State-owned Shareholder, Property Rights, Equity Concentration and Corporate Green Investment-An Empirical Study Based on Listed Companies of Heavy Pollution Industry in China's A-share Market

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Abstract: This paper took 246 listed companies of heavy pollution industry in China's A-share market with time series between 2008 and 2017 as the sample to study the impact of state-owned shareholders on the corporate green investment. The results show that the state-owned shareholders have a significant positive impact on corporate green investment. They will promote enterprises to carry out green investment and improve the level of that when participating in governance. Further considering the property rights and equity concentration, results showed that state-owned shareholders can play a better role in green investment in state-owned enterprises or enterprises with high equity concentration.

1. Introduction

As the main manufacturers of environmental pollution, enterprises should focus on the social responsibility of green investment. Green investment referred to the investment in environmental protection research, pollution control, environmental protection technology development and other main behaviors. Existing research showed that shareholders can influence the investment decisions and investment efficiency of enterprises. However, state-owned shareholders play an important role in China's shareholding structure, and state-owned enterprises often face greater pressure from the government and the public on environmental issues. On the other hand, Lin Yifu and Li Zhiyun (2004) thought that state-owned enterprises will pay more attention to social responsibility for they undertook more social goals, such as price stability and employment. Kong Dongmin et al. (2013) argued that the incentives for state-owned shareholders to reduce green investment in pursuit of private income may be weakened. Therefore, this paper proposed hypothesis 1: there is a positive correlation between the shareholding ratio of state-owned shareholders and the scale of green investment.

Schwartz & Carroll (2003) showed that state-owned and private enterprises have different performances in the internal and external motives from the requirements of economy, system and ethics. Lin Yifu (2004) found that state-owned enterprises faced smaller financing constraints. Based on that, this paper proposed research hypothesis 2: state-owned shareholders will promote green investment better in state-owned enterprises comparing with non-state-owned enterprises.

Barnea, A. & Rubin, A. (2010) found that the agency problem would change from that between managers and owners to that between controlling shareholder and minority shareholder in enterprises with high equity concentration. Steen Thomsen (2000) showed that the major shareholders had higher decision-making power in enterprises with high equity concentration. Based on the above analysis, this paper proposed the research hypothesis 3: state-owned shareholders will promote green investment better in enterprises with high equity concentration.

2. Research Design

2.1 Measurement of Corporate Green Investment Scale

This paper used the following steps to measure the scale of corporate green investment with "content analysis method" and "index method". Firstly, we divide green investment into six types of sub-investment which is investment on environmental consolidation management, pollution control, resource conservation, climate change prevention, environmental protection business and environmental protection system respectively according to the requirements of paper from Bi Qian and Yu Lianchao (2016) and the "Environmental Information Disclosure Measures (Trial)" and "Listed Companies ESG Evaluation Index System", and each type of investment has corresponding secondary indicators. Secondly, the paper made an objective evaluation of the six kinds of sub-investments based on the rule with: assign 0 to the responsibility report with no description of such sub-investments, assign 1 to that with only qualitative description, assign 2 to that with only quantitative description, and assign 3 to that with both qualitative and quantitative description. Finally, we should aggregate the scores under different indicator metrics in each year to obtain the total green investment scale score.

2.2 Model Design

In order to test the research hypothesis of this paper and verify the correlation between state-owned shareholder and corporate green investment, this paper set the following empirical model:

$$GI = \alpha_0 + \alpha_1 SO_{it-1} + \alpha_2 ROA_{it-1} + \alpha_3 Growth_{it-1} + \alpha_4 Lev_{it-1} + \alpha_5 TobinQ_{it-1} + \alpha_6 Size_{it-1} + \alpha_7 CFO_{it-1} + \alpha_8 Inv_{it-1} + \alpha_9 Idd_{it-1} + +\alpha_{10} Age_{it-1} + \sum Industry + \sum Year + \varepsilon_{it} \quad (1)$$

That, GI was corporate green investment, and SO was shareholding ratio with state-owned shareholder. In this paper, we used the panel quantile regression method to describe the relation between GI and SO.

3. Regression analysis

3.1 Regression Analysis of SO on GI

As shown in Table 1, from the results of mean regression, the shareholding ratio of state-owned shareholders and the green investment scale are positively correlated at the statistical level of 99%, with the coefficient of 6.351, which means that enterprises will expand scale of green investment with the increase in the shareholding ratio of state-owned shareholders. Judging from the quantile regression results, the shareholding ratio of the state-owned shareholders is 99% positively correlated with the green investment scale from the 2-digit to the 8-digit, thus verifying the hypothesis 1. The results indicates that state-owned shareholders have greater preference in the green investment decisions with the increase in the shareholding ratio of state-owned shareholders. On the other hand, with the increase of the quantile, the regression coefficient is increasing, indicating that state-owned shareholders have greater impact on the enterprises with higher green investment level.

3.2 Regression Analysis under Property Rights and Equity Concentration

As shown in Table 2, indicator "State" represents the state of property rights, the value of state-owned enterprises is 1, otherwise is 0. The impact of state-owned shareholders on green investment of enterprises is significantly positively correlated at the statistical level of 99% in the sample of state-owned enterprises but not significant in the other group. The results indicate that, state-owned enterprises have politically related motives to avoid institutional risks, and state-owned enterprises, as the exercisers of state-owned shares, are more susceptible by government intervention in corporate decision-making. Therefore, shareholders of state-owned enterprises have a greater

impact on green investment.

When the value of equity concentration variable "HERF" is 1 , it means that the company's equity concentration is high. When it is 0, it means the equity concentration is low. As shown in Table 2, the impact of state-owned shareholders on corporate green investment is positively correlated at statistical level of 99% in both sets of samples, but the regression coefficient of the sample with high equity concentration is larger, which indicates that, state-owned shareholders can exert their influence on green investment in enterprises with high equity concentration, and hypothesis 3 is verified. When the equity concentration is high, shareholders are more likely to form specific decisions, thus better promoting the increase in the scale of corporate green investment.

Table 2 Fixed-Effect Regression Results of Samples under the Classification of Property Rights and Equity Concentration

GI	SO1		SO2	
	State=0	State=1	HERF=0	HERF=1
SO1	-0.983	8.206***	2.839***	8.613***
	(-0.454)	(8.480)	(3.028)	(9.578)
SO2				
ROA	-1.546	-8.138**		
	(-0.316)	(-2.109)		
GROWTH	-0.207	-0.521		
	(-0.335)	(-0.989)		
LEV	5.175***	-2.582**	-3.199	-2.133
	(3.524)	(-2.344)	(-0.785)	(-0.473)
TobinQ	-0.340*	-0.720***	-0.227	-0.783
	(-1.951)	(-3.888)	(-0.399)	(-1.355)
SIZE	0.202**	0.669***	1.830	-2.049
	(2.023)	(7.087)	(1.527)	(-1.575)
CFO	-2.878	9.014***	-0.746***	-0.374*
	(-0.721)	(2.855)	(-4.810)	(-1.688)
INV	2.748	6.016*	0.163*	0.704***
	(0.566)	(1.658)	(1.915)	(6.820)
IDD	-3.437	0.283	7.955**	2.496
	(-0.782)	(0.100)	(2.374)	(0.664)
AGE	-0.304***	-0.149***	10.646***	-3.228
	(-6.684)	(-4.175)	(2.927)	(-0.654)
_cons	2.298	-8.568***	1.083	1.483
	(1.124)	(-3.987)	(0.317)	(0.448)
industry	control			
Year	control			
N	469	1016	741	744
Adj.R-Square	0.179	0.312	0.189	0.309

Note:t statistics in parentheses * p <0.1, ** p < 0.05, *** p < 0.01

4. Conclusion

The empirical research shows that state-owned shareholders have a significant positive impact on corporate green investment. They will promote enterprises to carry out green investment and improve the level of that when participating in governance. Further considering the property rights and equity concentration, results showed that state-owned shareholders can play a better role in green investment in state-owned enterprises or enterprises with high equity concentration.

The enlightenment is: Firstly, we should consolidate the shareholding position of state-owned shareholders in enterprises in heavy pollution industries, and further promote the level of green investment through the supervision of state-owned shareholders; Secondly, non-state-owned enterprises could not significantly improve the level of green investment by increasing state-owned shares. Thirdly, the heavily polluting listed companies with high equity concentration should be encouraged to promote the green investment level by improving the shareholder structure.

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Table 1 The Impact of State-owned Shares on The Scale of Corporate Green Investment: Based on Panel Quantile Regression

GI	(1)	(2)	(3)	(4)	(5)
	Mean	q=0.2	q=0.4	q=0.6	q=0.8
SO	6.351***	4.032***	5.018***	7.703***	9.267***
	(10.908)	(5.939)	(6.981)	(9.738)	(9.126)
ROA	-3.986	-0.636	-3.644	-5.559	-0.993
	(-1.307)	(-0.179)	(-0.968)	(-1.342)	(-0.187)
GROWTH	-0.549	-0.484	-0.059	-0.530	-0.731
	(-1.339)	(-1.013)	(-0.117)	(-0.952)	(-1.023)
LEV	-0.386	-1.257	-0.327	0.085	1.774
	(-0.436)	(-1.218)	(-0.299)	(0.071)	(1.149)
TobinQ	-0.742***	-0.581***	-0.616***	-0.686***	-0.665***
	(-5.821)	(-3.907)	(-3.914)	(-3.962)	(-2.993)
SIZE	0.346***	0.322***	0.224***	0.268***	0.166
	(5.366)	(4.280)	(2.811)	(3.058)	(1.477)
CFO	5.977**	2.967	4.803	8.467**	5.724
	(2.372)	(1.010)	(1.544)	(2.474)	(1.303)
INV	4.532	1.844	2.907	6.274	13.356***
	(1.536)	(0.536)	(0.798)	(1.565)	(2.595)
IDD	0.557	1.540	1.234	-0.422	-0.151
	(0.234)	(0.556)	(0.421)	(-0.131)	(-0.037)
AGE	-0.226***	-0.257***	-0.210***	-0.200***	-0.142***
	(-8.824)	(-8.610)	(-6.643)	(-5.766)	(-3.186)
_cons	0.172	-0.530	1.852	0.741	2.855
	(0.131)	(-0.346)	(1.141)	(0.415)	(1.246)
industry	control				
Year	control				
N	1485	1485	1485	1485	1485
Adj/Pseudo R-Square	0.268	0.1356	0.1476	0.1685	0.2042

Note:t statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1,The mean regression is adj R square and the quantile regression is pseudo R-square.