

# Corporate Governance, Media Attention and Environmental Information Disclosure

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**Abstract:** Environmental information disclosure is an important element in the modernization of Chinese environmental governance system and governance capacity. Based on two perspectives of corporate governance and media attention, the relationship between the two and corporate environmental information disclosure is analyzed based on the research samples of Shanghai and Shenzhen A-share listed enterprises from 2017-2021. The empirical results of this paper show that: corporate governance and media attention can significantly enhance corporate environmental information disclosure; media attention has a significant moderating effect on corporate environmental information disclosure, which can further strengthen the relationship between corporate governance and environmental information disclosure, and this moderating effect is more obvious in state-owned enterprises.

**Keywords:** Corporate Governance; Media Attention; Environmental Information Disclosure

## 1. Introduction

With the rapid development of society and economy, the environmental pollution brought about by industrial civilization has become increasingly serious and has led to a serious ecological crisis<sup>[1]</sup>. Ecological crises are caused by a decline in environmental quality due to human activities, the loss of self-regulation of entire ecosystems and the destruction of systems. Once an ecological crisis has occurred, it is difficult to restore the balance, causing inconvenience to people's productive lives. In recent years, people have begun to think about how to improve the ecological environment and achieve a harmonious coexistence between man and nature. As the mainstay of social development, enterprises bear the responsibility of protecting the ecological environment<sup>[2]</sup>. The CSRC issued a revised version of the Code of Governance for Listed Companies in June 2018, a document that requires listed companies to disclose environmental information and other social responsibility-related information in accordance with the regulations. Moreover, as an important way for enterprises to fulfil their social responsibility, environmental information disclosure can weaken information asymmetry and protect the public's right to know and monitor. This is why exploring what factors influence the level of environmental information disclosure has led to extensive debate among scholars.

The main corporate governance characteristics include shareholders' meeting characteristics, board of directors' characteristics, executive management characteristics and supervisory board characteristics. However, most scholars study a few indicators within each of the characteristics of corporate governance, such as shareholding concentration and board size. Few scholars have used principal component analysis to measure comprehensive indicators of corporate governance. In recent years, smartphones have become increasingly popular and the number of Internet users in China has risen rapidly, reaching 1.051 billion as of June 2022. This is why the media has played a more obvious role in disseminating information and monitoring public opinion in this era<sup>[3]</sup>. The media is an external mechanism that can increase corporate transparency and media coverage has contributed to the resolution of major environmental pollution incidents like the major water pollution of the Songhua River in China, the cadmium pollution of the Longjiang River in Guangxi and the arsenic pollution of the Yangzong Sea in Yunnan. So, how do corporate governance and media attention each affect corporate environmental disclosure? Does media attention affect the relationship between corporate governance and environmental information disclosure, and how does this effect differ between state-owned and non-state-owned enterprises? This paper will answer these questions through empirical evidence.

Possible contributions of this paper: (1) the use of principal component analysis to construct corporate governance indicators to provide a comprehensive picture of the level of governance of the sample companies, thereby examining the relationship between corporate governance and corporate environmental information disclosure. (2) Media attention as external governance to explore its impact on environmental information disclosure; combining internal governance as corporate governance with media attention to external governance to examine its relationship with environmental information disclosure. The research in this paper will further enrich the study of the influencing factors of corporate environmental information disclosure and provide empirical references for enterprises to improve the level of environmental information disclosure.

## **2. Theoretical Analysis and Research Hypothesis**

### ***2.1. Corporate Governance and Environmental Information Disclosure***

Environmental information disclosure is the process of disclosing information about the environmental impact and performance of an enterprise's production and operation to the outside world, and accepting public scrutiny. Corporate governance is a mechanism for monitoring and balancing the operators by the stakeholders of the firm. Not only does corporate governance address the separation of ownership and control of the firm and protect the interests of external investors, but corporate governance affects the disclosure decisions of the firm's managers and thus has an impact on the access of external investors and other stakeholders of the firm. According to principal-agent theory, the relationship between the owner of the principal and the operator of the trustee is clarified by means of a contract. The principal and the trustee have inconsistent objectives and information asymmetries. Information disclosure can improve the information asymmetry between principals and trustees and reduce agency costs. Better corporate governance allows trustees to make rational and correct decisions based on the identification of various risks of the firm<sup>[4]</sup>.

As global ecological issues continue to emerge, environmental information is becoming an increasingly sought-after part of information disclosure. In recent years, because environmental issues are so important, managers of companies with good corporate governance have improved the disclosure of environmental information in order to maximise corporate value. Therefore, corporate governance can influence the environmental information disclosure of companies. Based on the above discussion this paper proposes hypothesis 1:

**H1:** Corporate governance has a facilitating effect on environmental information disclosure.

### ***2.2. Media Attention and Environmental Information Disclosure***

Most of the public will be informed through the media, which is a bridge for the transmission of information. On the one hand, the media will report on the economic behaviour of the enterprise, arousing public opinion and thus the attention of the relevant authorities and promoting the rectification of the wrongdoing of the enterprise, while the media will influence the reputation of the enterprise and stakeholders will reflect on the media reports, which will have an impact on the behaviour of the enterprise; On the other hand, according to public pressure theory, media attention coverage will bring pressure to enterprises, and this part of pressure will regulate the behaviour of enterprise managers to a certain extent. Environmental information disclosure can communicate to investors in the market that companies are actively fulfilling their social responsibility, and at the same time will reduce agency costs and increase the productivity of companies<sup>[5]</sup>. As a result, the media's attention to companies will draw the attention of society at large, and thus the public opinion of society will act on the managers of companies and have an impact on the disclosure of corporate environmental information. Media attention enables the public to be more aware of the relevant production and operation of the company, thus pushing the company to improve its corporate governance, thus strengthening the role of corporate governance in promoting environmental information disclosure. Based on the above discussion this paper proposes hypothesis 2 and hypothesis 3:

**H2:** Media attention has a facilitating effect on environmental information disclosure.

**H3:** Media attention enhances the contribution of corporate governance to environmental information disclosure.

As an important pillar of the national economy, state-owned enterprises have a stake in the development of all sectors of society and deserve to play an exemplary role in the disclosure of

environmental information. State-owned enterprises do not only pursue simple economic interests, but also have to pursue the advancement of social development and the protection of the environment. The nature of ownership has a significant impact on the fulfilment of social responsibility and disclosure of environmental information [6]. Based on the above discussion this paper proposes hypothesis 4:

**H4:** The moderating effect of media attention is more pronounced in state-owned enterprises.

### 3. Research Design

#### 3.1. Data Sources

This paper takes listed companies in China's Shanghai and Shenzhen A-shares from 2017-2021 as the initial research sample, and in order to improve the reliability and validity of the research results, the initial sample is screened as follows: (1) excluding listed companies in ST and \*ST; (2) sample companies in the financial securities industry were excluded; (3) sample companies for which five consecutive years of data did not exist were excluded; (4) to eliminate the effect of outliers, all continuous variables were subjected to a top and bottom 1% tail reduction, resulting in 11,782 sample observations. Additional corporate data for this article is from the CSMAR Guotaian database. Data on media attention is obtained by screening the CNRDS database. The level of corporate governance was constructed as a composite indicator by principal component analysis. Environmental information disclosure was obtained using a five-category item scoring method. Stata 17.0 software was used to conduct the data analysis in this paper.

#### 3.2. Variable Definitions

##### 3.2.1. Environmental Information Disclosure (Eid)

Table 1: Environmental Disclosure Index Scoring Criteria

Indicator type	Disclosure type	Disclosure items	Criteria
Non-monetary environmental information disclosure	Environmental information disclosure vehicles	Annual Reports	Disclosed as 2 Undisclosed as 0
		Social Responsibility Report	
		Environmental Reports	
		Environmental Philosophy	
	Environmental Management Disclosure	Environmental objectives	
		Environmental Management System	
		Environmental training	
		Special Environmental Action	
		Emergency response mechanisms	
		Environmental honours or awards	
	Environmental Regulation and Certification Disclosure	The "three simultaneous" system	
		Key pollution monitoring units	
		Pollutant discharge compliance	
		Sudden environmental accidents	
		Environmental violations	
Environmental petition cases			
Monetary Environmental Information Disclosure	Disclosure of environmental liabilities	ISO14001 certification or not	Quantitative as 2 Qualitative as 1 Non-disclosure as 0
		ISO 9001 certification or not	
		Waste water Discharge Volume	
		COD emissions	
		SO <sub>2</sub> emissions	
	Environmental performance and governance disclosure	CO <sub>2</sub> emissions	
		Soot and dust emissions	
		Industrial solid waste generation	
		Exhaust emission reduction treatment	
		Wastewater abatement treatment	
Control of dust and smoke			
Solid waste utilization and disposal			
Noise, light pollution, radiation and other governance			
Implementation of Cleaner Production			

Drawing on existing research, the environmental information disclosed by enterprises was analysed and the item scoring method was used to measure the environmental information disclosure, with the specific environmental information disclosure scoring items shown in Table 1. The environmental

information disclosure indicators of enterprises are classified according to whether they are monetary or not. These scores were summed and then processed to obtain a score of 2 for quantitative disclosure, 1 for qualitative disclosure and 0 for non-disclosure, and 2 for non-disclosure for non-monetary disclosure. The formula was calculated as follows:  $Eid = \sum Eid / \sum MEid$

**3.2.2. Corporate Governance (GOV)**

Drawing on existing research, seven corporate governance variables were selected and principal component analysis was used to construct comprehensive indicators of corporate governance. The seven corporate governance variables were: (1) executive compensation (total annual salary of supervisors) (2) executive shareholding ratio (number of supervisors' shares/paid-up capital or share capital) (3) proportion of independent directors (4) board size (5) institutional shareholding ratio (6) Nature of shareholding (7) Concentration of shareholding (shareholding of the 2nd to 5th largest shareholder / shareholding of the first largest shareholder) Based on the above seven corporate governance variables, using principal component analysis, four principal components were selected to calculate the composite corporate governance (GOV) indicator based on the cumulative variance contribution. In order to make the corporate governance value positive for analysis, each formula governance value is uniformly added by 2.19. The higher the value of the corporate governance (GOV) composite indicator, the higher the level of corporate governance.

**3.2.3. Media Attention (Media)**

This paper uses the total number of news stories in mainstream online financial media and financial newspapers in which the company appears in the headlines, taking the natural logarithm to measure media attention.

**3.2.4. Nature of Ownership (SOE)**

In this paper, the nature of ownership of enterprises is divided into state-owned enterprises and non-state-owned enterprises. If the enterprise is a state-owned enterprise, the value is 1; if the enterprise is a non-state-owned enterprise, the value is 0.

**3.2.5. Control Variables**

In this paper, the variables of firm size, firm age, profitability, solvency and growth, which may have an impact on environmental information disclosure, are selected as control variables. The main study variables are defined and their calculations are shown in Table 2.

Table 2: Definition and Description of Key Variables

Variable type	Variable symbol	Variable definition
Explained variables	Eid	Item scoring
Explanatory variables	GOV	Composite indicators for principal component analysis
Modulating variables	Media	Ln (total number of media headline stories)
Control variables	SOE	1 for state-owned enterprises; 0 otherwise
	Size	Ln (total business assets)
	Lev	Total liabilities/total assets
	Age	Year of observation - year of business establishment + 1
	ROA	Net Profit / Total Assets
	Grow	(Increase in operating profit for the year/total operating profit for the previous year) x 100%
	Ind	Industry fixed effects
Year	Year fixed effects	

**3.3. Model Setting**

**3.3.1. A model of the impact of corporate governance on environmental information disclosure**

$$Eid_{it} = \alpha_0 + \alpha_1 GOV_{it} + \alpha_2 Controls_{it} + Ind_i + Year_t + \epsilon_{it} \tag{1}$$

If the coefficient  $\alpha_1$  is positive and significant, it indicates that corporate governance has a significant contribution to environmental information disclosure.

**3.3.2. A model of the impact of media attention on environmental information disclosure**

$$Eid_{it} = \alpha_0 + \alpha_1 Media_{it} + \alpha_2 Controls_{it} + Ind_i + Year_t + \epsilon_{it} \tag{2}$$

If the coefficient  $\alpha_1$  is positive and significant, it indicates that media attention has a significant

contribution to environmental information disclosure.

### 3.3.3. A model of corporate governance, media attention and environmental information disclosure

$$Eid_{it} = \alpha_0 + \alpha_1 GOV_{it} + \alpha_2 Media_{it} + \alpha_3 GOV_{it} \times Media_{it} + \alpha_4 Controls_{it} + Ind_i + Year_t + \varepsilon_{it} \quad (3)$$

If the coefficient  $\alpha_3$  is positive and significant, it indicates that media attention can enhance the contribution of corporate governance to environmental information disclosure.

$$Eid_{it} = \alpha_0 + \alpha_1 GOV_{it} + \alpha_2 Media_{it} + \alpha_3 SOE_{it} + \alpha_4 SOE_{it} \times GOV_{it} \times Media_{it} + \alpha_5 Controls_{it} + Ind_i + Year_t + \varepsilon_{it} \quad (4)$$

If the coefficient  $\alpha_4$  of the interaction term in model (4) is positive and significant, it indicates that the moderating effect of media attention between corporate governance and environmental information disclosure is more significant in state-owned enterprises.

## 4. Analysis of Empirical Results

### 4.1. Descriptive Statistics

The descriptive statistics for each variable in this paper are shown in Table 3. As shown in Panel A, the mean value of the quality of environmental information disclosure (Eid) increased from 0.370 to 0.748 year by year from 2017 to 2021, which indicates that the level of environmental information disclosure of the sample companies has been improving during these five years; the mean maximum value of these five years is 1.386, the minimum value is 0.080 and the standard deviation is 0.314, and the mean value is larger than the median, indicating that the quality of environmental information disclosure of most of the sample companies has not reached the mean value and the overall level is low. In Panel B, the mean value of Corporate Governance (GOV) was 2.250, with a minimum value of 0.645 and a maximum value of 4.375, indicating a wide variation in the level of corporate governance across companies. Media attention (Media) has a very high value of 9.537 and a very low value of only 0, indicating a significant difference in media attention between the different sample companies.

Table 3: Descriptive statistics.

Panel A: Descriptive statistics for Eid							
Year	Average	Standard deviation	Minimum	25%	Median	75%	Maximum
2017	0.370	0.281	0.067	0.133	0.267	0.500	1.333
2018	0.427	0.305	0.067	0.200	0.333	0.600	1.333
2019	0.455	0.320	0.067	0.200	0.367	0.667	1.400
2020	0.509	0.314	0.067	0.267	0.467	0.733	1.333
2021	0.748	0.351	0.133	0.467	0.733	1.000	1.533
Average	0.502	0.314	0.080	0.253	0.433	0.700	1.386
Panel B: Descriptive statistics for other variables							
GOV	2.250	0.730	0.645	1.730	2.276	2.736	4.375
Media	4.243	1.314	0.000	3.611	4.248	4.860	9.537

### 4.2. Empirical Test Results

#### 4.2.1. Empirical Analysis of Corporate Governance and Environmental Information Disclosure

The regression results of model (1) are shown in Table 4, where column (1) is the regression result of environmental information disclosure (Eid) on corporate governance (GOV). The regression results show that the regression coefficient of corporate governance (GOV) is 0.0452 and significant at the 1% level, which indicates that the level of corporate governance has a significant contribution to corporate environmental information disclosure. Hypothesis H1 was verified.

#### 4.2.2. Empirical Analysis of Media Attention and Environmental Information Disclosure

The regression results of model (2) are shown in Table 4, where column (2) shows the regression results of environmental information disclosure (Eid) on media attention (Media). The regression results show that the regression coefficient of Media is 0.0079, which is significant at the 1% level, indicating that the media attention received by enterprises will play a "governance effect" and can

significantly improve the level of environmental information disclosure, thus testing hypothesis H2.

#### 4.2.3. Empirical Analysis of Corporate Governance, Media Attention and Environmental Information Disclosure

To further investigate the role of media attention (Media) in corporate governance (GOV) and environmental information disclosure (Eid), regression analysis of models (3) and (4) was conducted in this paper, and the results of the regressions are shown in Table 4. In this case, an interaction item with corporate governance (GOV) and media attention (Media) has been added to column (3). The results of the regression show that the regression coefficient of the interaction term between corporate governance (GOV) and media attention (Media) is positive and significant at the 5% level, which indicates that media attention (Media) can enhance the positive effect of corporate governance (GOV) on environmental information disclosure (Eid) and thus enhance its promotion of environmental information disclosure (Eid), testing hypothesis H3.

In addition, the interaction term of corporate governance (GOV), media attention (Media) and nature of property rights (SOE) is added in (4). The regression results show that the regression coefficient of the interaction term of corporate governance (GOV), media attention (Media) and nature of property rights (SOE) is 0.016 with a significance level of 5%, which indicates that the effect of media attention on corporate governance for environmental information disclosure is significantly different when comparing state-owned and non-state-owned enterprises. In state-owned enterprises, media attention is more likely to strengthen the role of corporate governance in promoting environmental information disclosure, testing hypothesis H4.

Table 4: Regression results of GOV, Media and Eid

Variable	(1)	(2)	(3)	(4)
GOV	0.0452*** (7.40)		0.0417*** (5.66)	0.0331*** (4.24)
Media		0.0079*** (2.75)	0.0191*** (5.72)	0.0189*** (5.35)
GOV×Media			0.0084** (2.16)	
SOE				0.0461*** (3.50)
GOV×Media×SOE				0.0160** (2.44)
Constant	-1.3584*** (-16.82)	-1.4941*** (-19.11)	-1.2710*** (-13.33)	-1.2296*** (-12.81)
N	11782	11782	11782	11782
Ind	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Adj. R <sup>2</sup>	0.43	0.42	0.24	0.24

Note: (1) \*\*\*, \*\*, \* denote t-tests significant at the 1%, 5% and 10% levels respectively

#### 4.3. Robustness tests

##### 4.3.1. Change of explanatory variables

The environmental information disclosure (Eid) in the above analysis was measured using the principal component analysis method used by many previous scholars. The robustness of the results of the regression between corporate governance, media attention and environmental information disclosure was tested by changing the criteria for assigning scores to the environmental information disclosure level indicator system. The new environmental information disclosure level indicator is no longer scored on the basis of whether it is presented in monetary terms, but on the basis of the disclosure items already designed, if 2 points for quantitative disclosure, 1 point for qualitative disclosure and 0 points for non-disclosure. The regression coefficient results are consistent with the above, which indicates that the regression results above are robust.

##### 4.3.2. Change of Moderator Variable

The media coverage data in the above analysis was obtained from the CNRDS database and media attention was measured using the natural logarithm of the total number of companies covered by the media to measure media scrutiny of the company. The robustness of the moderating effect of media attention is verified by measuring the moderating variable media attention with the dummy variable

dummy\_Media. Media attention is grouped by median, with media attention greater than the median being the high media attention group, represented by the dummy variable dummy\_Media with a value of 1, and media attention less than the median being the low media attention group, represented by the dummy variable dummy\_Media with a value of 0. The regression coefficient results are consistent with the above, which indicates that the regression results above are robust.

## 5. Conclusion and Insights

This paper empirically examines the relationship between corporate governance, media attention and environmental information disclosure, using Chinese listed A-share enterprises in Shanghai and Shenzhen from 2017-2021 as the research sample. Based on the above study, this paper concludes that: corporate governance can significantly promote environmental information disclosure; media attention can significantly promote environmental information disclosure, and media attention can further strengthen the relationship between corporate governance and environmental information disclosure, and this strengthening effect of media attention is more significant in state-owned enterprises compared with non-state-owned enterprises.

Based on the above analysis and research, the following insights emerge from this paper: (1) The government and relevant supervisory and management authorities should establish and improve a more comprehensive environmental information disclosure system, and constantly allow enterprises to improve the quantity and quality of environmental information disclosure, so as to help the enterprise's stakeholders and the public to fully understand the enterprise and make a correct judgment. (2) The media, as an important channel for transmitting information in today's society, must first ensure its objectivity and impartiality, create a good atmosphere of public opinion, strengthen its coverage and supervision of environmental information disclosure issues, and strive to contribute to increasing the extent of voluntary environmental information disclosure. (3) As an important part of society, enterprises have an inescapable responsibility to solve the current ecological problems. Companies should not only improve their production and operation processes related to environmental protection, but also increase their efforts to disclose environmental information. Enterprises can improve their corporate governance and at the same time use the media's information transfer function to build a good corporate image among the public, improve the level of environmental information disclosure and form a new competitive advantage in today's highly competitive environment.

## Acknowledgements

Project: "Corporate Governance, Media Attention and Environmental Information Disclosure" (KYCX23\_1826) of the Jiangsu Postgraduate Research Innovation Programme.

## References

- [1] Wang Xia, Xu Xiaodong, Wang Chen. *Public Pressure, Social Reputation, Inside Governance and Firm Environmental Information Disclosure: the Evidence from Chinese Listed Manufacturing Firms* *Nankai Business Review*, 2013, 2, 82-91.
- [2] Wang Juan, Xiong Chengchong. *Corporate governance, media attention and environmental information disclosure level* [J]. *Journal of Nanjing University of Posts and Telecommunications (Social Science)*, 2021, 3, 58-71.
- [3] Wang Bo, Wu Qian, Ye Yong. *Media Attention, Marketization Process and Corporate Social Responsibility Fulfillment—Based on Empirical Evidence of Chinese A-Share Listed Companies*[J]. *Modern Economic Research*, 2017, 7, 30-36.
- [4] Xie Zhihua. *Internal Control, Corporate Governance, Risk Management: Relationships and Integration* [J]. *Accounting Research*, 2007, 10, 37-45+95.
- [5] Ye Hua, Ren Chen. *A Study on the Relationship between Social Responsibility, Media Attention and Corporate Financial Performance—An Analysis of Data Based on Listed Companies in the Pharmaceutical Manufacturing Industry*[J]. *Times of Economy & Trade*, 2023, 1, 55-61.
- [6] Gao Jingzhong, Zhou Xiaosu. *Operating Performance Ultimate Controller and Degree of Social Responsibility Fulfillment* [J]. *Collected Essays on Finance and Economics*, 2008, 6, 63-69.