

## **An Empirical Study on the Impact of Stock Ownership Structure on the Performance of Environmental Protection Listed Companies**

Xinhong Wang, Tingting Li

School of Management, Xi'an University of Science and Technology Xi'an, Shaanxi 710054,  
China.

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*Abstract: All the time, the company's ownership structure problem has been the focus for domestic and foreign scholars, and with the development of corporate governance, corporate performance is an important criterion for assessing company value. Thus, the research on the relationship between ownership structure and corporate performance contributes to increasing firm value. The paper considers the environmental listed companies as research samples, based on financial reports between 2015 to 2017 and domestic development of the environmental protection industry. Through the collation and analysis of domestic and foreign results about the effect of ownership structure on corporate performance. We put forward hypotheses from the perspective of equity property, concentration and balance and use SPSS22.0 regression analysis to verify the relationship between Ownership structure and corporate performance in the environmental protection industry.*

*Keywords: Ownership structure, Corporate performance, Environmental listed companies.*

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### **1. RESEARCH BACKGROUND**

Since the financial crisis of 2008, the global economy has been in a period of weakness. China's economy has achieved rapid economic development by relying on the low cost advantages of demographic dividends, but it also caused serious damage to the ecological environment. Therefore, the country vigorously promotes economic reform to reduce environmental pollution. At present, most enterprises in our country do not pay much attention to the pollution problem in the development process for their short - term interests, which bring great difficulty to the sustainable development of the economy. The environmental protection industry is committed to improving the environmental pollution in China. Therefore, the development of the environmental protection industry will not only help strengthen the public's trust in the country but also promote the healthy development of China's economy. This paper hopes to study the present situation and problems of the equity structure of environmental protection industry in order to improve the ownership structure of the company and improve the performance of the enterprise.

## **2. RESEARCH DESIGN**

### **2.1 Selection of samples and data sources**

This paper takes 48 listed companies in the "concept of Environmental Protection" section of the wind database from 2015 to 2017 as a sample. For the integrity of the data and the reliability of the results, this article eliminated 2 ST companies and deleted 6 companies with missing data in the research variables. Finally, we got 40 samples, accounting for 83% of the initial sample. The data comes from wind database and annual report of listed company. The data is processed by Excel and SPSS22.0 software.

### **2.2 Research assumptions**

#### **2.2.1 The Research hypothesis of Equity property and firm performance**

H1: There is a Significant positive correlation between operating performance of State-owned Enterprises and Environmental Protection listed companies in China.

H2: There is a significant positive correlation between the proportion of corporate shares and the operating performance of environmental protection listed companies in China.

H3: There is a significant negative correlation between the proportion of circulating shares and the operating performance of environmental protection listed companies in China.

#### **2.2.2 Research hypotheses on equity concentration and corporate performance**

H4: There is a significant negative correlation between the proportion of the largest shareholders and the operating performance of the environmental protection listed companies in China.

H5: There is a significant positive correlation between the proportion of the top ten shareholders and the operating performance of our country's environmental protection listed companies.

#### **2.2.3 The Research hypothesis of Equity balance degree and Corporate performance**

H6: The degree of reconciliation between the first and second largest shareholders is significantly positively correlated with the performance of China's environmental protection listed companies.

H7: The degree of equity balance between the first largest shareholder and the second to the tenth largest shareholders is significantly positively related to the performance of China's environmental protection listed companies.

## **2.3 Variables and their settings**

### **2.3.1 Explained variables and their settings**

This paper selects the performance of listed environmental protection companies as explanatory variables. It can be seen from previous research literature that a single financial index, such as net asset return rate (ROE), total asset return rate (ROA), is adopted by most scholars because of its simple calculation and easy to obtain. However, because it can only reflect the level of enterprise profitability, it cannot fully reflect the company's assets, liabilities, sales, market share and so on. Therefore, in order to reflect the overall operating performance of the enterprise, this paper selects the turnover of total capital (V1), return rate of net assets

(V2), total asset return rate (V3), earnings per share (V4), operating profit (V5) and total asset growth rate (V6) to reflect overall corporate performance.

Table 1. Variable definition table

Index		Meaning	Computational method
Operational capacity	V <sub>1</sub>	Turnover of total capital	Net operating income/Average Total Assets
Profitability	V <sub>2</sub>	Return rate of net assets	Net margin/Average value of shareholders' equity
	V <sub>3</sub>	Total asset reward rate	Net margin/Total assets
	V <sub>4</sub>	Earnings per share	Net income of the year/Total number of common shares
	V <sub>5</sub>	Operating profit	Operating income—Operating cost
Growth ability	V <sub>6</sub>	Total asset growth rate	Total asset growth/Total assets at the beginning of the year

This paper uses SPSS22.0 software to make principal component analysis on 6 financial indicators of 40 listed companies of environmental protection in China from 2015 to 2017. In order to verify whether it is suitable for principal component analysis, the financial data of 6 listed companies are tested by KMO.

Table 2. Test of KMO and Bartlett

Kaiser-Meyer-Olkin measure of sampling adequacy.	0.708
Approximate chi-square	129.888
Sphericity Test of Bartlett	15
Sig.	0.000

From Table 2, we can see that the approximate Chi-square statistic value of KMO value is 0.708 and Bartlett spherical test is 129.888, the degree of freedom is 15, the significant level is 0.000, KMO value is greater than the standard value 0.6, the significance level is less than 0.005. Therefore, principal component analysis can achieve good results.

Table 3. Total variance of explanation

Element	Initial eigenvalue			Extracting square sum and loading			Rotated square sum loading		
	Total	variance (%)	Accumulation(%)	Total	variance (%)	Accumulation(%)	Total	variance (%)	Accumulation(%)
1	3.235	53.914	53.914	3.235	53.914	53.914	2.937	48.955	48.955
2	1.309	21.811	75.726	1.309	21.811	75.726	1.303	21.718	70.673
3	0.752	12.526	88.252	0.752	12.526	88.252	1.055	17.579	88.252
4	0.409	6.824	95.075						
5	0.174	2.894	97.969						
6	0.122	2.031	100.000						

Extraction method: Principal component analysis.

As can be seen from table3, the variance contribution of the first and second factors is 75.726%, the eigenvalue of the third factor is 0.752, and the variance contribution value after the rotation is 12.526%. Thus, the variance contribution rate of the first three common factors accumulated has reached 88.252%, which can fully reflect most of the information of the original data. Therefore, this paper selects the first three factors as the main factors to analyze.

Table 4. Rotational component Matresa<sup>a</sup>

	Element		
	1	2	3
V <sub>4</sub>	0.889	-0.100	0.196
V <sub>5</sub>	0.858	-0.288	0.173
V <sub>3</sub>	0.846	0.275	0.156
V <sub>2</sub>	0.803	0.491	0.105
V <sub>1</sub>	-0.005	0.945	-0.046
V <sub>6</sub>	0.223	-0.032	0.974

Extraction method: Principal component analysis.

Rotary process: Orthogonal rotation method with Kaiser standardization.

a. The rotation converges after 4 iterations.

From the table4 , it is found that the first factor F1 has a large load on the net asset rate of return(V2), total return rate of assets(V3), earnings per share(V4) and operating profit(V5).Their loads are above 0.8.Therefore, F1 is mainly determined by net asset return(V2), total asset return(V3), earnings per share(V4) and operating profit(V5).The correlation between these indicators is very high, which can reflect the profitability of Listed Companies in environmental protection to a certain extent.

The second factor F2 is mainly determined by the total asset turnover rate (V1) , and the load reaches 0.945 , which indicates the operation ability of the environmental-friendly listed company .

The third factor F3 is mainly determined by the total asset growth rate (V6), and its load reaches 0.974, which reflects the growth ability of the listed companies in the environmental protection category.

Table 5. Component score coefficient matrix

	Element		
	1	2	3
V <sub>1</sub>	-0.086	0.745	0.054
V <sub>2</sub>	0.262	0.318	-0.074
V <sub>3</sub>	0.287	0.147	-0.051
V <sub>4</sub>	0.332	-0.150	-0.059
V <sub>5</sub>	0.346	-0.299	-0.098
V <sub>6</sub>	-0.206	0.061	1.074

Extraction method: Principal component analysis.

Rotary process: Orthogonal rotation method with Kaiser standardization.

Based on Table5, we can establish a factor score model:

$$F_1 = -0.086 \times V_1 + 0.262 \times V_2 + 0.287 \times V_3 + 0.332 \times V_4 + 0.346 \times V_5 - 0.206 \times V_6$$

$$F_2 = 0.745 \times V_1 + 0.318 \times V_2 + 0.147 \times V_3 - 0.150 \times V_4 - 0.299 \times V_5 + 0.061 \times V_6$$

$$F_3 = 0.054 \times V_1 - 0.074 \times V_2 - 0.051 \times V_3 - 0.059 \times V_4 - 0.098 \times V_5 + 1.074 \times V_6$$

The weights of each common factor are calculated by the variance contribution rate corresponding to each common factor. Then the data of environmental protection listed companies are brought into the model, and the final evaluation coefficient of environmental performance of listed companies is calculated.

$$VALUE = 0.6789 \times F_1 + 0.2471 \times F_2 + 0.074 \times F_3$$

**2.3.2 Explanatory variables and their settings**

The selection of explanatory variables is mainly from three aspects: ownership property, equity concentration, equity balance and balance. Ownership attributes are divided into whether to state-owned enterprises(Control1), the proportion of legal personnel shares(Ownership1)and the proportion of circulating shares(Ownership2).Ownership concentration is divided into the first largest shareholder shareholding ratio(Top1) and the top ten shareholder shareholding ratio(Top2).The balance of ownership is divided into two aspects: the balance between the second major shareholders and the largest shareholder (Z1)and the balance between the top ten shareholders and the largest shareholder(Z2).

**2.3.3 Definition and setting of control variables**

In order to enhance the persuasiveness of the study, this paper selects three variables as control variables: company size, cash flow and financial leverage.

Table 6. Variable table

Variable		Value	Meaning	Computational method
Explained variable			Company performance	Factor analysis
Explanatory variable	Equity attribute	Control	Whether or not it is a state-owned enterprise	State-owned enterprises=1, Non-state-owned enterprises=0
		Ownership <sub>1</sub>	Institutional shareholding ratio	Number of institutional shares/ Total share capital
		Ownership <sub>2</sub>	Tradable share ratio	Number of shares in circulation/ Total share capital
	Equity concentr-ation	Top <sub>1</sub>	Proportion of first largest shareholder	Number of largest shareholders/ Total share capital
		Top <sub>2</sub>	Top ten shareholders' shareholding ratio	Number of top 10 shareholders/ Total share capital
	Equity balance degree	Z <sub>1</sub>	The balance between the second major shareholders and the largest shareholder	Number of shares of the second largest shareholder/Number of largest shareholders
Z <sub>2</sub>		The balance between the top ten shareholders and the largest shareholder	Number of top 10 shareholders/Number of largest shareholders	
control variables	Company size	Size	Company size	The logarithm of the total assets
	Cash flow	Cash	Cash flow ratio	Operating cash flow/Cash liabilities
	Financial leverage	Leverage	Asset-liability ratio	Total indebtedness/General assets

**2.4 Model construction**

This paper studies corporate performance from three aspects of equity structure, and establishes the following models:

(1) Ownership property and Corporate performance

$$VALUE = \alpha_1 + \beta_1 \times C + \beta_2 \times O_1 + \beta_3 \times O_2 + \beta_4 \times SIZE + \beta_5 \times CASH + \beta_6 \times LEV + \varepsilon_1$$

(2) Equity Concentration and Corporate Performance

$$VALUE = \alpha_2 + \beta_7 \times T_1 + \beta_8 \times T_2 + \beta_9 \times SIZE + \beta_{10} \times CASH + \beta_{11} \times LEV + \varepsilon_2$$

(3) Equity balance and Corporate performance

$$\text{VALUE} = \alpha_3 + \beta_{12} \times Z_1 + \beta_{13} \times Z_2 + \beta_{14} \times \text{SIZE} + \beta_{15} \times \text{CASH} + \beta_{16} \times \text{LEV} + \varepsilon_3$$

## 2.5 Empirical Analysis

### 2.5.1 Descriptive statistics

Table 7. Description statistic

Variable	Median	Minimum	Maximum	Mean	Standard deviation
VALUE	0.3989	-0.2348	2.8922	0.6376	0.6687
C	Dummy variable				
O <sub>1</sub>	29.3189	1.3409	72.3576	38.615	20.0188
O <sub>2</sub>	79.165	47.1586	100	80.3296	6.4315
T <sub>1</sub>	35.5300	13.8600	62.87	33.3895	13.7595
T <sub>2</sub>	53.5000	28.8900	76.09	53.5588	11.8809
Z <sub>1</sub>	4.1195	1.1943	31.7525	7.4000	7.9797
Z <sub>2</sub>	2.0127	0.4501	11.4714	2.4881	2.3529
SIZE	9.5650	8.9414	10.5578	9.6139	0.4041
CASH	0.1114	-0.2782	0.8916	0.1538	0.2473
LEV	42.5415	12.6559	72.889	42.802	16.2781

As can be seen from Table 7 the average value of the overall performance of the environmental protection industry is 0.6376, with a median of 0.3989. This shows that the level of development of the industry is not balanced. Most of the companies are at a low level in the industry. A few companies are at the top level in the industry, and the gap between the two is extremely large.

From the perspective of equity attributes, whether the sample data is artificially endowed by state-owned enterprises. The standard deviation of institutional shareholding ratio is 20.0188, and the mean value is greater than the median, which indicates that the polarization of institutional shareholding ratio is serious. From the median, average and standard deviation of circulating shares, it can be seen that the distribution of circulating shares is relatively uniform, and most companies are concentrated near the average value.

From the degree of ownership concentration and balance, the mean and median of the first large shareholders are close, while the standard deviation is relatively large and the maximum is great. It can be seen that most enterprises are concentrated in the vicinity of the median, and the largest shareholder of individual enterprises has absolute control rights. From the Z index, it can be proved that individual enterprises have the problem of high equity concentration. The maximum value is 31.7525, indicating that the other ten largest shareholders are difficult to check and balance the largest shareholder and there is an absolute holding phenomenon.

From the perspective of company scale, the natural logarithm of the total share capital of the company remains stable, and the data among the companies are not different. Although there are errors in data processing, it can still be considered that there is no great difference in the size of the company. From the cash flow point of view, there is a great difference between the industry average and the industry median, and the median is less than the average, indicating that the cash flow of most companies is below the mean level, a few companies are higher than

the mean, and the overall level of the industry is in a state of disequilibrium. In terms of asset-liability ratio, the median and average are mostly around 42 percent, indicating that industry levels remain stable.

**2.5.2 Correlation analysis**

The correlation test is used to test the correlation between variables, and the autocorrelation between variables can cause the co linear between variables, thus causing interference to the regression results.

Table 8. Correlation test

	VALUE	C	O <sub>1</sub>	O <sub>2</sub>	T <sub>1</sub>	T <sub>2</sub>	Z <sub>1</sub>	Z <sub>2</sub>	SIZE	CASH	LEV
VALUE	1										
C	0.206	1									
O <sub>1</sub>	0.191	0.037	1								
O <sub>2</sub>	-0.076	0.235	0.083	1							
T <sub>1</sub>	0.042	0.246	0.443	0.065	1						
T <sub>2</sub>	0.169	0.235	0.450	-0.138	0.207	1					
Z <sub>1</sub>	-0.010	0.052	0.073	-0.015	0.709	0.255	1				
Z <sub>2</sub>	0.089	0.221	0.237	0.156	0.753	0.256	0.854	1			
SIZE	0.723	0.372	0.348	0.243	0.053	0.077	0.024	0.160	1		
CASH	0.265	0.288	0.231	0.108	0.175	0.266	0.062	0.128	0.115	1	
LEV	0.029	0.358	0.27	0.346	-0.010	-0.020	0.035	0.014	0.385	-0.179	1

From table8, we can see that most variables have low correlation and avoid collinearity. Among them, independent variables and control variables are positively related to company performance. The correlation coefficient between each control variable and the independent variable is not large, and it will not cause a great impact on the model. The correlation coefficient of equity concentration and equity balance is larger than 0.5. In order to avoid the influence of linear correlation on the regression results, this paper makes regression analysis on equity concentration and equity balance.

**2.5.3 Regression analysis**

(1) Equity attribute regression analysis

It can be seen from tables9 that the indicator of whether the state-owned enterprise has not passed the significant test of 0.05, the original hypothesis is rejected, which indicates that there is no correlation between the state-owned enterprise and the operating performance of the company. The institutional shareholding ratio passed the t test of 0.05, and the original hypothesis was accepted. Among them , the proportion of institutional holdings is positively related to the company ' s operating performance . At the level of 95 % , T- test is adopted, and the original hypothesis is accepted. This shows that the higher the proportion of institutional holdings, the better the company's operating performance. The proportion of tradable shares has reached a 0.05 significant level, and the correlation coefficient is negative. This shows that the larger the proportion of tradable shares, the worse the company's performance. The

proportion of tradable shares is negatively correlated with corporate performance, and the original hypothesis is accepted.

Table 9. Equity Attribute Regression Table

Model	Non-standardized coefficient		Standard coefficient	t	Sig.	Collinear statistics	
	B	standard error	Trial version			Tolerance	VIF
(Constant)	-11.059	1.805		-6.129	0.000		
C	-0.017	0.180	-0.012	-0.094	0.926	0.595	1.682
O <sub>1</sub>	0.005	0.005	0.156	3.031	0.019	0.441	2.269
1 O <sub>2</sub>	-0.013	0.006	-0.326	-2.296	0.028	0.500	1.999
SIZE	1.334	0.191	0.806	6.981	0.000	0.755	1.324
CASH	0.386	0.303	0.143	1.275	0.211	0.804	1.244
LEV	-0.007	0.005	-0.181	-1.479	0.149	0.675	1.481

(2) Regression analysis of equity concentration degree

Table 10. Equity concentration regression table

Model	Non-standardized coefficient		Standard coefficient	t	Sig.	Collinear statistics	
	B	Standard error	Trial version			Tolerance	VIF
(Constant)	-12.070	1.780		-6.781	0.000		
T <sub>1</sub>	-0.007	0.007	-0.148	-0.999	0.325	0.500	1.999
2 T <sub>2</sub>	0.010	0.009	0.179	2.183	0.045	0.479	2.087
SIZE	1.334	0.192	0.806	6.948	0.000	0.815	1.227
CASH	0.282	0.304	0.104	0.926	0.361	0.868	1.152
LEV	-0.011	0.005	-0.260	-2.226	0.033	0.801	1.249

As can be seen from Table 10, the proportion of the first largest shareholder does not pass the t test of significance 0.05, and its correlation coefficient is negative. This indicates that the company is likely to have the phenomenon of "one share is dominant", which leads to the absence of a significant correlation between the shareholding ratio of the first largest shareholder and the operating performance of the company. The original hypothesis is rejected. The proportion of the top ten shareholders passed the significant level of 0.05, and the correlation coefficient is positive. It shows that the increase of the proportion of the top ten shareholders helps to improve the performance of the company, which is consistent with the original assumption. The increase of the top ten shareholders' shares may be easier to decentralize control among shareholders and reduce the supervision cost of individual shareholders, which is beneficial to the development of the company.

As can be seen from the control variables, the size of the firm and the financial leverage passed the t test of significant level 0.05. The results show that the size of the company is positively correlated with the performance of the company, and the financial pole is negatively correlated with the performance of the company.

## Equity balance regression analysis

Table 11. Equity balance regression table

Model	Non-standardized coefficient		Standard coefficient	t	Sig.	Collinear statistics	
	B	Standard error	Trial version			Tolerance	VIF
(Constant)	-8.958	0.824		-10.876	00.000		
Z <sub>1</sub>	0.002	0.002	0.046	0.675	0.501	0.795	1.259
Z <sub>2</sub>	-0.228	0.214	-0.074	-1.062	0.290	0.784	1.275
3 SIZE	1.031	0.092	0.775	11.245	0.000	0.792	1.263
CASH	0.221	0.123	0.117	1.803	0.074	0.900	1.111
LEV	-0.004	0.002	-0.155	-2.274	0.025	0.807	1.239

As can be seen from Table 11, the coefficient of equity checks and balances has not passed the t test of 0.05. This shows that the degree of checks and balances between shareholders in environmental protection industry is not high, which cannot form a good restriction on large shareholders, and cannot have an impact on corporate performance, so the original hypothesis is rejected.

### 3. CONCLUSIONS AND RECOMMENDATIONS

#### 3.1 Conclusions of the study

In this paper, the relationship between equity structure and corporate performance is studied by using SPSS22.0 software and regression analysis model, taking listed companies in wind database from 2015 to 2017 as research objects. At the same time, combined with the development of environmental protection industry, this paper draws the following conclusions.

(1) Corporate attributes have no significant impact on corporate performance, institutional investors have significant positive correlation with corporate performance, while the proportion of outstanding shares has a significant negative correlation with corporate performance.

At present, China is in the period of industrial reform, and the effect of state-owned capital on the development of environmental protection industry is not obvious. At the same time, the rigid management mode of state-owned enterprises does not play a good role in the performance of the company. Institutional investors with professional knowledge, advanced technological advantages and reliable sources of information can bring a favorable improvement to the comprehensive performance of listed companies. At the same time, the proportion of circulating shares leads to the relaxation of the internal supervision mechanism and the serious phenomenon of interest expropriation. Therefore, increasing the shareholding ratio of institutional investors can give full play to the professional advantages of institutional investors and promote the long-term development of the company. At the same time, the company should strengthen the supervision and management mechanism, reduce the free-rider effect of circulating shares, and improve the company's operating performance.

(2) There is no significant correlation between the shareholding ratio of the largest shareholder and the performance of the enterprise, but the proportion of the top ten shareholders has a significant positive correlation with the corporate performance.

The increase of shareholders' shareholding ratio of the top ten shareholders can help the company make business decisions more quickly, reduce the management cost of shareholders better, and stimulate the enthusiasm of the shareholders to supervise and manage the enterprise. Therefore, the increase of the proportion of the top ten shareholders is beneficial to the shareholders to form the motive force to manage the company and to promote the corporate performance.

(3) There is a significant positive correlation between enterprise size and business performance, and a significant negative correlation between financial leverage and operating performance.

The expansion of the scale of the company is conducive to the formation of a perfect organizational structure within the company, to reduce the management costs and to resist the risks of the industry. At the same time, too much financial leverage will make the company face huge financial risk. Therefore, by expanding the scale of environmental protection industry companies, their enterprise performance will be improved. At the same time, within a reasonable range, the company can reduce financial leverage to improve overall operating performance.

### **3.2 Suggestions**

(1) Companies should increase the number of institutional investors.

The results show that the proportion of institutional investors holding shares is significantly positively correlated with the operating performance of the company. Institutional investors have good professional knowledge and information channels and pay more attention to the long-term development of enterprises, which can help enterprises to obtain long-term benefits. Increasing the shareholding ratio of institutional investors not only helps optimize the company's shareholding structure, but also helps improve the internal management system of the company and ensures that the company makes reasonable business decisions.

(2) Companies should maintain a relatively centralized degree of equity concentration.

From the results of the study, we can see that the shareholding ratio of the top ten shareholders is positively correlated with the company's performance. However, the relationship between the proportion of the largest shareholders and the performance of the company is not significant. Therefore, increasing the proportion of shares held by the top ten shareholders and maintaining appropriate concentration of shareholdings by major shareholders will be beneficial to the improvement of company performance.

(3) Companies should maintain proper financial leverage.

The results show that there is a significant negative correlation between financial leverage and corporate performance in environmental protection industry. At this stage, the company needs a lot of money to promote the further development of the enterprise. However, a large amount of debt financing will lead to excessive corporate financial leverage, which will cause

companies to face greater financial risks. Therefore, the company should maintain a suitable financial leverage factor based on its own risk level and industry level to enhance its overall performance.

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