

# *Relevance between Equity Structure and Financial Performance*

—Empirical Study Based on Bi-Logit Selective Model

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**Abstract**—Aiming to provide empirical evidence to optimize governance structure and enhance performance level in China Capital Market, drawing Chinese listed companies during 2012-2016 as samples, dividing into equity ownership structure and equity concentration, the paper tested empirically the relevance between equity structure and financial performance based on methods such as factor analysis and Bi-Logit selective model. The results show that state-owned shares proportion and the top ten major shareholder shareholding proportion have significantly negative correlation with financial performance, and legal person share proportion and the first majority shareholder shareholding proportion have significantly positive correlation with financial performance, and circulation A shares proportion and managers shareholding proportion have no significant correlation with financial performance.

**Keywords**—Equity Ownership Structure; Equity Concentration; Financial Performance; Factor Analysis; Bi-Logit Selective Model

## I. INTRODUCTION

The equity structure refers to the distribution of the shares of the company among each shareholder and the differences in the way of behaviors due to different natures of shareholder. Jan Mahrt - Smith (2005) argued that, with the improvement of equity concentration, large shareholders can supervise and control managers, having positive effect on financial performance, while infringement that may occur on small and medium-sized shareholders, bringing negative effects on financial performance [1]. Kumar and Zattoni (2014) proposed that equity ownership structure is the core of enterprise innovation research, determining the distribution of the internal human resources and material resources, thus affecting the investment and financial performance of the enterprise [2]. Bridoux and Stoelhorst (2014) expanded the research scope, showing that the strategic choices and financial performances should depend on a wider range of stakeholders and equity structure can only affect the enterprise's financial performance to a certain extent [3]. Although based on foreign mature capital markets, lots of empirical evidence has been provided in vast literature. Chinese capital markets are at the crucial stage of transformation, varying a lot from western system background and realistic conditions, whether common empirical evidence can be established in our country still need further exploration. Therefore, from the equity ownership structure and the equity

concentration, the A-share listed companies in Shanghai and Shenzhen selected as the research samples, this paper uses methods such as Factor Analysis, Bi-Logit Selective Model to test empirically the link between equity structure and financial performance, aiming to provide empirical evidence to optimize governance structure of listed companies and enhance performance level in China.

## II. STUDY HYPOTHESES

Most listed companies in our country are reformed from state-owned enterprises, or controlled by state and local governments. The government often implements administrative interference in the operations of enterprises. So a unique phenomenon arises in the equity ownership structure of listed companies in China, namely diversification in ownership subject, which can be divided into state-owned shares, legal person shares, social public offerings and management shareholding. According to the research results by Yanbing Wu (2012), the phenomenon of subject absence in state-owned shares, a single large number of shares and the administrative pressure to restrain the financial performance of listed companies are still more common. The legal person shares are more explicit in property rights than that of state-owned shares, which will promote the financial performance of listed companies in China to a certain extent. The company with higher proportion of circulation A shares has a strong equity financing ability, and abundant sources of funds create favorable a guarantee for the improvement of financial performance [4]. And Maolin Wang and Huiting Lin (2015) think equity incentive of listed companies in our country has not been fully implemented yet, managers' shareholding proportion is relatively low, and the "zero holdings" of executives in listed companies makes that there is no significant correlation between ownership and corporate financial performance [5]. To sum up, this paper proposes the following research hypotheses:

- H1: the state-owned shares proportion is negatively correlated with financial performance.
- H2: the corporate shares proportion is positively correlated with financial performance.
- H3: the A shares proportion is positively related to financial performance.

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- H4: there is no significant correlation between the managers' shareholding ratio and financial performance.

The impact of equity concentration on the company's financial performance is mainly manifested in two aspects: supervision and tort effect. With the improvement of equity concentration, large shareholders can supervise and control managers, positively influencing financial performance but may also occur tort, negatively influencing financial performance. Ye An and Tingyong Zhong (2011) pointed out that the supervision effect and infringement effect of ownership concentration of listed companies should exist simultaneously, which ultimately depends on the comparison and game of the two forces [6]. With the increase in the proportion of the first shareholder, financial performance began to increase, but after a turning point, the financial performance decreased; The larger the top 10 shareholders proportion, the more checks and balances will be created on the possible infringement of the largest shareholders, causing financial performance to rise again. To sum up, this paper proposes the following research hypotheses:

- H5: the shareholding ratio of the largest shareholder has a certain interval effect with the company's financial performance.
- H6: the shareholding ratio of the top 10 shareholders is positively correlated with the company's financial performance.

### III. STUDY DESIGN

#### A. Sample data

This paper takes Chinese listed companies as research objects, separately and randomly selecting samples from 7 geographical regions of northeast China, northwest, southwest, north China, central China, east China and south China respectively. To guarantee the stability of the sample data, this paper takes period of 2012-2016 as a time limit, avoiding the single annual outlier. After eliminating the companies of ST, financial, the sort of inadequate inspection of fixed number of years and the ones with missed important data. 50 issued A-share companies were chosen in every region, choosing 350 companies as the research samples. The sample data were all from RESSET financial database, and data analysis was completed by SPSS19.0 statistical software.

#### B. Study variable

##### 1) Explained Variable

###### a) Original variables

Financial performance refers to the enterprise strategy and its contribution for the final performance, which can fully express the effect and efficiency in cost control, asset management, capital allocation, shareholders pay, closely related to many factors. This paper selects the six financial performance indicators: Return on Assets (ROA), Return on Equity (ROE), Main Business Profitability (MOP), Earnings Per Share (EPS), Net Assets Per Share (NAPS), Cash Flow Per Share (CFPS) to measure the financial performance. To avoid that the above original variables get highly relevant, this paper uses Factor Analysis to exercise dimension reduction,

further refining the main factor and calculating the financial performance comprehensive factor as the explained variables.

##### b) Factor analysis

The KMO and Bartlett tests. Table I shows the results of KMO and Bartlett test, and the KMO value is 0.60, which is greater than 0.5, indicating that the degree of information overlapping between the original variables is high. Significance probability (Sig.) is 0, which is less than the significance level 0.05, indicating that the correlation matrix of the original variables is not the identity matrix, which conforms to the precondition of factor analysis.

TABLE I. KMO & BARTLETT TEST

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>		0.60
<b>Bartlett's Test of Sphericity</b>	3421.36	3186.49
	15	15
	0.00	0.00

Extract common factors. Table II shows characteristic root, variance contribution rate and the cumulative contribution rate of the various components. The first three principal components were extracted via SPSS19.0 software, which concluded that the cumulative contribution rate was 78.1%, indicating that the three principal components contain most information of original variables, namely the common factor of this paper.

TABLE II. TOTAL VARIANCE EXPLAINED

Components	Initial Eigen Values			Rotated Sums of Squared Loadings		
	Total	Variances %	Accumulation %	Total	Variances %	Accumulation %
1	2.67	44.43	44.43	1.77	29.55	29.55
2	1.08	17.92	62.35	1.62	27.04	56.58
3	0.95	15.75	78.10	1.29	21.52	78.10
4	0.74	12.27	90.37			
5	0.42	6.97	97.34			
6	0.16	2.66	100.00			

Factor score equation. In table III, the factor score matrix is given, and the factor scoring equation of the three principal components is deduced respectively  $K_1$ ,  $K_2$  and  $K_3$ :

TABLE III. FACTOR SCORES COEFFICIENT MATRIX

Components	ROA	ROE	MOP	EPS	NAPS	CFPS
1	0.45	0.62	0.12	0.08	-0.24	-0.22
2	0.02	-0.23	-0.16	0.41	0.73	0.004
3	-0.04	-0.11	0.55	0.07	-0.13	0.72

$$K_1 = 0.45ROA + 0.62ROE + 0.12MOP + 0.08EPS - 0.24NAPS - 0.22CFPS \quad (1)$$

$$K_2 = 0.02ROA - 0.23ROE - 0.16MOP + 0.41EPS + 0.73NAPS + 0.004CFPS \quad (2)$$

$$K_3 = -0.04ROA - 0.11ROE + 0.55MOP + 0.07EPS - 0.13NAPS + 0.72CFPS \quad (3)$$

Financial performance factor. Let the scores of factors of the principal components  $K_1$ ,  $K_2$  and  $K_3$  respectively to multiply respective variance contribution rate in table II, and then divided by the accumulated contribution rate to reach the measurement model FP of the financial performance factor:

$$FP = \frac{29.55}{78.1}K_1 + \frac{27.04}{78.1}K_2 + \frac{21.52}{78.1}K_3 = 0.38K_1 + 0.35K_2 + 0.28K_3 \quad (4)$$

2) *Explanatory Variables*

a) *Equity ownership structure*

In this paper, the proportion of state-owned shares, legal person share proportion, circulation A shares and managers' ownership are the explanatory variables of ownership structure.

b) *Equity concentration*

This paper takes the shareholding ratio of the first majority shareholder shareholding proportion and the top ten major shareholder shareholding proportion as the explanatory variables of equity concentration degree.

3) *Control variables*

In this paper, we introduce two control variables: corporate size and growth.

To sum up, the study variables constructed in this paper are shown in table IV:

TABLE IV. STUDY VARIABLE DEFINITION TABLES

Variable types	Research object	Variable name	Variable code
Explained variable	Financial performance	Financial performance synthesis factor	FP
Explanatory variables	Equity ownership structure	State-owned shares proportion	SSP
		Legal person share proportion	LSP
		Circulation A shares proportion	CSP
		Managers shareholding proportion	MSP
	Equity concentration	The first majority shareholder shareholding proportion	CR <sub>1</sub>
		The top ten major shareholder shareholding proportion	CR <sub>10</sub>
Control variables	Corporate size	The natural log of total assets	SIZE
	Corporate growth	Asset growth rate	GROW

IV. EMPIRICAL TEST

A. *Model design*

According to the Study variable definition in table IV, the multivariate linear regression model constructed in this paper is shown below:

$$FP = \beta_0 + \sum_{i=1}^8 \beta_i \times X_i + \varepsilon \quad (5)$$

$\beta_0$  represents constant term, and  $\beta_i$  represents the regression estimation coefficient of each explanatory variable and control

variable,  $X_i$  represents each explanatory variable and control variable,  $\varepsilon$  represents error term, which means the regression model doesn't include the impact on financial performance.

The financial performance factor FP changes greatly, so it is treated coarsely in this paper, only in positive and negative cases, when  $FP \geq 0$ , equal to 1;  $FP < 0$ , 0. At this point, FP is a binary choice variable, and this paper adopts the form of Logit distribution function to design Bi-Logit selective model as shown below:

$$\text{Logit}(p_i) = \ln \frac{p_i(y=1)}{1-p_i(y=1)} = \beta_0 + \sum_{i=1}^8 \beta_i \times X_i \quad (6)$$

The  $p_i$  indicates the probability of each explanatory variable and control variable.

B. *Regression results and interpretation*

Regression results of Bi-Logit selective model of SPSS19.0 software is shown in table V, VI and VII:

TABLE V. MODEL SUMMARY

-2 Log Likelihood	Cox & Snell R <sup>2</sup>	Nagelkerke R <sup>2</sup>
275.21 <sup>a</sup>	0.22	0.28

Table V shows the correlation strength test results of explanatory variables, control variables and explained variables. Among them, Cox & Snell R<sup>2</sup> and Nagelkerke R<sup>2</sup> are 0.22 and 0.28 respectively. It indicates that the binary choice Logit model has a certain statistical significance, and there is a strong correlation of research variables.

TABLE VI. HOSMER AND LEMESHOW TEST RESULT

chi-square	df	Sig.
9.32	8	0.32

Table VI shows the results of the fitting optimization of Bi-Logit selective model. This paper uses Hosmer and Lemeshow test methods, if the test value doesn't reach the significance level, then the model fits well. Based on this theory, the test value is 9.32 and P value is 0.32, more than 5% not reaching the significant level, so the total fitting of Bi-Logit selective model is good.

TABLE VII. LOGIT MODEL REGRESSION ESTIMATION RESULTS

Variable	B	S.E.	Wals	Df	Sig.	Exp (B)
SSP	-1.03	0.32	10.08	1	0.00	0.36
LSP	0.02	0.01	7.44	1	0.01	1.02
CSP	0.00	0.01	0.13	1	0.72	1.00
MSP	0.00	0.00	0.47	1	0.49	1.00
CR <sub>1</sub>	3.04	0.62	24.20	1	0.00	20.91
CR <sub>10</sub>	-1.12	0.51	4.70	1	0.03	0.33
SIZE	0.45	0.07	41.86	1	0.00	1.56
GROW	0.00	0.00	0.65	1	0.42	1.00
Constant	-10.46	1.47	50.94	1	0.00	0.00

According to the regression results of table VII, SSP is significantly negative correlation with financial performance in equity ownership structure, assuming H1 is established. This is because the shareholders of Chinese listed company have a serious vacancy and cannot effectively participate in corporate governance, thus decreasing financial performance. The LSP is positively correlated with financial performance, assuming H2 is established. Due to legal person shares' remaining control and the residual claims are more consistent, it motivates the shareholders to drive the value growth and improve financial performance. Assuming H3 is false and H4 is established, CSP, MSP aren't significantly correlated with financial performance. Since the circulation A shares are widely dispersed among different investors and combined with the shareholders' complex composition, it's difficult to coordinate the exercise of control and the impact on financial performance is not significant. Due to the low level management of equity, executives concern more about self-interest and equity incentive doesn't reach expected effect, so there is no significant impact on financial performance.

In the degree of equity concentration, the interval effect is within the growth interval, so CR<sub>1</sub> is positively correlated with financial performance assuming that H5 is partially formed. Because Chinese listed company's shareholding proportion of largest shareholder ownership is often high, generally in a relative holding position, so its effect is greater than infringement effect of their supervision, with the shareholding proportion of a moderate increase to have stronger ability to create value. The top ten major shareholder shareholding proportion CR<sub>10</sub> has significantly negative correlation with financial performance, assuming that H6 is false. Because the first majority shareholder shareholding proportion of Chinese listed companies has a big variance with other shareholder shareholding proportion, which the other shareholder shareholding can't balance the possible act of tort of first big shareholder.

## V. CONCLUSION

This paper is based on equity ownership structure and equity concentration level to empirical study, and the practical value of the research results is reflected in the following aspects:

- Conclusion 1: In terms of equity ownership structure, we should gradually improve the equity ownership structure of listed companies in our country through legislation and supervision department, and change the dominant situation of state-owned shares, eliminating the phenomenon of insider control as a result of subject vacancy, and cut off government intervention in internal management of the listed companies. Meanwhile, we should appropriately increase the proportion of investment of institutional investors, strengthening the system of checks and balances on

state-owned shareholders and legal person shares, adapting to a fair, open and just market competition mode. In addition, relevant policies should be published to protect small and medium shareholders' control rights, and the executives shareholding should be regarded as a kind of internal incentive mechanism, gathering the interests of the small and medium-sized shareholders and management to reduce the agency costs and improve financial performance.

- Conclusion 2: In terms of equity concentration, the first majority shareholder's influence on financial performance is the result of the game between supervision effect and infringement effect. At present, the first majority shareholder shareholding proportion can be moderately increased in Chinese listed companies within a reasonable range; Meanwhile, we should amplify the agglomerative ability of the voting rights of minority shareholders to form the control of large shareholder through the proxy voting and online voting systems and strive to form a diversified shareholding structure with a moderate concentration of controlling shareholders and other large shareholders to construct the internal and external governance mechanism with each other, improving the ability to create value and financial performance constantly.

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