

Corporate Environmental Information Disclosure and Market Value

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Abstract: In the face of global environmental degradation, people are increasingly concerned about the environment. Heavy polluting enterprises, as the main emitters of pollutants, need to bear the main responsibility for environmental protection, and how to make heavy polluting enterprises pay attention to environmental information has become an important concern of society. Therefore, this paper examines the quality of environmental information disclosure and the market value of heavily polluting enterprises from the perspective of heavily polluting enterprises themselves, in order to promote the value of heavily polluting enterprises, achieve rapid development, improve public awareness to increase expected cash flows, and adapt to the pace of marketisation to promote the harmonisation of economic and social values.

Keywords: Heavy polluting enterprises; ENvironmental information disclosure quality; Enterprise value.

1. Background and Significance of Study

Over the past few years, China has made great efforts to improve the ecological environment, to increase the awareness of the environment, and to put in place policies for environmental protection. Some traders, however, feel that such policies will lower their performance and impact on the market value of the company. Therefore, they do not want to reveal the truth about the environment to the government or to the general public when they are being inspected by the Environmental Protection Agency. In this paper, we mainly discuss the relation between the disclosure of environment information and market value, the mechanism of the influence of management ability and enterprise innovation output on market value, and construct regression model, regression analysis and robustness test.

2. Current Research Situation

The influence of environmental information disclosure on corporate value has not been unified by scholars at home and abroad. First, there is a positive correlation. Cheng Qiongwen and Liu Feng [1] studied the influence of environmental information disclosure on corporate value, classified them according to the nature of ownership and regional differences. "Healy [2] took a sample of 200 U. S. companies, and built a regression model to prove that the improvement of EBIT can improve the stock yield." Gao Shuang [3] has studied the relation of environment information disclosure, environment quality, green technology innovation and enterprise value. Hassel [4] took 71 Swedish companies as the sample, and studied the information disclosure of enterprises in 1998 ~ 2000. The sample of 100 large British companies, and based on the content analysis, concluded that the improvement of environmental information did not lead to a higher return on the capital market.

3. Theoretical Basis and Research Hypothesis

3.1. Theory

3.1.1. Theory of stakeholders

The Stakeholder Theory takes the Economic Society as a community, in which all enterprises are affected by their stakeholders. [1] As far as the environment resources are concerned, the government, the consumer and the shareholders are the suppliers of the environment resources, and the relationship of trust between them and society. Companies are expected to become more efficient and more efficient in allocating resources. However, this can only be done through the media that the company publishes. Therefore, interested parties need to make full disclosure of the company's environmental information so that they can make correct decisions [2].

3.1.2. The theory of signal transfer.

The enterprise and the market are connected by means of information transmission. No matter how good the information is, the market will react accordingly. But, while signaling theory can explain that corporate disclosure can improve the company's own growth, its information users should pay more attention to the reliability and truthfulness of the information. At the same time, it is necessary for government departments to make laws and regulations and to establish a sound review system [3].

3.1.3. Theory of Information Asymmetry

Asymmetric information theory means that both sides of the transaction receive different information in the market behavior, which leads to the asymmetry of information. According to the classical signalling theory model (Spence 1973), there is an obvious asymmetry of information between employers and job applicants, which makes it hard for employers to decide if a candidate is fit for the job. In order to address this issue, recruiters use the educational experience of the applicant as a sign that they are fit for the job [4].

3.2. Research hypothesis

The result shows that the information disclosure makes the business profit uncertain, and the enterprise's commercial risk increases, which will cause the market value to drop. When the cost of information disclosure exceeds the profit, it will result in lower profit and lower market value. Moreover, if investors can't get valuable information from the market, the cost of investment will be increased, which will lead to higher expected returns for investors.

This paper proposes the following hypothesis:

H1: The degree of disclosure of environmental information is positively correlated with enterprise value.

The disclosure of environmental information has an incentive effect on the innovation performance of enterprises. The more environmental information a company publishes, the greater its willingness to assume more social responsibility. These companies take the benefit of their stakeholders into account, which will enhance the public supervision over the performance of their duties, so as to enhance the incentive for innovation. The enterprise obtains the technology superiority, the market superiority by the innovation output, the higher the profit, the higher the enterprise's market value. Thus, environmental information disclosure can influence the firm's market value by acting as an intermediary variable. This paper proposes a second research hypothesis:

H2: The Relationship between Environmental Information Disclosure and Corporate Value is mediated by Innovation Output

Management ability plays a moderating role in the relation between the disclosure of environmental information and enterprise value. Management's behavior influences the entire

company's strategic decision-making. Management ability has a direct impact on management's actions. The more capable managers are, the more they care about the firm and their reputation, and thus the more important it is to pursue the interests of the company and enhance its reputation. Meanwhile, reputation has a restraining effect on management. As a result, companies with more qualified managers will be able to improve their environmental information disclosure and increase their value. On this basis, the third research hypothesis is put forward:

H3: There is a positive moderating effect on the relationship between the disclosure of environmental information and enterprise value.

4. Empirical Research Design

4.1. Sample selection and data sources

This study was conducted on 16 categories of listed companies in major polluting industries announced by the Ministry of Environmental Protection in 2010. The study on the impact of environmental information disclosure on corporate value of the relevant number of listed companies from 2015-2020 was selected and taken directly from the Guotaian database system. access to data through various platforms and databases. In order to improve the reliability of the study, the primary sample was treated as follows. Enterprises with abnormal profitability status such as ST or ST* have been excluded. (2) Excluding enterprises without continuous data. (3) Excluding Hong Kong stock enterprises. The above processing of the primary sample using Excel.2010 resulted in a final sample of 274 enterprises with a total of 1202 observations.

Table 1. Number and percentage of industrial enterprises

Industries	Number	Percentage (%)
Power	27	9.8
Steel	6	2.1
Aluminium electrolysis	10	3.6
Chemical	17	6.2
Building Materials	2	0.7
Pharmaceuticals	176	64.2
Paper	10	3.6
Textiles	3	1
Mining	23	8.3
Total	274	100

This research is based on the "Guidelines for Enterprise Information Disclosure" published in 2010 by the Ministry of Environmental Protection, which suggested that heavy pollution industries such as power, steel, electrolytic aluminum, coal, chemical, building, paper, pharmaceuticals, textiles, and mining were proposed. The China Securities Regulatory Commission (CSRC) 2012 Industry Classification was used as the main base of this research, and

the final industry classification of the sample was presented in the following table

We can draw the conclusion from the above table that the proportion of enterprises in the sample is the largest, accounting for 64.2%, whereas the proportion of the enterprises in textile and construction materials is less than 1%.

4.2. Variable Description

Table 2. Variable definition table

Variable properties	Variable name	Variable symbol	Variable definition
Explained variables	Corporate Values	TobinQ	Tobin's Q, a measure of corporate value
Explanatory variables	Environmental Disclosure	EDI	Corporate Environmental Disclosure Quality Index
Mediating variable	Innovation Output	IN	Number of patents granted
Moderating variables	Management Capability	MA	Residual values obtained by the DEA-Tobit two-stage method
Control variables	Company size	Size	Natural logarithm of total assets at the end of the year
	Concentration of shareholding	OC	Percentage of shareholding of the largest shareholder
	Gearing ratio	Lev	Ratio of average annual total liabilities to annual total assets of an enterprise
	Corporate growth	Growth	Potential for enterprise value enhancement

4.3. Model construction

To test the impact of environmental information disclosure on market value, model I was developed:

$$\text{TobinQ}_{it} = \alpha_0 + \alpha_1 \text{EID}_{it} + \alpha_2 \text{EID}_{it}^2 + \alpha_3 \text{Controls}_{it} + \sum \text{Year} + \varepsilon_{it} \quad (1)$$

To test whether the innovation output of a firm plays a mediating role between environmental information disclosure and firm value, model II was developed:

$$\text{IN}_{it} = \alpha_0 + \alpha_1 \text{EID}_{it} + \alpha_2 \text{EID}_{it}^2 + \alpha_3 \text{Controls}_{it} + \sum \text{Year} + \varepsilon_{it} \quad (2)$$

$$\text{TobinQ}_{it} = \alpha_0 + \alpha_1 \text{EID}_{it} + \alpha_2 \text{EID}_{it}^2 + \alpha_3 \text{Controls}_{it} + \alpha_4 \text{IN}_{it} + \sum \text{Year} + \varepsilon_{it} \quad (3)$$

To test the moderating effect of management capability on the relationship between environmental information disclosure and firm value, Model III was developed:

$$\text{TobinQ}_{it} = \alpha_0 + \alpha_1 \text{EID}_{it} + \alpha_2 \text{EID}_{it}^2 + \alpha_3 \text{Controls}_{it} + \alpha_4 \text{MA}_{it} + \alpha_5 \text{EID}_{it} \times \text{MA}_{it} + \alpha_6 \text{EID}_{it}^2 \times \text{MA}_{it} + \sum \text{Year} + \varepsilon_{it} \quad (4)$$

5. Analysis of Results

5.1. Descriptive analysis

Data from listed companies in the energy sector from 2015-2020 was used as the sample for the study and the variables were processed using Stata16 statistical analysis software. The table shows the results of the descriptive statistical analysis for each variable.

Table 3. Regression analysis

Variable	Minimum	Maximum	Median	Mean	Std Dev
TobinQ	0.814	5.023	1.172	1.398	0.652
EDI	0	0.682	0.223	0.264	0.18
Size	1.182	2.378	1.849	1.84	0.256
LEV	0.079	0.917	0.564	0.563	0.233
Growth	-0.478	4.37	0.098	0.235	0.598
MA	-0.149	0.17	0.029	0.027	0.032
OC	0.017	0.596	0.201	0.216	0.13

As shown in the table below, the average of the Explanatory Variable Enterprise Value (TobinQ) is 1,398, and the highest and lowest values are 5.023 and 0.814, which reflects the great difference in the business value of energy companies.

The average of Explanatory Variable Environmental Information Publication (EDI) is 0.23, and the highest and lowest values are 0.682 and 0, which shows that there is a great difference in the quality of information disclosed by enterprises.

The largest Size (Size) is 2.378 and the smallest is 1.182, which shows that there is a big difference in the size of the companies with heavy pollution. The average level of debt (LEV) is 0,63, with a mean value of 0,64, which means that the indebtedness of heavily polluting companies is generally stable, with a maximum LEV of 0.917 and a minimum of

0.079, which shows that the level of indebtedness of heavily polluting companies varies greatly. The average of growth is 0.235, and the median is 0.098, which shows that the heavy pollution companies grow well and have great development potential. The average of Managerial Competence (MA) is 0.027 and the median is 0.029, which shows that the overall management ability of the energy industry is not strong, and there is much room for improvement. The maximal equity concentration (OC) is 0.596, and the lowest is 0.017, which shows that there are large differences in the degree of equity concentration between heavy polluters.

5.2. Relevance analysis

In terms of descriptive statistics, the correlation test among the major variables is described in the table below:

Table 4

	TobinQ	EDI	Size	LEV	Growth	MA	OC
TobinQ	1.000						
EDI	-0.401*	1.000					
Size	-0.124*	0.171**	1.000				
LEV	-0.375*	0.122**	-0.127*	1.000			
Growth	-0.052*	-0.063	-0.034	0.065	1.000		
MA	0.112**	-0.079**	0.044	-0.415*	-0.041	1.000	
OC	0.191*	0.193**	-0.002	0.060*	0.040	0.136**	1.000

Note: ***, **, * denote statistically significant at 1%, 5%, 10% respectively.

As can be seen from the table, the quality of environmental information disclosure (EDI), firm size (Size), and gearing (LEV) are significantly and negatively correlated with firm value (TobinQ), and the sign is not consistent with the hypothesis. This is because the correlation analysis considers the correlation between two variables, while the positive correlation between EDI, Size, LEV and TobinQ is due to a combination of multiple factors, resulting in the correlation analysis being inconsistent with the hypothesis.

5.3. Robustness tests

As can be seen from the table, only the quality of environmental information disclosure (EDI), passes the significance test. Therefore, H1 and H3 are again verified and the quality of environmental information disclosure has a positive effect on firm value.

Table 5

Variables	X VII	X VIII	X IX
	TobinQ	TobinQ	TobinQ
EDI	0.324**		
Size	-0.085 (0.0887)	-0.057 (-0.620)	-0.111 (-1.083)
LEV	-0.212 (-0.953)	-0.198 (-0.989)	-0.210 (-0.949)
MA	-0.043 (-0.035)	0.150 (-0.129)	0.012 (0.011)
Growth	-0.031 (-1.012)	-0.039 (-1.212)	-0.030 (-0.956)
OC	-0.035 (-0.241)	0.012 (0.085)	-0.079 (-0.489)
Year	Control	Control	Control
N	205	205	205
R2	0.841	0.843	0.845

Note: Robust t-values in brackets, *, ** and *** denote regression coefficients significant at 10%, 5% and 1% confidence levels respectively.

5.4. Summary of empirical results

Empirical research focuses on the influence of environmental information disclosure on enterprise value.

The following table presents a comparison between the concrete hypothesis and the empirical one.

Table 6

Serial number	Research hypothesis	Empirical results	Is it consistent
H1	The level of environmental information disclosure by heavy polluters is positively correlated with corporate value.	Significant positive impact	Yes
H2	Innovation output mediates the relationship between environmental disclosure and firm value	Significant intermediary effect	Yes
H3	Positive moderating effect of management capability on the relationship between environmental information disclosure and corporate value	Significant positive regulation	Yes

6. Conclusion

First, the paper analyzes the status quo of environmental information disclosure and the enterprise value of Chinese heavy polluters.

Second, based on the descriptive statistics, we find that: the quality of environmental information disclosure of heavy polluting enterprises is increasing year by year, but the quality of the information disclosure is not good, and the managers don't pay attention to the public disclosure of environmental

information, and they don't realize the importance of increasing the value of enterprises.

Third, the quality of the disclosure of environmental information by highly polluting companies can add value to the market. The government, investors, and other stakeholders have made higher demands on the environment behavior of heavy polluters in China.

Fourth, the quality of environmental information disclosed by highly polluting companies can affect the value of companies under greater environmental pressure. Moreover, investors and consumers will attach more importance to corporate environment information disclosure, which will increase the signal effect.

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