiveness much higher than most other enterprises, and it ranks second in the overall ranking.

In terms of operational capability, Jixiang airlines ranks the first in each index, which indicates that this enterprise has a high operational efficiency, and its profitability and solvency are not weak, so its comprehensive financial competitiveness is still strong.

It can be seen from the comprehensive table 6 that the comprehensive scores are generally good and positive. Huaxia airlines, Jixiang airlines and spring airlines scored higher, and the four airport companies scored better overall, with their scores all above the average level. The financial indicators of the three years showed an obvious upward trend. This is also related to the vigorous development of airport economic policies in various regions in recent years, focusing on the airport to create an aviation city and promote regional economic development. As the core of airport economy, airport enterprises should enhance their profitability, maintain stable debt paying ability, enhance their operation ability and improve their financial growth ability.

3. Conclusions and Suggestions

In this paper, based on the characteristics of airport attributive transport enterprises, combining the connotation and influencing factors of enterprise competitiveness, using accounting index method, using financial index to construct the evaluation index system of airport transport enterprise competitiveness, using factor analysis method and principal component analysis method to determine the index weight, and obtain the comprehensive score of each enterprise. From the perspective of the 12 enterprises studied in this paper, Huaxia airlines, Jixiang airlines and spring airlines have to separate; Shanghai airport, Xiamen airport, Baiyun airport and Shenzhen airport scored better. With the arrival of "airport era", airport economy has gradually become a new industrial development model. In recent years, China has attached great importance to the development of aviation industry. Under the new normal, aviation hub becomes a new growth pole, and airport transport enterprises should also follow the new stage of airport economic development.

Improve the business environment of the enterprise, pay attention to non-aviation income and improve its revenue capacity while ensuring the stable growth of aviation income. It should be pointed out that the improvement of revenue capacity is exactly reflected in the enterprise growth variable in the empirical model of this paper, which can directly promote the improvement of the level of airport economic zone.

Improve the revenue capacity of the airport, encourage the diversification of investment subjects in the airport industry, and expand the non-aviation business income; actively integrate into the large transport operation system to build multimodal transport.

Play the comparative advantage, reduce the vicious competition, strengthen cooperation and exchanges, provincial airports is easy to form the competition in the convenient traffic conditions are prone to shunt phenomenon of passenger and goods or stimulation, airports, airlines are effective mechanism should be complementary, avoid the occurrence of island type airport, power airport economic development, drive the surrounding economy.

Should through the control cost, optimize capital structure, accelerate the capital turnover and strengthen innovation to accelerate the transformation and upgrading to improve the enterprise management, improve the level of financial management, optimize the enterprise financial indicators, financial competitiveness, in order to comply with the airport economic development situation, the continuous creation of enterprise's value and airport economic competitiveness improvement.

References

- [1] Chen yujian. Research on evaluation of financial competitiveness of enterprises based on factor analysis method-A case study of listed agricultural companies [J]. Journal of Heilongjiang institute of technology, 2018 (8).
- [2] Yang tao. Research on the impact of financing structure on performance of listed companies in China's airport industry [D]. Tianjin: civil aviation university of China, 2018.
- [3] Li xiaofang. Empirical analysis of factors affecting the capital structure of listed companies based on factor analysis - taking Shanxi Province as an example [J]. Finance and accounting communications, 2013.
- [4] Cheng cheng, li kai, sha liurui. Study on the elements of airport competitiveness and measures to improve it. A case study of Guangzhou baiyun international airport [J]. Chanye Yu Keji Luntan, 2012 (2).