

# The Impact of Enterprise R&D Investment on Social Responsibility Performance Under the Role of Ownership Structure

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**Abstract**—The enterprises' innovation and its fulfillment of social responsibility have increasingly become the focus of public attention. Based on observations of 2234 listed companies in China from 2009 to 2015, this paper analyzes the above relationship and the impacts of ownership structure on this relationship. Additionally, we analyze the impacts of ownership structure from two aspects: ownership concentration and ownership type. The following conclusions are drawn: First, there is a significant positive correlation between corporate R&D investment and social responsibility performance. Second, regarding this positive impact is more obvious for Non-state-owned listed companies than state-owned listed companies. Third, regarding this positive impact is more obvious for companies with low ownership concentration than companies with high concentration.

**Keywords**—ownership concentration; ownership type; social responsibility; R&D investment

## I. INTRODUCTION

In recent years, mass entrepreneurship and innovation have flourished, which has spawned a large number of new market forces, promoted profound changes in concept renewal, institutional innovation, and production management, effectively improved innovation efficiency, shortened the path of innovation. The important support for expanding employment, the promotion of new and old kinetic energy conversion and structural transformation and upgrading are becoming the source of vitality for the Chinese economy.

Recently, more and more companies have begun to respond to the call of the state to start research and development activities, and are actually fulfilling certain social responsibilities. Some scholars' researches also show that corporate social responsibility is not only a cost or a constraint, but also a source of nurturing opportunities, promoting innovation, and gaining competitive advantage; enterprises' investment in social responsibilities can give product social responsibility attributes, winning the favor of consumers.

Thus, the following questions become interesting. Is there any correlation between social responsibility and

corporate R&D investment? And what role does equity play as an important measure of the company?

The rest of the paper is arranged as follows: the second part reviews the relevant literature and develop hypothesis; the third part describes the sample selection processes and the empirical models; the fourth part presents the results; the fifth part concludes.

## II. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

### A. R&D Investment and Corporate Social Responsibility

A lot of previous studies have examined the relationship between R&D investment and corporate social responsibility, but the results are mixed. Posnikoff (1997) and Waddock (1997) found a significantly positive relationship between the two, but Wright (1997) et al. documented a negative relationship and Aupperle(1985) et al. cannot find relationship. So, what is the relationship between R&D investment and corporate social responsibility performance? This paper proposes the hypothesis:

H1: R&D investment and social responsibility show a significant positive correlation

### B. The Impacts of Ownership Type on the Relationship Between the Two

The ownership type determines the management style and operation direction of the enterprise. In response to the country's innovation strategy, state-owned enterprises will allocate part of their funds for research and development, and thus fulfill part of their social responsibilities. However, due to the unclear division of labor and unclear responsibilities of the internal management of state-owned enterprises, it is likely that funds will not be efficiently allocated to research and development.

However, non-state-owned enterprises are different. In order to enhance the corporate social responsibility performance, enterprises must improve their technological innovation capabilities which can improve their core competitiveness, and then strengthen and expand, scientific

development, and have the ability to undertake more social responsibility. The sustainable development of enterprises can provide employment opportunities for the society and pay taxes to the state. Only enterprises that have achieved technological innovation have their own core competitiveness, which can better stand on the increasingly fierce Business competition, seeking the development of the company itself.

From the perspective of the innovation efficiency of R&D investment, if the R&D investment and innovation efficiency of private enterprises is higher than that of state-owned enterprises, then under the same conditions, the social benefits created by R&D investment of private enterprises will be higher than that of state-owned enterprises. R&D investment may have a greater impact on its CSR. Mu Lin (2014) believes that the main CSR performance of state-owned enterprises is reflected in the socially responsible investment and the rights and interests of employees and consumers. Under the guidance of government policies, the state-owned enterprises try to ease employment pressures; integrate resources from all parties, participate in charitable donations and social service construction while developing ourselves; improve public relations and improve corporate integrity. However, most of the social responsibility activities carried out by state-owned enterprises do not require innovation and R&D investment. This is because state-owned enterprises have more social behaviors due to their own social status, social expectations, and state and government pressures. For political needs, the society needs to do social resource integration, public welfare construction, and welfare, and these behaviors are usually less directly related to the R&D of the enterprise. This makes the social responsibility performance of state-owned enterprises more affected by non-R&D factors, which makes the R&D of state-owned enterprises have less impact on their CSR.

On the contrary, private enterprises are less subject to government restraint, and society's social responsibility for non-state-owned enterprises is not that strong correspondingly. Non-state-owned enterprises spend relatively little on donations and social welfare undertakings, and they need to work hard on R&D investment. In this way, they could be more competitive. Non-state-owned enterprises may gain more recognition from their own product innovation, technological innovation, and service innovation, instead of choosing social welfare and public welfare to optimize the company's reputation or popularity. Improving its financial performance will be more cost-effective than CSR. Therefore, we put forward the hypothesis:

H2: Relative to state-owned enterprises, the impact of R&D investment of Chinese listed non-state-owned enterprises on CSR is more significant. And the difference between the two is significant.

According to the hypothesis, we will introduce ownership type in the regression equations. However, the introduction of cross-variables in the regression model is likely to cause multi-collinearity problems. To reduce the impact of multicollinearity on regression results, we divide

the sample into two groups: R&D inputs by state-owned enterprises and R&D inputs by non-state-owned enterprises.

### C. *The Impacts of Ownership Concentration on the Relationship Between the Two*

Cheng Cuifeng (2018) mentioned that during the shareholders' meeting, the company's board of directors will review and decide on the next company's development strategy (research and development investment). The difference in the concentration of ownership determines the different effects of shareholders on the company.

When the equity is relatively dispersed, the single shareholder often has no direct influence on the company's major decisions. The company will have the phenomenon of "internal person control" caused by "owner absence". However, at this time, the self-interest decision of the company's shareholders will not be well realized, so the company can continue to carry out research and development in the direction of the conventional social responsibility.

When the equity is relatively concentrated, the decision of a single major shareholder is very useful. This is likely to lead to deviations in the direction of the company's research and development and to invest more in self-interested projects. This weakens the positive impact of R&D investment on social responsibility performance.

Liu Fang (2018) analyzed whether the impact of the ownership structure on social responsibility is actually good or bad. On the one hand, the more shares a company has, the more it will actively participate in the company's decision-making, and the small and medium-sized shareholders can be free riders who will be willing to participate in the company's decision-making and promote the social responsibility. On the other hand, if the equity is too concentrated, then the company's internal management is virtually ineffective, and the major shareholders can easily encroach on the interests of the minority shareholders. This inhibits the internal supervision of corporate social responsibility.

Therefore, we propose the hypothesis:

H3: For enterprises with a high concentration of equity, the impact of R&D investment on enterprises with a low concentration of ownership is more significant. And the difference between the two is significant.

We divided the sample into two groups of samples of R&D investment with a high concentration of equity and R&D investment with a low concentration of equity and examined their differences in social responsibility performance.

### III. SAMPLE SELECTION AND RESEARCH MODEL

TABLE I. VARIABLE SOURCES AND INTERPRETATION

Variable type	variable name	Variable meaning	Variable source
<i>Explained Variable</i>	Score	Corporate Social Responsibility Performance Rating	Run Ling Data (2009-2015)
	R&D	Listed company R&D investment	WIND
<i>Explanatory Variable</i>	H5	Equity concentration Bigger than the median is high concentration Smaller than median is low ownership	CSMAR (2008-2014)
	Equity Nature	We divided the Equity Nature into state-owned and non-state-owned.	CSMAR (2008-2014)
<i>Mediating Variables</i>	Sales	Listed company operating income	CSMAR listed company income statement (2008-2014)
	Employee	Total number of shareholders of listed companies	CSMAR Corporate Governance Form (2008-2014)
<i>Control Variables</i>	ROA	Net profit margin of listed companies	CSMAR Financial Indicators Analysis (2008-2014)
	LEV	Listed company's asset-liability ratio	CSMAR Financial Indicators Document (2008-2014)

The CSR proxy variable selected in this paper is the MTC composite index of Runling Global CSR Report (see "Table I"). The reason for choosing this indicator is that the index is a CSR report that evaluates the company's CSR report in a neutral and impartial manner by an organization with years of experience in CSR reporting, and is updated annually. Through the data of all parties, the results of the relatively complete model are established, which has high authority and credibility. Since BRAMMER (2008) and KACPERCZYK (2008) have revealed a close relationship

between company size and CSR, it is necessary to use company size as a control variable. The size of the company can be measured by operating income, the number of employees, and the original data is logarithmized. And then returns the return on assets and the risk of the enterprise are respectively used as the proxy variable by the ROA and the total asset-liability ratio of the enterprise. The industry classification is based on the latest manufacturing standards of the CSRC.

This article builds the following measurement models:

$$Score_{ys} = \alpha + \beta_1 R \& D_{y-1s} + \beta_2 Employee_{y-1s} + \beta_3 Sales_{y-1s} + \beta_4 ROA_{y-1s} + \beta_5 LEV_{y-1s} + \varepsilon_{y-1s}$$

Where y and s represent the year and the security code, pi represents the intercept, and  $\varepsilon_{y-1s}$  represents the error term subject to the standard normal distribution. Considering that the company's social responsibility performance may have a time lag effect on various factors, the data of each variable is advanced by one year, that is y - 1 year. If the research hypothesis 1 is supported, the coefficients of Score and R&D should be significantly positive.

If hypothesis 2 is supported, the coefficient of the group between the two groups is significantly positive and the

coefficient of the non-state-owned enterprise group is greater than that of the state-owned enterprise group.

Finally, if hypothesis 3 is supported, the coefficient of the group between the two groups is significantly positive and the coefficient of the low concentration group is greater than the group with the high concentration of the equity concentration.

### IV. RESULT ANALYSIS

TABLE II. DESCRIPTIVE STATISTICS

Variable	N	Mean	Median	Max	Min	Standard Deviation
Score	2334	39.29	36.50	80.34	18.55	12.02
R&D	2334	18.03	18.06	22.46	13.02	1.870
Employee	2334	8.550	8.450	12.42	4.880	1.310
Sales	2334	21.83	21.86	26.81	13.77	2.010
ROA	2334	0.040	0.030	0.220	-0.110	0.050
LEV	2334	0.450	0.460	0.940	0.020	0.210
Equity Nature	2334	0.620	1	1	0	0.480
H5	2334	0.200	0.170	0.780	0	0.140

TABLE III. CORRELATION MATRIX

	Score	R&D	Sales	Employee	ROA	LEV
<i>Score</i>	1					
<i>R&amp;D</i>	0.322***	1				
<i>Sales</i>	0.348***	0.453***	1			
<i>Employee</i>	0.412***	0.575***	0.626***	1		
<i>ROA</i>	0.001	0.070***	-0.022	-0.026	1	
<i>LEV</i>	0.134***	0.124***	0.376***	0.373***	-0.388***	1

From “Table II” that the listed company's CSR average is 39.29, out of 100 points, this score is not high.

From “Table III” that the correlation between CSR and R&D is positively significant, CSR has a positive correlation

with the company size (operating income and number of employees). R&D has a positive correlation between the number of employees and the risks.

TABLE IV. OLS REGRESSION RESULTS

Variable	Full Sample	Low concentration	High concentration	Non-state-owned	State-owned
<i>R&amp;D</i>	1.021*** (5.94)	1.408*** (6.46)	1.139*** (4.78)	1.997*** (6.69)	1.177*** (5.55)
<i>Sales</i>	0.735*** (5.29)	0.844*** (4.91)	0.510** (2.60)	0.429 (1.85)	0.868*** (4.61)
<i>Employee</i>	2.170*** (8.85)	0.859** (2.82)	2.353*** (6.88)	0.673 (1.77)	2.140*** (6.67)
<i>ROA</i>	3.063 (0.68)	1.047 (0.19)	-0.00599 (-0.00)	-12.61* (-2.00)	-3.869 (-0.67)
<i>LEV</i>	-2.368 (-1.87)	-3.835* (-2.36)	-3.020 (-1.67)	-4.389* (-2.11)	-4.166* (-2.58)
<i>Cons</i>	-19.26*** (-6.17)	-18.73*** (-4.73)	-21.18*** (-4.79)	-12.56** (-2.75)	-21.79*** (-5.31)
<i>R<sup>2</sup></i>	0.32	0.31	0.33	0.32	0.33
<i>F</i>	50.61	24.68	26.31	20.25	34.26
<i>N</i>	2334	1166	1168	882	1452

<sup>a</sup>. t statistics in parentheses

<sup>b</sup>. \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

From “Table IV” that for the full sample group, we can see that the impact of R&D on social responsibility is a very significant positive correlation ( $p < 0.001$ ), which verifies H1, indicating that for Chinese listed companies, the R&D investment of enterprises has a significant positive correlation with the fulfillment of corporate social responsibility;

For non-state-owned enterprises, R&D has a very significant positive impact on the fulfillment of social responsibility ( $p < 0.001$ ). For state-owned enterprises, R&D has a significantly but smaller impact on social responsibility performance than non-state-owned enterprises. The empirical p-value in Fisher's Permutation test = 0.000 There

## V. CONCLUSION

This paper analyzes the impact of R&D investment on corporate social responsibility performance under the two grouping situations based on the research of equity nature and equity concentration. It reveals how the internal development of enterprises and enterprises affects the fulfillment of social responsibilities at the macro level. It also clarifies that the company's operating income and the total number of employees also have a significant role in promoting corporate social responsibility.

is a significant difference in the implementation of social responsibility between the two sets of innovation inputs. This is consistent with H2.

For companies with low concentration, R&D also has a very significant positive impact on the fulfillment of social responsibility ( $p < 0.001$ ). For companies with high concentration, the significant influence of R&D on social responsibility performance is significant. It is slightly smaller than a company with a low concentration. The empirical p-value in Fisher's Permutation test = 0.037. The two sets of innovative inputs have significant differences in social responsibility performance at the 5% level. This is consistent with H3.

So, this paper draws the following conclusions: First, the company's R&D investment plays a significant role in promoting social responsibility. Second, non-state-owned enterprises do promote the social responsibility implementation better than the state-owned enterprises in research and development. It can be seen that state-owned enterprises still have a lot of room for reform.

Third, enterprises with a high concentration of equity have weakened the role of R&D investment in fulfilling social responsibility compared with enterprises with low

concentration, and also reflected some problems of the shareholders' meeting.

#### ACKNOWLEDGMENT

This paper is funded by the Research Projects of the Social Science and Humanity on Young Fund of the Ministry of Education (No. 18YJC630178), the Social Science Foundation of Shandong Province (No. 18CGLJ19) and the Social Sciences of Shandong Province Planning Project (No. 18CGLJ10).

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