Original article

Research on the Impact of Ownership Structure to Operation Performance of the Chinese Listed Port Companies*

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Abstract

The ownership structure which has a huge impact on company operation performance is the foundation of corporate governance structure choice. At present, the number of China's listed port companies is the largest in the world; however, they have a very complex ownership structure. This study discusses the impact of ownership structure on the operation performance of the Chinese ports. This empirical research applies factor analysis to evaluate the operation performance of listed port companies, and then adopts linear regression analysis based on the evaluation results to explore the impact of ownership structure to operation performance. Finally, it proposes recommendations for optimizing the ownership structure of listed port companies, in order to promote a better and faster development of China's port industry. The empirical results show that for most of the listed port companies, the largest shareholder is in the absolute controlling position, and the gap between the largest shareholder and the second largest shareholder is very large, which means the ownership concentration is relatively high. Meanwhile, the top five shareholders equity ratio squared is in negative correlation with operation performance.

Keywords: Ownership Structure, Operation Performance, Listed Port Companies

I. Introduction

In recent years, the development of Chinese port enterprises has been relatively fast, and China owns the largest number of listed port companies in the world. The listing of port companies can be divided into two stages: (1) 1993-2000 is the first listing period of port enterprise. During this time, the development of port industry was rapid and its scale was also expanding; (2) 2002-2010 is the second listing period of port enterprises. In this period, the port industry developed on the basis of the first period, and the container throughput soared. In addition, there are still some ports that are actively preparing for listing.

Therefore, it has become a very important issue how to optimize the ownership structure of Chinese listed port companies. In this study, we discuss the impact of the ownership structure on operation performance from the perspective of listed port companies and analyze the characteristics of ownership structure, in order to provide some valuable information and guidance for optimizing the ownership structure.

In regards to the relationship between ownership structure and operation performance, most western scholars believe that higher ownership concentration is conducive to improving operation performance. They think that too dispersed ownership structure will lead to a lack of supervision operators (Berle and Means, 1932). Recent research also shows that ownership concentration and operation performance are in significant positive correlation (Edwards, 1999). There are also a number of scholars who study the impact of ownership structure on operation performance only from the perspective of ownership concentration, and most findings show that ownership concentration and operation performance are in positive correlation. (Zhang Hongjun, 2000; Zhang Ruijun and Zhuang Hao, 2008, Zhang Xueping , 2010).

Despite the mixed results of scholars at home and abroad, they are very useful references for the descendants of the research and it can be summarized as follows: (1) research ideas, most of them use ownership structure as an independent variable and operation performance indicator as a dependent variable; (2) selection of indicators, most of them focus on ownership concentration; (3) research conclusions, most of them show that ownership concentration is positively correlated with operation performance, but a few scholars believe that ownership concentration is not conducive to enhancing operation performance or the existence of an inverted U-shaped relationship.

This paper is attempting to study the mechanism of action of ownership structure on operation performance in two angles including the nature and ownership concentration. It also evaluates the performance of Chinese listed port companies based on data from the annual reports, and then proposes recommendations to optimize and improve ownership structure of three companies.

The reminder of this paper is as follows. The second part is the basic concepts and making assumptions; the third part is the factor analysis of operation performance of Chinese listed port companies; the fourth part is the regression analysis of ownership structure on operation performance; finally, conclusions and outlook.

II. Basic Concepts and Hypothesis

2.1. Basic Concepts

(1) Ownership structure: this paper chooses ownership concentration to analyze ownership structure; ownership concentration, refers to the equity holders of master's stock and the overall proportion of specific quantitative indicators including the Herfindahl index, the proportion of the top five shareholders and Z index.

(2) Operation performance: this article selects related indicators of listed port company operation efficiency including net income, earnings, liquidity ratios and other financial indicators. Besides, some other indicators such as throughput reflect port capacity and competitiveness.

2.2. Hypothesis

Due to the equity nature of Chinese listed port companies, the ratio of internal shareholders is almost close to zero. So, we choose the proportion of state-owned shares, legal person share proportion and the proportion of tradable shares as explained variables. Based on the theoretical impact of ownership structure on operation performance, this article puts forward a hypothesis from the perspective of equity nature and ownership concentration. See table 1.

Table 1: Hypothesis Content

Hypothesis	Ownership Structure Variables	Relationship with Operation Performance
H1	the largest shareholding ratio	positively correlated
H2	top five shareholding ratio	positively correlated
H3	top five shareholding ratio squared	inverted U-shaped
H4	Z value	inverted U-shaped

III. Performance Evaluation of Listed Port Companies

In order to evaluate the relationship between ownership structure and operation performance of listed port companies more accurately and clearly, we need to select representative indicators to reflect the operation performance.

3.1. Chinese Listed Port Companies Profile

The listed port companies in this paper are the A-share listed companies defined by the CSRC, and the sample data is from listed port company's annual report of Shenzhen Stock Exchange and Shanghai Stock Exchange. We select the data range from 2008 to 2010, and because Ningbo Port, Tangshan Port and Dalian Port were listed in 2010 without complete data, in this paper they will be removed and the other 13 listed port companies will be used in empirical analysis. This paper selects the index of annual reports of listed port companies in 2008-2010, in order to reflect the comprehensive operating status of listed port companies. The evaluation of operation performance uses factor analysis.

3.2. The Selection of Evaluation Index System

Port industry differs from other industries, so the operation performance evaluation should not only include financial indicators but also some non-operating indicators which reflect port competitiveness. According to the characteristics of the part industry, this article sets 10 indexes to evaluate the operation performance of listed port companies. For the convenience of calculation, the 10 indexes are divided into two major categories of cost and benefit. See table 2.

Table 2: Evaluation Categories

Type of Indicator	Name of Index
Cost-based	asset-liability ratio, receivable accounts
Benefit-based	port throughput, container throughput, ROE, Net profit, current ratio, earnings, earnings per share, net assets per share

3.3. Performance Evaluation of Listed Port Companies

(1) Data preprocessing

Due to the cost-based operation performance indicators are reverse indicators, the raw data needs to be standardized before factor analysis. For each indicator the best value is 1, while the worst value is 0. The basic transform principle is:

For benefit-based indicators,

$$y_{ij} = \frac{x_{ij} - x_j^{min}}{x_j^{max} - x_j^{min}} \qquad (1)$$

For cost-based indicators,

$$y_{ij} = \frac{x_j^{max} - x_{ij}}{x_j^{max} - x_j^{min}} \qquad (2)$$

where i--ports; j--indicators; y_{ij} -- standardized data; x_{ij} --raw data; x_j^{min} --minimum value in data; x_j^{max} --maximum value in data.

(2) Correlation test and KMO test

Most of the correlation coefficient of the original variable matrix is close to 1, and most of the values are high; the p-value of the correlation coefficient is less than 0.05, which means it passes the significance test. Among original variables there is a strong correlation, so the factor analysis is applicable.

Table 3: KMO Test and Bartlett Test of Sphericity

KMO Test and Bartlett Test of Sphericity		
KMO Test Statistic		.782
Bartlett Test Statistic	chi-square	118.443
	Freedom	45
	Significance Test	.000

Table 3 is the results the of KMO test and Bartlett test. The KMO statistic is 0.782, higher than 0.5, while the p-value of Bartlett test is less than 0.05. And it also shows that the factor analysis is applicable to the raw data.

(3) Factor analysis and evaluation results

Table 4: Characteristic Roots and Variance Contribution Rate

Component		Initial Eigenvalues			Extraction Sums of Squared Loading			Rotation Sums of Squared Loading		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
Dimension 0	1	4.044	40.444	40.444	4.044	40.444	40.444	3.477	34.765	34.765
	2	2.164	21.642	62.086	2.164	21.642	62.086	2.129	21.292	56.057
	3	1.662	16.620	78.706	1.662	16.620	78.706	1.845	18.449	74.507
	4	1.039	10.391	89.097	1.039	10.391	89.097	1.459	14.591	89.097
	5	.702	7.016	96.113						
	6	.247	2.466	98.580						
	7	.080	.804	99.384						
	8	.047	.466	99.850						
	9	.013	.129	99.979						
	10	.002	.021	100.000						

From table 4 we can see that the cumulative variance contribution rate of the first four factors is 89.097%, which has included most of the information of operation performance.

According to the rotation factor loading matrix and the factor score coefficient matrix, the overall performance score of listed port companies is listed in Table 5.

Table 5: Listed Port Companies Comprehensive Performance Score

Port name	Factor score					
	F1	F2	F3	F4	F	Rank
Shenzhen	0.331	0.561	0.106	0.767	0.367	1
Beihai port	0.338	0.101	-0.198	0.329	0.169	7
Jinzhou port	0.376	-0.030	-0.319	0.302	0.123	11
Tianjin port	0.369	0.148	-0.206	0.916	0.286	4
Yantian port	0.511	0.294	0.059	0.466	0.327	3
Xiamen port	0.378	-0.037	-0.285	0.441	0.152	9
Chongqing port	0.406	-0.212	-0.168	0.652	0.180	6
Yingkou port	0.465	-0.088	-0.117	0.561	0.228	5
Wuhu port	0.371	-0.566	-0.249	0.468	0.035	13
Nanjing port	0.455	-0.343	-0.423	0.395	0.073	12
Rizhao port	0.391	0.071	-0.296	0.329	0.162	8
Shanghai port	0.710	0.480	0.125	-0.242	0.334	2
Lianyungang	0.422	-0.076	-0.395	0.525	0.151	10

Table 5 shows that a lot of the scores of listed port companies are negative, but it does not mean that the operation performance of these companies is negative. Because we standardized the original data before analysis, the positive and negative here only show the gap between operation performance and average level. If the comprehensive performance value is positive, indicating that the operation performance is better than average; if the comprehensive performance is negative, indicating that the operation performance is poorer than average.

IV. Port Ownership Structure and Performance Analysis

4.1. Ownership Structure Characteristics of Chinese Listed Port Companies

Chinese listed port companies are most split-listing by country-controlled ports and each of them has different equity characteristics.

Table 6: the Ownership Concentration of Listed Port Companies Index Statistics

CR1	Interval Distribution (%)	10-30	31-50	51-60	61-70	>70
	Number of Companies	1	6	4	2	0
	Proportion (%)	7.7	46.1	30.7	15.5	0
CR5	Interval Distribution (%)	40-50	51-60	61-70	71-80	81-90
	Number of Companies	1	3	6	2	1
	Proportion (%)	7.7	23.1	46.1	15.4	7.7
H5	Interval Distribution (%)	0-0.1	0.1-0.2	0.2-0.4	0.4-0.5	>0.5
	Number of Companies	1	3	7	2	0
	Proportion (%)	7.7	23.1	53.8	15.5	0
Z	Interval Distribution (%)	0-5	5-10	11-30	51-70	>100
	Number of Companies	5	3	1	2	2
	Proportion (%)	38.4	23.1	7.7	15.4	15.4

Note: The largest shareholding ratio (CR1), the top five shareholding ratio (CR5), the top five shareholding ratio squared (H5) as well as the ratio of the first largest and the second largest shareholding ratio (Z value).

As can be seen from table 6, 46.2% of the listed port companies largest shareholding ratio exceeds 50%, which means the largest shareholder controls the company; the top five shareholdings are more than 40%, and 92.3% of them are more than 50%. According to the Matthew effect, when Hn is close to 1, equity is more concentrated, indicating a bigger gap among the shareholders` stake. And 84.5% of these companies` value of H5 are less than 0.4, which means the power of these companies` top five shareholders is equal; 61.6% of these companies` Z value are greater than 5, indicating that most port companies are controlled by the largest shareholders and the gap between the first largest shareholder and the second largest shareholder is still very large. According to the statistical analysis of ownership concentration, it can be seen that ownership concentration of Chinese listed part companies is high.

4.2. Ownership Structure and Performance Analysis

4.2.1.Research Methods

In order to research the relationship between ownership structure and operation performance of listed port companies, we use the linear regression model, where Here in regards to the first largest shareholding ratio, the top five shareholders equity ratio squared, Z values and the top five shareholders equity ratio as explanatory variables and the operation performance value as the dependent variable, as shown in table 7.

Table 7: Explanatory Variables

	Variable	Symbol	Formula
Ownership Structure	the largest shareholding ratio	CR1	the largest shareholder / total Equity
	the top five shareholders equity ratio	CR5	the top five shareholders / total equity
	the top five shareholders equity ratio squared	H5	the top five shareholders equity ratio squared
	the largest and second largest shareholding ratio	Z	the largest shareholder count / second largest number of shareholders

By correlation test, we find that the correlation coefficient of each variable is relatively large, so considering the existence of serious collinearity, and we should not put all the variables into one regression model. This paper puts each variable into the regression model to analyze the relationship between ownership structure and operation performance.

4.2.2. Regression Analysis

In the empirical analysis, we apply SPSS18.0 to operate linear regression model. The regression results are shown in table 8.

Table 8: Regression Coefficient Estimates and Significance Tests

X	b	Standard error	Goodness of fit (R2)	t-value	p-value
CR1	.164	.002	.459	.013	.005
CR5	.125	.003	.421	.021	.011
H5	-.025	.003	.189	.021	.003
Z	.020	.039	.055	.519	.614

As can be seen from table 8, the results illustrate the ownership concentration index CR1 of listed port companies and the comprehensive performance are in significant positive correlation. As can be seen from Table 6, there are six listed port companies whose largest shareholding are more than 50% in China. And the largest shareholding of most listed port companies are tradable shares, which is consistent with the research assumption.

Moreover, The results illustrate that there is a significant positive correlation between ownership concentration index CR5 and comprehensive performance of listed port companies. As can be seen from table 6, there are 12 of 13 listed port companies whose top five shareholder

equity ratios are more than 50%, in absolute controlling position, and the empirical result is consistent with the reserch hypothesis. As can be seen from table 8, the regression coefficient is equal to -0.025, indicating that there is a significant negative correlation between the top five shareholder's equity ratio squared H5 and the comprehensive performance. However, the result shows that the ownership concentration index Z of listed port companies and the comprehensive performance have no significant relationship. In summary, comparing the above empirical results with the preceding assumptions, we come to table 9.

Table 9: the Empirical Results Compared with the preceding Assumptions

	CR1	CR5	H5	Z value
the empirical results	Positive correlated （0.164）	Positive correlated （0.125）	Negative Correlated （-0.025）	None
inferred assumptions	Positive correlated	Positive correlated	inverted U-shaped	inverted U-shaped
Comparison	Same	Same	Contrary	－

Note: The largest shareholding ratio (CR1), the top five shareholding ratio (CR5), the top five shareholding ratio squared (H5) as well as the ratio of the first largest and the second largest shareholding ratio (Z value).

V. Conclusions and Outlook

This article selects 13 listed port companies on the Shanghai and Shenzhen Stock Exchange and evaluates the operation performance from the port competitiveness and financial aspects and carries out empirical analysis between ownership structures and operation performance. Empirical results show that for ownership concentration, most of the listed port companies are the largest shareholder who are in the absolute controlling position, and the gap between the largest shareholder and the second largest shareholder is large, which means the ownership concentration is relatively high.

We can conclude from the empirical results that the top five shareholders equity ratio squared is in negative correlation with operation performance. The empirical results differ from theoretical assumptions, indicating that Chinese listed port companies have a special ownership structure. It has a very important practical significance to analyze the reasons combined with theoretical analysis and empirical results so as to optimize the ownership structure for restructuring and long-term development.

However, there are some shortcomings. Firstly, the time span, the paper selects data only from 2008 to 2010, and it is difficult to ensure a very comprehensive and thoughtful

evaluation. Secondly, the limitation on the number of listed port companies may not guarantee the reliability of the regression results. It is hoped that more in-depth research will be done in future, and through this study, Chinese listed part companies can optimize their ownership structure.

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