Volume 20, Number 4 – December 2018
China Accounting and Finance Review
中 国 会 计 与 财 务 研 究
2018 年 12 月 第 20 卷 第 4 期

Does Analyst Coverage Reduce Environmental Information Opaqueness? Evidence from China*

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Received 10th of August 2017 Accepted 30th of May 2018

Abstract

This study investigates the relation between analyst coverage and corporate environmental information opaqueness using a sample of Chinese listed firms over the period 2008 to 2014. The empirical results show that analyst coverage is significantly associated with a reduction in environmental information opaqueness, implying that analyst coverage can reduce the opaqueness of environmental information. Moreover, better internal control mechanisms lead to a stronger negative relationship between analyst coverage and environmental information opaqueness. Various sensitivity tests validate that our results are robust to alternative dependent and independent variables, such as the rank of analyst coverage and environmental information opaqueness. Our conclusions are still valid after controlling for the endogeneity between analyst coverage and environmental information opaqueness.

***Keywords*:** Analyst Coverage, Environmental Information Opaqueness, Internal Control, China

* We appreciate the constructive comments received from Hongmei Pei, Shaojuan Lai, Yingying Chang, and participants at our presentations at Xiamen University and Anhui University. Prof. Du acknowledges financial support from the Ministry of Education Key Project of Key Research Institutes of Humanities and Social Sciences (Approval number: 16JJD790032). This study is also funded by the National Natural Science Foundation of China (Approval number: NSFC-71702158) and the China Scholarship Council (CSC).

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分析师关注降低了环境信息的不透明度吗？基于中国资本市场的经验证据*

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摘要

本文以 2008-2014 年期间的中国上市公司为样本，研究了分析师关注是否影响企业环境信息的不透明度。实证结果显示，分析师关注会显著降低环境信息的不透明度。此外，更好的内部控制机制会强化分析师关注对信息环境不透明度的抑制作用。使用分析师关注以及环境信息不透明度的排序变量的敏感性测试进一步支持了本文的实证结果。本文的发现在控制了分析师关注和环境信息不透明度之间的内生性后依然为经验证据所支持。

关键词：分析师关注、环境信息不透明度、内部控制、中国

* 感谢裴红梅、赖少娟、常莹莹、厦门大学与安徽大学 seminar 参与者的有益评论。感谢教育部人文社科基地重大项目（16JJD790032）的资助。同时感谢中国国家自然科学基金（NSFC-71702158）和国家留学基金委员会的资助。

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I. Introduction

Several previous studies (e.g. Bernardi and Stark, 2018; Dhaliwal *et al.*, 2012; Healy and Palepu, 2001; Lang and Lundholm, 1996) argue that corporate information disclosure can affect the behaviour of financial intermediaries because it conveys value-relevant information. A strand of literature regards financial analysts as important intermediaries and shows the impact of information disclosure on analyst coverage (Hope, 2003; Gao *et al.*, 2015). Moreover, Dhaliwal *et al.* (2012) reveal that security analysts, regarded as a type of external stakeholder, are able to benefit from corporate voluntary disclosure. In recent years, a growing environmental awareness has pressured companies to voluntarily release information about their environmental practices. Although previous studies focus on the impact of voluntary disclosure on analysts' forecasts, there is little evidence regarding the role of analyst coverage in environmental information disclosure. The purpose of this study is to fill this gap by examining the association between analyst coverage and environmental information opaqueness.

This study focuses on Chinese firms for two reasons. First, the different levels of corporate environmental responsibility among Chinese companies may enhance the informational role of environmental disclosure. Second, in China, financial intermediaries (e.g. rating agencies and analysts) are more likely to rely on voluntary corporate reports to obtain environmental information because there are few information channels on environmental responsibility. Thus, in Chinese capital markets, analysts may have strong incentives to require firms to increase voluntary disclosure.

In this study, we argue that environmental information—an important dimension of corporate social responsibility (CSR) information—has a remarkable impact on the accuracy of analysts' forecasts. Therefore, the informational role of environmental disclosure is more likely to trigger analysts' demand for this kind of information. According to the stakeholder theory (Freeman, 1994), firms attempt to meet demands from a variety of stakeholders, including analysts, and thereby may improve the amount and quality of the environmental disclosure supplied. Accordingly, we predict that analyst coverage is negatively associated with environmental information opaqueness. Moreover, internal control plays an important role in ensuring the credibility of disclosure. As Ball *et al.* (2012) reveal, the value of non-financial disclosure depends on its verification or reliability. In this case, the information issued by firms with superior internal control may be more valuable than that issued by firms with inferior internal control, and security analysts are likely to increase the demand for non-financial information that has higher credibility. Therefore, internal control can reinforce the negative relation between analyst coverage and environmental information opaqueness.

We conduct empirical tests using a sample of 2,489 Chinese listed companies in the Shenzhen Stock Exchange and Shanghai Stock Exchange during the period 2008 to 2014. In

brief, the study reveals the following key results. First, analyst coverage is significantly negatively associated with environmental information opaqueness. More specifically, an increase of one standard deviation in analyst coverage leads to a decrease of about 1.06% in environmental information opaqueness. Second, internal control reinforces the negative relation between analyst coverage and corporate environmental information opaqueness. Third, our findings are robust to a variety of sensitivity tests, and the above conclusions still stand after controlling for the endogeneity issue.

Our study makes several contributions to the literature. First, this study is one of very few studies, if not the first, to investigate whether the coverage of analysts, a particular kind of stakeholder, exerts effects on corporate environmental information opaqueness. Previous studies (Clarkson *et al.*, 2008; Du *et al.*, 2014; Flammer, 2013; Zeng *et al.*, 2012) reveal that stakeholders (e.g. stockholders, creditors, suppliers, and customers) require firms to increase their environmental disclosure. However, there is little evidence on the role played by analysts. Thus, this study, focusing on financial analysts as relevant stakeholders, extends the application of stakeholder theory. Second, our study offers a novel insight into the existing literature regarding the association between analysts' behaviour and CSR-related disclosure by revealing that the value of environmental information to analysts can lead to a great demand for the information and eventually urge firms to improve environmental disclosure. Third, this study suggests a new measure of environmental information opaqueness by constructing an opaqueness index using the content analysis method. Instead of directly measuring information transparency, we define information opaqueness by referring to the benchmarking theory (Francis and Holloway, 2007; Moriarty, 2011) in the management literature. Finally, the interactive effect between analyst coverage and internal control on corporate environmental information opaqueness contributes to the existing literature by indicating that better internal governance improves information credibility and its value relevance. Therefore, this finding adds to the existing literature by suggesting that internal and external governance can exert complementary effects on corporate behaviour (reducing information opaqueness in our case).

The remainder of this paper is organised as follows. Section II introduces the institutional background, presents the literature review, and develops the hypotheses. Section III explains the methodology. Section IV reports the empirical results and robustness checks. Section V discusses policy implications and research limitations. In the last section, we summarise our conclusions.

II. Background, Literature, and Hypotheses Development

2.1 Institutional Background

In recent years, the attention of Chinese people has been drawn to severe environmental issues, such as frequent smog and haze, sand storms, and floods. The public

is asking for more and open environmental information about their living surroundings. Since 2003, the Chinese government has responded to this concern by issuing a series of official documents on environmental protection. These documents include the Environmental Impact Assessment (EIA) Law in 2003, the Measures on Public Participation in EIA in 2006, the Measures for the Registration of Hazardous Chemicals for Environmental Management in 2013, and the Measures on Self-Monitoring and Information Disclosure of Key State-Controlled Enterprises in 2014.

Since the promulgation of China's Regulations on Open Government Information as well as the Measures on Open Environmental Information in 2008, Chinese companies have largely increased the amount of environmental information disclosed to the public (Zhang *et al.*, 2016). Among these companies, environmental disclosure is taking an increasingly important position. As early as in 2003, the Cleaner Production Promotion Law required firms with heavily polluting activities to disclose pollutant emissions. In 2014, China amended its 25-year-old Environmental Protection Law and discussed environmental information disclosure in a whole chapter (Ker, 2015), making progress in terms of the country's environmental information transparency. As a result, a large proportion of Chinese listed firms began to provide open environmental information data online.[7] However, the non-mandatory nature and poor enforcement of environmental laws and regulations may not ensure the quality and/or quantity of environmental information. Therefore, the Chinese public mainly depends on corporate voluntary disclosure for environmental information.

Some governmental agencies try to encourage firms to make more informative disclosures and monitor them with the help of corporate external stakeholders. For example, the China Securities Regulatory Commission stipulates that Chinese listed firms should disclose environmental information when they release annual reports (Du e*t al.*, 2017), which are the main source of corporate information in capital markets. At the end of 2013, four Chinese governmental regulatory agencies (the Ministry of Environmental Protection, the National Development and Reform Commission, the People's Bank of China, and the China Banking Regulatory Commission) jointly released the Corporate Environmental Credit Evaluation Methods (for Trial Implementation) to propose that banks should be prudent in providing loans and gradually recover loans according to the changes in corporate environmental credit.

With regard to stockholders and creditors, the monitoring role of analysts has not been explored in depth. In fact, analysts usually applaud "information transparent" firms but are unwilling to follow firms with opaque information. The services of analysts can contribute to external corporate governance and compel firms to reduce information opaqueness. In this study, we focus on the governance role of analysts in mitigating environmental

[7] Using such online data, the research centre of listed firms' social responsibility established by *Securities Times* and the Institute of Public and Environmental Affairs (IPE) based in Beijing jointly released an annual report on the ranking of the pollutant emissions of A-share listed firms in February 2016.

information asymmetry and reducing related information opaqueness.

2.2 Literature Review

A growing body of CSR-related literature indicates that environmental information disclosures are motivated by many factors, such as environmental performance (Al-Tuwaijri *et al.*, 2004; Clarkson *et al.*, 2008; Patten, 2002), regulations (Flammer, 2013), reputation (Zeng *et al.*, 2012), and religious norms (Du *et al.*, 2014). However, there is little empirical evidence regarding the impact of external corporate governance mechanisms (e.g. analyst coverage) on environmental information disclosure.

As a matter of fact, corporate information disclosure can convey value-relevant information to analysts and thus affect their behaviour (Dhaliwal *et al.*, 2012; Healy and Palepu, 2001; Lang and Lundholm, 1996). Lang and Lundholm (1996) show that informative disclosures attract a great deal of attention from analysts and are beneficial to lowering forecast dispersion and improving forecast accuracy. Moreover, a thin but growing branch of literature (Bernardi and Stark, 2018; Dhaliwal *et al.*, 2012) pays attention to the role of non-financial information in analysts' forecasts. For example, Bernardi and Stark (2018) reveal that environmental, social, and governance (ESG) disclosures are associated with an increase in the accuracy of analysts' earnings forecasts. Dhaliwal *et al.* (2012) find that the issuance of CSR reporting leads to a reduction in analysts' forecast errors. Overall, the existing literature investigates whether and how corporate information disclosure affects analysts' reporting. However, there is little evidence on whether analyst coverage affects the supply and quality of disclosed information, particularly non-financial disclosed information. Our study addresses this gap by examining the association between analyst coverage and environmental information transparency.

2.3 Analyst Coverage and Environmental Information (Hypothesis 1)

As Dhaliwal *et al.* (2012) argue, CSR information is a useful input in the forecasting process because of the value relevance of CSR activities, which refers to the impact of CSR practices on sales, costs, operational efficiency, financing, firm risk, and reputation. Bernardi and Stark (2018) shed light on the fact that CSR reporting may not directly reflect accounting numbers but is likely to have potential impact on the information set through which the implicit value of accounting numbers can be revealed. Recent studies (e.g. He *et al.*, 2013; Luo *et al.*, 2015; Ioannou and Serafeim, 2015) show that analysts are more likely to integrate CSR-related information—typically non-financial information—into their forecasts and recommendations, and such information is conducive to improving their work. Luo *et al.* (2015) and Ioannou and Serafeim (2015) indicate that security analysts may report their assessments of CSR practices in their recommendations. Ioannou and Serafeim (2015) further highlight that the evaluations about CSR information are affected by analysts' personal perceptions. Notably, in the context of China, He *et al.* (2013) reveal that CSR

disclosure is also beneficial to improving forecast accuracy and mitigating forecast dispersion.

Likewise, corporate environmental disclosure—one of the CSR dimensions—also conveys value-relevant information to analysts due to the value of corporate environmental practices. Cordeiro and Sarkis (1997) document that analysts incorporate environmental activities into their investment recommendations and report lower earnings forecasts for companies with inferior environmental performance. Specifically, better environmental performance is beneficial to building relationships between firms and external stakeholders (e.g. consumers, suppliers, shareholders, and creditors) and thus can lead to superior sales, lower costs, and stable financing (Du *et al.*, 2017; Tian *et al.*, 2011; Zhang *et al.*, 2014).[8] Particularly, in China, environmentally friendly activities are conducive to debt financing due to the green credit policy executed by all commercial banks (Du *et al.*, 2017). Moreover, in recent years, the Chinese government has impelled firms to improve energy saving and pollution control by administrative regulations, such as shutdowns, compulsory mergers, and mandatory transformations, which may result in a great number of uncertainties. Therefore, superior environmental performance reduces the likelihood that a firm will be involved in litigation or regulated by administrative authorities in respect of environmental misconduct (Jo and Na, 2012; Salama *et al.*, 2011). Moreover, environmentally friendly activities are conducive to corporate reputations (Salama *et al.*, 2011), which may assist firms to respond to bad events and build goodwill. On the basis of the above findings and the value relevance of environmental practices in China, we can reasonably believe that analysts are more likely to value environmental information in their forecasts and recommendations.

Indubitably, the important role of CSR-related information, including environmental information, in analysts' reporting processes creates a higher demand for information from analysts. According to the stakeholder theory (Freeman, 1994), a firm needs to satisfy demands from various stakeholders (e.g. employees, shareholders, creditors, suppliers, customers, analysts, etc.) due to their importance to a firm's survival and development. Usually, analysts, as a kind of vital external stakeholder, have a great impact on the decision-making of other stakeholders through their forecasts and recommendations, and therefore managers must take their claims into account. As a result, the increased information requirements from analysts are more likely to impel firms to improve the amount and quality of disclosed environmental information.

On the basis of the above discussions, we propose the first hypothesis:

[8] In 2012, Sichuan Hongda Co., Ltd (Stock Code: 600331) had to suspend the construction of an important project because its environmental evaluation was doubted by the local government. This event led to a decline in its stock price on the event day. Moreover, in 2013, Jiangsu Environmental Protection Department reported that Huaguan (Stock Code: 600475) had not passed the environmental evaluation and its qualification for financing in capital markets was revoked in that year. Please refer to https://finance.qq.com/a/20120703/000305.htm and http://news.hexun.com/2013-06-24/155434432.html.

Hypothesis 1: *Ceteris paribus*, analyst coverage is negatively associated with environmental information opaqueness.

2.4 The Moderating Role of Internal Control (Hypothesis 2)

Previous studies identify internal control as one of the core internal governance mechanisms (Gillan, 2006; Kinney, 2000) which can exert great impact on the corporate internal information environment. Ho and Wong (2001) indicate that effective internal governance can strengthen the internal monitoring of companies that provides an "intensive inspection package" for a firm to reduce information asymmetry. The aim of internal control is to improve the efficiency of corporate internal management by increasing the credibility of producing, collecting, processing and reporting information (Ashbaugh-Skaife *et al.*, 2009; Beneish *et al.*, 2008; Costello, 2011). Clearly, low credibility is less likely to result in transparent information, including financial and non-financial information. As such, regulatory bodies such as the Securities and Exchange Commission in the United States and the China Securities Regulatory Commission require managers to take responsibility for building effective internal controls for processing and reporting corporate information.[9] Accordingly, we predict that superior internal control may be associated with a reduction in environmental information opaqueness.

Next, we elaborate the moderating effect of internal control on the association between analyst coverage and environmental information opaqueness. In the existing literature, the consensus appears to be that internal control exerts strong effects on the credibility of information (Ashbaugh-Skaife *et al.*, 2009; Beneish *et al.*, 2008; Costello, 2011). Moreover, Guiral *et al.* (2014) find that internal control can confirm the credibility of CSR-related (environmental, philanthropic, and social) information disclosure. As Ball *et al.* (2012) argue, to a great extent, the value of non-financial information relies on its credibility and verifiability: that is, the more reliable non-financial information is, the greater its value will be. Therefore, environmental information issued by a firm with weak internal control usually has less value than that issued by a firm with superior internal control. In this case, the informational role of environmental disclosure becomes less important for analysts, and they are more likely to seek other channels to obtain credible information. As a result, the demands for voluntary disclosure of environmental information from analysts will decline. Conversely, if corporate voluntary disclosure is more credible, then analysts will increase their demands for the information that is much more valuable, including environmental information.

On the basis of the above discussions, we can infer that internal control strengthens the mitigating effect of analyst coverage on environmental information opaqueness, and thus we formulate Hypothesis 2 in an alternative form:

[9] Please refer to *Environmental Disclosure: SEC Should Explore Ways to Improve Tracking and Transparency of Information* (United States Government Accountability Office, July 2004, p.64).

Hypothesis 2: *Ceteris paribus*, internal control reinforces the negative association between analyst coverage and environmental information opaqueness.

III. Methodology

3.1 Sample

The sample of our study initially consists of all Chinese listed firms from 2008 to 2014. Panel A of Table 1 shows the sample selection process. First, we exclude firms pertaining to the banking, insurance, and other financial industries due to the different structures of their annual reports. Second, we eliminate firm-year observations whose net assets are below zero to exclude outliers of *BTM* and *LEV*. Third, we delete firm-year observations whose data on analyst coverage and/or internal control are unavailable. Finally, we eliminate firm-year observations whose data on firm-specific control variables are unavailable. This process yields a final sample of 2,489 unique firms and 13,317 firm-year observations. Panel B in Table 1 illustrates the sample distribution by year and industry, indicating no severe clustering problem in a certain year or industry for our sample.

3.2. Data Sources

The data used in our research are collected in various ways. We hand collect the data on corporate environmental disclosure from firms' annual financial reports and/or CSR reports and then calculate *EIO* (*EIO_RANK*). We obtain the data on *ANALYST* from the China Stock Market and Accounting Research (CSMAR) database and compute *ANALYST_RANK*. Data on internal control index (IC) are obtained from the DIB internal control and risk database (available at http://www.ic-erm.com/). Other data on internal governance and firm-specific features are also collected from the CSMAR database.

3.3 Environmental Information Opaqueness

In this study, the dependent variable is environmental information opaqueness, labelled as *EIO*. We summarise the method of calculating environmental information opaqueness in three steps.

First, referring to Clarkson *et al.* (2008), Du *et al.* (2014, 2016, 2017), and GRI (2006), we compute the score of environmental disclosure for each firm. Specifically, following Clarkson *et al.* (2008), we decompose environmental information disclosure into seven components—governance structure and management systems, credibility, environmental performance indicators, environmental spending, vision and strategy claims, environmental profile, and environmental initiatives—and further divide the components into 45 subcomponents (see Panel B of Table 2 for details). Furthermore, we extract environment-related information from firms' annual reports, CSR reports, and/or official websites and then assign a specific value for each subcomponent. Finally, we sum up a score

Table 1 Sample Selection

Panel A: Firm-year observations selection	
Initial observations	15,396
Eliminate observations pertaining to the banking, insurance, and other financial industries	(270)
Eliminate observations whose net assets or shareholders' equity are below zero	(249)
Eliminate observations whose data on analyst coverage and/or internal control are not available	(1,487)
Eliminate observations whose data required to measure firm-specific control variables are not available	(71)
Available firm-year observations	13,317
Unique firms	2,489

Panel B: Sample distribution by year and industry

Year / Industry Code	2008	2009	2010	2011	2012	2013	2014	Total by industry	%
A	34	34	36	40	46	40	41	271	2.03%
B	27	36	37	42	49	71	73	335	2.51%
C0	57	62	66	75	89	91	95	535	4.02%
C1	65	66	63	69	80	72	72	487	3.66%
C2	3	5	6	8	12	13	13	60	0.45%
C3	29	32	33	36	40	42	42	254	1.91%
C4	146	160	166	186	239	257	259	1,413	10.61%
C5	63	69	74	106	123	139	142	716	5.38%
C6	130	133	135	149	183	196	193	1,119	8.40%
C7	220	236	264	328	428	505	523	2,504	18.80%
C8	90	91	97	114	132	140	141	805	6.04%
C9	24	23	24	23	28	13	15	150	1.13%
D	62	62	63	64	68	83	85	487	3.66%
E	31	33	35	38	47	66	66	316	2.37%
F	62	62	63	69	69	79	79	483	3.63%
G	86	88	102	142	185	184	193	980	7.36%
H	83	90	99	103	115	142	143	775	5.82%
J	67	82	96	94	99	132	132	702	5.27%
K	44	45	49	56	67	74	74	409	3.07%
L	9	10	12	19	27	40	40	157	1.18%
M	67	66	61	54	61	25	25	359	2.70%
Total by year	1,399	1,485	1,581	1,815	2,187	2,404	2,446	13,317	
%	10.51%	11.15%	11.87%	13.63%	16.42%	18.05%	18.37%		100%

Note: A=agriculture, forestry, husbandry and fishery; B=mining; C0=food and beverage; C1=textile, garment manufacturing and products of leather and fur; C2=wood and furniture; C3=papermaking and printing; C4=petroleum, chemicals, plastics, and rubber products; C5=electronics; C6=metals and non-metals; C7=machinery, equipment and instrument manufacturing; C8=medicine and biological product manufacturing; C9=other manufacturing; D=production and supply of electricity, steam and tap water; E=construction; F=transportation and warehousing; G=information technology; H=wholesale and retail; J= real estate; K=social services; L=communication and culture; M=conglomerates.

for the components on the basis of the subcomponents, and eventually we obtain a total score after adding up the scores for the seven components.

Second, we calculate the maximum and minimum of the score of environmental information disclosure for all firms in the year t, labelled as ENV_{max} and ENV_{min},

respectively.

Finally, drawing on the benchmarking theory (Yasin, 2002; Francis and Holloway, 2007; Moriarty, 2011), environmental information opaqueness is defined as $(ENV_{max}-ENV_{i,t})$ / $(ENV_{max}-ENV_{min})$, where $ENV_{i,t}$ denotes the environmental disclosure score for firm i in year t.

3.4 Analyst Coverage

In this study, the main independent variable is *ANALYST*, calculated as the natural logarithm of (1+the number of following analysts). According to Hypothesis 1, we expect a significantly negative coefficient on *ANALYST*.

3.5 Internal Control

In this study, the moderating variable is internal control index, which can be obtained from the DIBO database (scaled by 100). Internal control is expected to increase (reduce) information disclosure transparency (opaqueness), and thus we expect a significant and negative coefficient on *IC*. If the coefficient on *ANALYST*×*IC* is significantly negative, then Hypothesis 2 is valid.

3.6 Control Variables

Referring to extant studies (Clarkson *et al.*, 2008; Huang, 2010; Lang *et al.*, 2004; O'Brien and Bhushan, 1990; Poropat, 2010), a set of control variables are included in the regression models to isolate the influence of analyst coverage on environmental information opaqueness.

First, we take internal governance mechanisms, including *BLOCK*, *MAN_SHR*, *INDR*, *DUAL,* and *BOARD,* into account and control for their effects on environmental information disclosure (Ho and Wong, 2001; Haniffa and Cooke, 2005; Eng and Mak, 2003). *BLOCK* is the ratio of shares held by the largest stockholder. *MAN_SHR* refers to the ratio of shares held by the top managers. *INDR* stands for the percentage of independent directors in corporate boards. *DUAL* is a dummy variable that equals 1 if the chairman of board serves as the CEO and 0 otherwise. *BOARD* is measured as the number of directors on corporate boards.

Second, we include firm-specific variables (i.e. *SIZE*, *LEV*, *ROA*, *BTM*, *ISSUE,* and *CAP_INV*) in the regression models to control for the effects of financial features on environmental information disclosure (Clarkson *et al.*, 2008; Lev and Penman, 1990; Miller, 2002). *SIZE* refers to firm size, measured as the natural logarithm of a firm's total assets, which is usually controlled for in regard to information production costs (Brammer and Pavelin, 2008; Clarkson *et al.*, 2008). Firms reliant on raising debt are inclined to undertake a high level of information disclosure (Leftwich *et al.*, 1981; Clarkson *et al.*, 2008), and thus financial leverage, labelled *LEV* and computed as liabilities scaled by total assets, is

included in the regression models. *ROA* is the return on total assets, measured as net profit scaled by total assets at the beginning of the year.[10] *BTM* is the ratio of the book value of equity to the market value of equity. Firms with undervalued stock have a propensity to reveal their true value in their disclosures to financial markets (Lev and Penman, 1990). *ISSUE* is a dummy variable that equals 1 if the amount of capital that firms raise from both debt and equity markets accounts for more than 5% of total assets at the beginning of the year and 0 otherwise. We introduce *ISSUE* into the model because firms are more likely to increase information disclosure before financing (Lang and Lundholm, 1993). *CAP_INV* refers to capital intensity (Healy and Palepu, 2001; Clarkson *et al.*, 2008), measured as the ratio of capital expenditures on long-term assets deflated by sales revenue.

Third, other control variables, such as *RET_SD* and *STATE,* are included. *RET_SD* denotes stock price volatility, measured as the standard deviation of weekly stock return adjusted with market return over the same period. It serves as a proxy for information asymmetry. In China, state-owned enterprises are expected to fulfil the government's requirements on environmental information disclosure (Kuo *et al.*, 2012). Therefore, we set a dummy variable (i.e. *STATE*) that equals 1 if the ultimate owner is a governmental agency or state-owned enterprise and 0 otherwise.

Finally, industry and year dummy variables are constructed to control for the fixed effects.

IV. Results

4.1 Summary Statistics

In Panel A of Table 2, we show the summary statistics of the variables used in our models. The mean value of *EIO* is 0.912. The mean value of *ANALYST* is 1.679, suggesting that the average number of analysts following a firm is about 4.36. Compared with the mean value of internal control (*IC*), that is 6.6876, for the period 2009 to 2011 in Du *et al.* (2017), the mean value of *IC* in our study (i.e. 6.669) shows that the average *IC* level of Chinese listed firms has changed slightly in recent years.

With regard to the control variables, on average, blockholder ownership (*BLOCK*) is 36.2%; managerial ownership (*MAN_SHR*) is 9.2%; the ratio of independent directors (*INDR*) is 37%; the chairman also serves as the CEO (*DUAL*) in 21.3% of the sample firms; the number of directors on corporate boards (*BOARD*) is 8.944; firm size (*SIZE*) is RMB3.17 billion ($e^{21.877}$); financial leverage (*LEV*) is 45.9%; return on total assets (*ROA*) is 5.1%; the book-to-market (*BTM*) ratio is 0.494; 76.8% of the sample firms raise a substantial amount of money (more than 5% of total assets at the beginning of the year) from debt or equity markets (*ISSUE*) in our sample period; *RET_SD* is about 0.049; the

[10] Firms with high earnings performance tend to reveal such "good news" to outside parties (Miller, 2002), and the "good news" of earnings would be the fiscal *ROA* for the upcoming year.

Table 2 Summary Statistics

Panel A: Summary statistics for variables used in main tests

Variable	N	Mean	Std. Dev	Min	25%	Median	75%	MAX
EIO	13,317	0.912	0.126	0	0.881	0.955	1	1
ANALYST	13,317	1.679	1.319	0	0	1.609	2.833	5.394
IC	13,317	6.669	1.140	0.000	6.330	6.840	7.151	9.954
BLOCK	13,317	0.362	0.154	0.084	0.238	0.344	0.476	0.770
MAN_SHR	13,317	0.092	0.183	0.000	0.000	0.000	0.052	0.704
INDR	13,317	0.370	0.053	0.250	0.333	0.333	0.400	0.750
DUAL	13,317	0.213	0.409	0	0	0	0	1
BOARD	13,317	8.944	1.813	4	8	9	9	18
SIZE	13,317	21.877	1.285	18.264	20.964	21.708	22.595	27.028
LEV	13,317	0.459	0.214	0.027	0.292	0.464	0.625	0.997
ROA	13,317	0.051	0.074	-0.325	0.014	0.040	0.077	0.696
BTM	13,317	0.494	0.261	0.004	0.294	0.462	0.662	1.544
ISSUE	13,317	0.768	0.422	0	1	1	1	1
RET_SD	13,317	0.049	0.017	0.018	0.037	0.046	0.057	0.226
CAP_INV	13,317	0.133	0.181	0.000	0.027	0.072	0.161	1.253
STATE	13,317	0.449	0.497	0	0	0	1	1

Panel B: Computing procedures for corporate environmental disclosure scores and results of descriptive statistics and t-test

Item \ Descriptive statistics and T/Z tests	*ANALYST*>Mean		*ANALYST*<=Mean		t-test
	Mean	Std. Dev	Mean	Std. Dev	
I: Governance structure and management systems (max score is 6)					
1. Existence of a department for pollution control and/or management positions for environmental management (0–1)	0.146	0.353	0.070	0.255	14.30***
2. Existence of an environmental and/or a public issue committee in the board (0–1)	0.010	0.099	0.002	0.046	5.81***
3. Existence of terms and conditions applicable to suppliers and/or customers regarding environmental practices (0–1)	0.037	0.188	0.011	0.105	9.70***
4. Stakeholder involvement in setting corporate environmental policies (0–1)	0.006	0.076	0.001	0.037	4.28***
5. Implementation of ISO14001 at the plant and/or firm level (0–1)	0.268	0.443	0.182	0.386	11.97***
6. Executive compensation is linked to environmental performance (0–1)	0.025	0.156	0.012	0.110	5.40***
Subtotal	**0.492**	**0.769**	**0.279**	**0.581**	**18.03*****

II: Credibility (max score is 10)					
1. Adoption of GRI sustainability reporting guidelines or provision of a CERES report (0–1)	0.338	0.474	0.146	0.353	26.55***
2. Independent verification or assurance of environmental information disclosed in the EP report/web (0–1)	0.018	0.134	0.005	0.072	7.02***
3. Periodic independent verifications or audits on environmental performance and/or systems (0–1)	0.034	0.180	0.018	0.132	5.76***
4. Certification of environmental programmes by independent agencies (0–1)	0.043	0.202	0.019	0.138	7.70***
5. Product certification with respect to environmental impact (0–1)	0.041	0.199	0.020	0.141	7.07***
6. External environmental performance awards and/or inclusion in a sustainability index (0–1)	0.113	0.317	0.046	0.210	14.37***
7. Stakeholder involvement in the environmental disclosure process (0–1)	0.003	0.058	0.001	0.032	2.83***
8. Participation in voluntary environmental initiatives endorsed by the Ministry of Environmental Protection of China (0–1)	0.021	0.142	0.007	0.081	7.01***
9. Participation in industry-specific associations or initiatives to improve environmental practices (0–1)	0.009	0.093	0.003	0.056	4.16***
10. Participation in other environmental organisations or associations to improve environmental practices (if not awarded under 8 or 9) (0–1)	0.023	0.150	0.003	0.054	10.22***
Subtotal	**0.643**	**0.963**	**0.268**	**0.613**	**26.73*****
III: Environmental performance indicators (EPI) (max score is 60）					
1. EPI on energy use and/or energy efficiency (0-6)	0.337	0.838	0.112	0.481	18.99***
2. EPI on water use and/or water use efficiency (0-6)	0.183	0.597	0.069	0.361	13.24***
3. EPI on greenhouse gas emissions (0–6)	0.094	0.431	0.031	0.239	10.53***
4. EPI on other air emissions (0–6)	0.167	0.549	0.063	0.353	12.91***
5. EPI on TRI (land, water, air) (0–6)	0.048	0.330	0.019	0.216	5.90***
6. EPI on other discharges, releases, and/or spills (not TRI) (0–6)	0.063	0.336	0.025	0.206	7.87***
7. EPI on waste generation and/or management (recycling, re-use, reducing, treatment, and disposal) (0–6)	0.170	0.547	0.063	0.339	13.46***
8. EPI on land and resource use, biodiversity, and conservation (0–6)	0.056	0.312	0.019	0.194	8.31***
9. EPI on environmental impact of products and services (0–6)	0.014	0.177	0.004	0.079	4.18***
10. EPI on compliance performance (e.g. exceedances, reportable incidents) (0–6)	0.053	0.306	0.031	0.238	4.63***
Subtotal	**1.185**	**2.738**	**0.436**	**1.617**	**19.17*****
IV: Environmental spending (max score is 3)					
1. Summary of dollar savings to the company arising from environment initiatives (0-1)	0.018	0.134	0.011	0.106	3.28***
2. Amount spent on technologies, R& D, and/or innovations to enhance environmental performance and/or efficiency (0-1)	0.221	0.415	0.136	0.343	12.88***
3. Amount spent on fines related to environmental issues (0–1)	0.005	0.070	0.003	0.052	2.05**
Subtotal	**0.244**	**0.461**	**0.150**	**0.365**	**13.06*****

V: Vision and strategy claims (max score is 6)					
1. CEO statement on environmental performance by letter to shareholders and/or stakeholders (0–1)	0.313	0.464	0.221	0.415	11.99***
2. A statement of corporate environmental policy, values and principles, and environmental codes of conduct (0–1)	0.527	0.499	0.365	0.482	19.07***
3. A statement about formal management systems for environmental risk and performance (0–1)	0.110	0.313	0.065	0.247	9.22***
4. A statement that the firm undertakes periodic reviews and evaluations of its environmental performance (0–1)	0.033	0.179	0.013	0.114	7.61***
5. A statement of measurable goals in terms of future environmental performance (if not awarded under A3) (0–1)	0.015	0.123	0.010	0.099	2.76***
6. A statement about specific environmental innovations and/or new technologies (0–1)	0.327	0.469	0.165	0.372	22.03***
Subtotal	**1.326**	**1.239**	**0.840**	**1.046**	**24.42*****
VI: Environmental profile (max score is 4)					
1. A statement about the firm's compliance (or lack thereof) with specific environmental standards (0–1)	0.100	0.300	0.053	0.225	10.15***
2. An overview of environmental impact of the industry (0–1)	0.100	0.300	0.077	0.267	4.63***
3. An overview of how the business operations and/or products and services impact the environment. (0–1)	0.162	0.368	0.102	0.303	10.25***
4. An overview of corporate environmental performance relative to industry peers (0–1)	0.007	0.082	0.003	0.057	2.89***
Subtotal	**0.369**	**0.652**	**0.236**	**0.534**	**12.86*****
VII: Environmental initiatives (max score is 6)					
1. A substantive description of employee training in environmental management and operations (0–1)	0.132	0.339	0.067	0.251	12.57***
2. Existence of response plans in case of environmental accidents (0–1)	0.073	0.259	0.048	0.214	5.93***
3. Internal environmental awards (0–1)	0.011	0.102	0.004	0.066	4.22***
4. Internal environmental audits (0–1)	0.018	0.132	0.008	0.087	5.24***
5. Internal certification of environmental programmes (0–1)	0.016	0.126	0.009	0.094	3.78***
6. Community involvement and/or donations related to environmental issues (if not awarded under A1.4 or A2.7) (0–1)	0.094	0.292	0.042	0.200	12.08***
Subtotal	**0.344**	**0.713**	**0.178**	**0.518**	**15.34*****
Total	**4.603**	**5.689**	**2.387**	**3.745**	**26.49*****

Note: ***, **, and * denote the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. In Panel B, Subsection III, the scoring scale of environmental performance data is from 0 to 6. A point is awarded for each of the following items: (1) Performance data are presented; (2) Performance data are presented relative to peers/rivals or industry; (3) Performance data are presented relative to previous periods (trend analysis); (4) Performance data are presented relative to targets; (5) Performance data are presented both in absolute and normalised forms; (6) Performance data are presented at a disaggregate level (i.e. plant, business unit, geographic segment). The procedures of computing environmental information disclosure scores refer to Clarkson *et al.* (2008) and Du *et al.* (2014, 2016, 2017).

Table 3 Pearson Correlation Matrix

Variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
EIO	(1)	1.000															
ANALYST	(2)	-0.284	1.000														
		(0.000)															
IC	(3)	-0.193	0.366	1.000													
		(0.000)	(0.000)														
BLOCK	(4)	-0.161	0.140	0.150	1.000												
		(0.000)	(0.000)	(0.000)													
MAN_SHR	(5)	0.059	0.126	0.007	-0.101	1.000											
		(0.000)	(0.000)	(0.425)	(0.000)												
INDR	(6)	0.010	0.007	0.005	0.050	0.079	1.000										
		(0.254)	(0.444)	(0.551)	(0.000)	(0.000)											
DUAL	(7)	0.071	0.023	-0.026	-0.065	0.249	0.082	1.000									
		(0.000)	(0.009)	(0.002)	(0.000)	(0.000)	(0.000)										
BOARD	(8)	-0.179	0.158	0.113	0.031	-0.184	-0.371	-0.159	1.000								
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)									
SIZE	(9)	-0.426	0.424	0.317	0.281	-0.264	0.031	-0.173	0.302	1.000							
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
LEV	(10)	-0.076	-0.094	-0.052	0.058	-0.361	-0.021	-0.164	0.158	0.443	1.000						
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.000)	(0.000)	(0.000)							
ROA	(11)	-0.052	0.373	0.361	0.115	0.108	-0.008	0.039	0.003	0.049	-0.285	1.000					
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.340)	(0.000)	(0.719)	(0.000)	(0.000)						
BTM	(12)	-0.161	0.051	0.146	0.188	0.053	0.010	-0.053	0.112	0.409	-0.005	-0.084	1.000				
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.266)	(0.000)	(0.000)	(0.000)	(0.543)	(0.000)					
ISSUE	(13)	-0.109	-0.031	0.024	-0.001	-0.157	-0.017	-0.069	0.099	0.256	0.456	-0.151	0.088	1.000			
		(0.000)	(0.000)	(0.006)	(0.912)	(0.000)	(0.045)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)				
RET_SD	(14)	0.098	-0.063	-0.090	-0.015	0.022	0.008	0.030	-0.067	-0.189	0.037	0.049	-0.306	-0.002	1.000		
		(0.000)	(0.000)	(0.000)	(0.088)	(0.013)	(0.369)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.841)			
CAP_INV	(15)	-0.027	0.091	-0.018	-0.031	0.082	-0.011	0.047	0.040	0.006	-0.106	0.004	0.093	0.035	-0.029	1.000	
		(0.002)	(0.000)	(0.041)	(0.000)	(0.000)	(0.221)	(0.000)	(0.000)	(0.521)	(0.000)	(0.682)	(0.000)	(0.000)	(0.001)		
STATE	(16)	-0.139	-0.009	0.077	0.199	-0.439	-0.059	-0.267	0.256	0.311	0.286	-0.096	0.089	0.104	-0.025	-0.043	1.000
		(0.000)	(0.289)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	

Note: *p*-values are presented in parentheses.

percentage of capital investment (*CAP_INV*) is 0.133, and 44.9% of firm-year observations belong to state-owned enterprises (*STATE*).

Furthermore, Panel B of Table 2 displays the computing procedures for environmental disclosure scores based on Clarkson *et al.* (2008), Du *et al.* (2014), and GRI (2006). We divide the full sample into two subsamples according to the mean value of analyst coverage and then test the inter-group differences (t-test). Panel B reveals that the differences in the seven components and the 45 subcomponents of the environmental disclosure scores are significantly higher for the high-*ANALYST* subsample than for the low-*ANALYST* subsample, implying that analyst coverage has a significantly positive effect on environmental information and can reduce environmental information opaqueness as a result.

4.2 Pearson Correlation Analysis

Table 3 presents the results of the Pearson correlation analysis. The Pearson correlation between *EIO* and *ANALYST* is significantly negative (-0.284 with $p<0.000$), offering preliminary support for Hypothesis 1. In addition, *IC* is significantly negatively associated with *EIO* (-0.193 with $p<0.000$) and significantly related to *ANALYST* (0.366 with $p<0.000$), validating the negative effect of internal control on environmental information opaqueness and the need to address the interactive effect between analyst coverage and internal control on environmental information opaqueness, respectively. Furthermore, the correlation coefficients between *EIO* and *MAN_SHR*, *INDR*, *DUAL,* and *RET_SD* are significantly positive, and *EIO* is significantly negatively related to *BLOCK*, *BOARD*, *SIZE*, *LEV*, *ROA*, *BTM*, *ISSUE*, *CAP_INV,* and *STATE*. The above results suggest that these control variables should be included in our regression models. In general, the Pearson correlations among the control variables are lower than 0.4, indicating that there is no serious multicollinearity problem in our models.

4.3 Empirical Tests for Hypothesis 1 and Hypothesis 2

Table 4 presents the results of the pooled OLS regressions employed to test hypotheses 1 and 2. To control for both the potential autocorrelation problem and the clustering phenomenon in our sample, we report t-statistics of all coefficients based on the cluster-adjusted standard errors, which are adjusted at both the firm and year levels (Petersen, 2009). In addition, the step-by-step regression procedure not only allows us to investigate the results of environmental information opaqueness on analyst coverage, internal control, and other control factors but also to capture the incremental explanatory power with gradually higher adjusted R^2. All these models have highly significant F statistics.

The first regression in Table 4 presents the results of regressing environmental information opaqueness on all the control variables. From the results in Column (1), opaque environmental information appears to be significantly negatively associated with

blockholder ownership (*BLOCK*), managerial ownership (*MAN_SHR*), board size (*BOARD*), firm size (*SIZE*), and refinancing behaviour (*ISSUE*) but significantly positively associated with financial leverage (*LEV*), accounting performance (*ROA*), book-to-market ratio (*BTM*), and the volatility of stock return (*RET_SD*).

Table 4 Results of Opaque Environmental Information on Analyst Coverage, Internal Control, and Other Determinants

Variable	Dependent Variable: *EIO*							
	(1)		(2)		(3)		(4)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ANALYST			-0.008***	-3.69	-0.007***	-3.61	-0.007***	-3.40
IC					-0.005**	-2.20	-0.007***	-3.17
ANALYST×IC							-0.005***	-2.84
BLOCK	-0.029**	-1.98	-0.028*	-1.96	-0.028*	-1.89	-0.030**	-2.03
MAN_SHR	-0.040***	-4.02	-0.030***	-2.92	-0.028***	-2.79	-0.029***	-2.82
INDR	0.014	0.39	0.012	0.35	0.012	0.36	0.016	0.46
DUAL	0.002	0.52	0.002	0.74	0.003	0.78	0.003	0.88
BOARD	-0.003**	-2.29	-0.002**	-2.02	-0.002**	-2.03	-0.002*	-1.91
SIZE	-0.051***	-11.68	-0.045***	-11.74	-0.043***	-12.33	-0.041***	-13.11
LEV	0.093***	6.75	0.081***	6.22	0.077***	6.20	0.077***	6.40
ROA	0.039*	1.96	0.067***	3.20	0.084***	3.77	0.084***	3.91
BTM	0.048***	4.32	0.037***	3.73	0.037***	3.78	0.031***	3.33
ISSUE	-0.010***	-2.89	-0.010***	-2.97	-0.009***	-2.81	-0.011***	-3.20
RET_SD	0.238***	3.65	0.219***	3.05	0.209***	2.84	0.204***	2.89
CAP_INV	0.005	0.61	0.009	1.03	0.007	0.86	0.007	0.81
STATE	-0.005	-0.88	-0.006	-1.11	-0.005	-1.07	-0.006	-1.17
Constant	1.972***	25.37	1.872***	27.00	1.872***	27.97	1.848***	30.47
Industry and Year	Control		Control		Control		Control	
Observations	13,317		13,317		13,317		13,317	
Adjusted R^2	0.2624		0.2658		0.2669		0.2700	
F(p-value)	72.85***(<.001)		74.37***(<.001)		72.91***(<.001)		73.46***(<.001)	
Test ΔR^2			61.66***(<.001)		19.98***(<.001)		58.37***(<.001)	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

The second regression in Table 4 reports the results for Hypothesis 1. As expected from Hypothesis 1, the coefficient on *ANALYST* is negative and significant at the 1% level (-0.008 with t = -3.69) in Column (2), implying that analyst coverage mitigates environmental information opaqueness. Therefore, Hypothesis 1 is validated by our empirical evidence. In addition, the coefficient estimate on *ANALYST* reveals that an increase of one standard deviation in *ANALYST* (1.319) leads to a decrease of about 1.06%

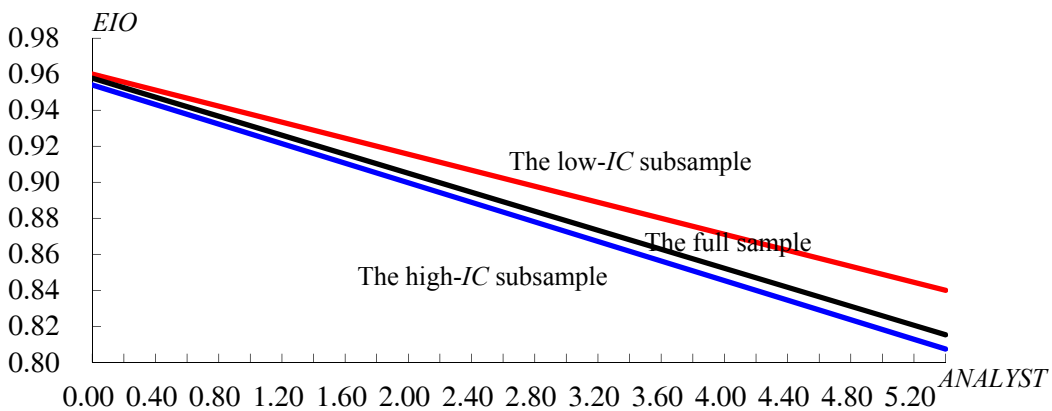
in environmental information opaqueness (*EIO*), equalling about 1.16% of the mean value of *EIO* (0.912). The above results suggest that the negative effect of analyst coverage on environmental information opaqueness is economically significant, in addition to its statistical significance.

In Column (3) of Table 4, the third regression adds the moderating variable of *IC*. The coefficient on *ANALYST* is still significantly negatively associated with environmental information opaqueness, again as expected. Furthermore, *IC* has a significantly negative coefficient (-0.005 with t = -2.20), implying that better internal control can lower environmental information opaqueness.

Column (4) of Table 4 incorporates *ANALYST*, *IC,* and the interaction of *ANALYST*×*IC* to test Hypothesis 2. The coefficients on *ANALYST* and *IC* are both significant and negative (-0.007 with t = -3.40 and -0.007 with t = -3.17). Meanwhile, the coefficient on *ANALYST*×*IC* is significantly negative (-0.005 with t = -2.84), lending support to Hypothesis 2. The result implies that internal control strengthens the reducing effect of analyst coverage on environmental information opaqueness: that is, if firms followed by the same number of analysts have better internal control, they will release less opaque environmental information.

Figure 1 further displays the interactive effect between analyst coverage (*ANALYST*) and internal control (*IC*) on reducing environmental information opaqueness (*EIO*). As shown in Figure 1, there is an obvious tendency that the negative influence of *ANALYST* on *EIO* is more pronounced for the high-*IC* subsample than for the low-*IC* subsample, suggesting that internal control reinforces the reduction effect of analyst coverage on environmental information opaqueness.

Figure 1 Interactive Effect between Analyst Coverage (*ANALYST*) and Internal Control (*IC*) on Environmental Information Opaqueness (*EIO*)



Note: The black, red, and blue lines denote the influence of analyst coverage on environmental information opaqueness for the full sample, the low-*IC* subsample, and the high-*IC* subsample, respectively.

4.4 Robustness Checks Using the Rank of Analyst Coverage

In the first robustness check, we introduce a variable of *ANALYST_RANK*. First, the sample is ranked according to the ascending order of the number of analysts following the firm and then divided into 10 groups. Second, for the first to the tenth groups, *ANALYST_RANK* is assigned a value of 1 to 10, respectively. The rank variable can reduce the arbitrary assignment of different values to the same item, although it sacrifices some detailed information about the original variable. Table 5 reports the regression results of environmental information opaqueness (*EIO*) on the rank of analyst coverage (*ANALYST_RANK*).[11]

Table 5 Robustness Checks Using the Rank of Analyst Coverage

Variable	Dependent Variable: *EIO*					
	(1)		(2)		(3)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ANALYST_RANK	-0.003***	-4.34	-0.003***	-4.20	-0.003***	-4.12
IC			-0.004**	-2.14	-0.007***	-3.12
ANALYST_RANK×IC					-0.002***	-3.02
BLOCK	-0.028*	-1.94	-0.027*	-1.87	-0.029**	-2.00
MAN_SHR	-0.030***	-2.86	-0.028***	-2.75	-0.028***	-2.76
INDR	0.012	0.35	0.012	0.35	0.016	0.46
DUAL	0.003	0.77	0.003	0.81	0.003	0.91
BOARD	-0.002**	-2.01	-0.002**	-2.02	-0.002*	-1.88
SIZE	-0.045***	-11.45	-0.044***	-12.06	-0.041***	-12.72
LEV	0.081***	6.07	0.077***	6.07	0.077***	6.24
ROA	0.068***	3.33	0.085***	3.87	0.085***	4.06
BTM	0.037***	3.68	0.037***	3.72	0.031***	3.27
ISSUE	-0.010***	-2.92	-0.009***	-2.76	-0.011***	-3.14
RET_SD	0.219***	3.06	0.209***	2.85	0.203***	2.90
CAP_INV	0.009	1.08	0.007	0.90	0.007	0.88
STATE	-0.005	-1.09	-0.005	-1.05	-0.006	-1.15
Constant	1.877***	26.41	1.876***	27.37	1.853***	29.66
Industry and Year	Control		Control		Control	
Observations	13,317		13,317		13,317	
Adjusted R^2	0.2660		0.2671		0.2701	
F(p-value)	75.31***(<.001)		73.79***(<.001)		74.08***(<.001)	
Test ΔR^2	65.31***(<.001)		19.98***(<.001)		56.55***(<.001)	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

[11] The results for environmental information opaqueness on all the control variables are the same as those in Column (1) of Table 4, and thus we do not report them for brevity.

In Column (1) of Table 5, the coefficient on *ANALYST_RANK* is positive and significant (-0.003 with t = -4.34), again providing support to Hypothesis 1 that firms covered by more analysts have less environmental information opaqueness. In Column (3) of Table 5, *ANALYST_RANK*×*IC* has a significantly negative coefficient (-0.002 with t = -3.02), lending support to Hypothesis 2.[12]

4.5 Robustness Checks Using the Rank of Environmental Information Opaqueness

In the second robustness check, we introduce another variable: *EIO_RANK*. First, the sample is ranked according to the ascending order of *EIO* and then divided into 10 groups. Second, *EIO_RANK* is assigned a value of 1 to 10 for the first to the tenth groups, respectively.

Table 6 Robustness Checks Using the Rank of Opaque Environmental Information

Variable	Dependent Variable: *EIO_RANK*							
	(1)		(2)		(3)		(4)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ANALYST			-0.171***	-4.33	-0.166***	-4.37	-0.164***	-4.25
IC					-0.048*	-1.92	-0.061**	-2.48
ANALYST×*IC*							-0.031*	-1.94
BLOCK	-0.487**	-2.20	-0.477**	-2.11	-0.467**	-2.06	-0.480**	-2.12
MAN_SHR	-0.702***	-3.29	-0.463**	-2.27	-0.449**	-2.23	-0.450**	-2.25
INDR	-0.521	-0.92	-0.556	-0.98	-0.554	-0.98	-0.530	-0.93
DUAL	0.024	0.43	0.040	0.72	0.041	0.74	0.043	0.77
BOARD	-0.046**	-2.55	-0.040**	-2.18	-0.040**	-2.18	-0.039**	-2.13
SIZE	-0.755***	-16.99	-0.626***	-10.98	-0.612***	-9.77	-0.598***	-8.79
LEV	1.365***	7.74	1.101***	5.98	1.061***	5.65	1.058***	5.58
ROA	0.252	0.85	0.875***	2.76	1.059***	3.30	1.060***	3.32
BTM	0.574***	3.00	0.332*	1.87	0.327*	1.85	0.289	1.61
ISSUE	-0.214***	-3.43	-0.218***	-3.52	-0.211***	-3.43	-0.222***	-3.65
RET_SD	8.023***	5.02	7.587***	4.38	7.480***	4.17	7.447***	4.17
CAP_INV	0.050	0.35	0.129	0.94	0.112	0.81	0.109	0.79
STATE	-0.085	-0.96	-0.110	-1.24	-0.107	-1.22	-0.110	-1.26
Constant	19.812***	19.39	17.555***	14.09	17.547***	13.67	17.398***	12.72
Industry and Year	Control		Control		Control		Control	
Observations	13,317		13,317		13,317		13,317	
Adjusted R^2	0.2570		0.2628		0.2632		0.2635	
F(p-value)	156.91***(<.001)		159.64***(<.001)		157.08***(<.001)		154.02***(<.001)	
Test ΔR^2			104.76***(<.001)		7.23***(0.007)		7.23***(0.007)	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

In Column (2) of Table 6, *ANALYST* is significantly negatively associated with

[12] Noticeably, using *ANALYST_RANK* to substitute for *ANALYST* leads to corresponding coefficient values being smaller in magnitude but higher in statistical significance because ranking data sacrifices some detailed information in the value of *ANALYST*, and thus the results of smaller coefficient values in magnitude are understood.

EIO_RANK (-0.171 with t = -4.33), consistent with Hypothesis 1. In Column (4), the coefficient on *ANALYST*×*IC* is significantly negative (-0.031 with t = -1.94), validating Hypothesis 2 again.

4.6 Robustness Checks Using the Score of Environmental Information Opaqueness from the Third Party

We hand collect the score of corporate environmental responsibility from the Hexun website for the period 2010 to 2014.[13] Then, we compute environmental information opaqueness as follows: $(ENV\_HX_{max}-ENV\_HX_{i,t})$ / $(ENV\_HX_{max}-ENV\_HX_{min})$, where $ENV\_HX_{i,t}$ denotes the environmental responsibility score for firm *i* in year *t* from the Hexun website. We label the variable as *EIO_INDEX*.

Table 7 reports the regression results. As shown by the table, we estimate the models step by step. In Column (2), the coefficient on *ANALYST* is negative and significant at the 1% level (-0.012 with t= -5.62), lending support to Hypothesis 1. Moreover, in Column (4), both *ANALYST* and *IC* have negative and significant coefficients. More importantly, the coefficient on the interactive item is also significantly negative (-0.005 with t= -2.90), consistent with Hypothesis 2.

4.7 Using Two-Stage Tobit-OLS Regressions to Control for the Endogeneity[14]

In response to the dual-directional causality, we use two-stage Tobit-OLS regression procedures to alleviate the effect of endogeneity. Moreover, we employ the residual of internal control (*IC_REISD*), which isolates the impact of analyst coverage, as the moderating variable to address the concerns about whether the endogeneity between analyst coverage and internal control leads to the negative relation between environmental information opaqueness and internal control.[15]

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[13] We wish to express our great thanks for the referee's valuable suggestion on using the environmental information disclosure scores from a third party. In this study, we employ the scores from the Hexun website. Of course, other third parties also provide ratings for evaluating corporate social responsibility, but the data provided by these institutions are not available or suitable for our study. For example, the Rankins CSR Ratings does not provide environmental responsibility ratings for listed companies. In addition, we cannot obtain the data on corporate environmental responsibility reported by the China Academy of Social Sciences or the Shanghai National Accounting Institute through public channels. Please note that the Hexun website reports related information for listed firms since 2010. Therefore, the sample period in this robustness check is from 2010 to 2014. Please refer to http://stockdata.stock.hexun.com/zrbg/ Plate.aspx?date=2016-12-31#.

[14] We wish to express our great thanks for the referee's valuable comments that inspired us to test the causality between environmental information opaqueness and analyst coverage. Before using the two-stage regression method, we employ Granger causality tests. Moreover, we further use the dynamic panel data model to control for the endogeneity. For brevity, we do not report the results. As shown by the non-tabulated results, analyst coverage is the Granger cause of environmental information opaqueness, but environmental information opaqueness is not the Granger cause of analyst coverage, and the results using the dynamic panel data model are qualitatively similar to those using two-stage regressions.

[15] We wish to express our great thanks for the referee's insightful comments that reminded us to pay attention to the endogeneity between internal control and analyst coverage. In doing so, we regress internal control on analyst coverage, industry dummies, and year dummies to generate the residual (*IC_RESID*). As expected, non-tabulated results show that internal control is significantly positively associated with analyst coverage, implying potential endogeneity between analyst coverage and internal control.

Table 7 Regression Results Using the Alternative Measure of Environmental Information Opaqueness from the *Hexun* Website

Variable	Dependent Variable: *EIO_INDEX*							
	(1)		(2)		(3)		(4)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ANALYST			-0.012***	-5.62	-0.012***	-5.62	-0.012***	-5.09
IC					-0.005**	-2.31	-0.008***	-3.26
ANALYST×IC							-0.005***	-2.90
BLOCK	0.025	1.33	0.025	1.33	0.026	1.39	0.024	1.29
MAN_SHR	-0.007	-0.40	0.010	0.63	0.011	0.74	0.012	0.76
INDR	-0.112**	-2.08	-0.116**	-2.17	-0.115**	-2.15	-0.111**	-2.07
DUAL	0.007	1.06	0.008	1.21	0.008	1.22	0.008	1.26
BOARD	-0.003	-1.42	-0.002	-1.23	-0.002	-1.22	-0.002	-1.16
SIZE	-0.073***	-3.80	-0.064***	-3.47	-0.062***	-3.47	-0.061***	-3.36
LEV	0.127***	3.08	0.107***	2.77	0.103***	2.68	0.103***	2.77
ROA	-0.011	-0.18	0.040	0.71	0.059	1.01	0.060	1.04
BTM	0.094**	2.34	0.076*	1.95	0.076**	1.98	0.071*	1.86
ISSUE	-0.007	-0.95	-0.007	-1.05	-0.007	-0.93	-0.008	-1.18
RET_SD	0.460**	2.52	0.433**	2.31	0.424**	2.31	0.417**	2.36
CAP_INV	0.003	0.19	0.009	0.62	0.008	0.51	0.007	0.46
STATE	-0.034***	-3.31	-0.036***	-3.51	-0.035***	-3.46	-0.036***	-3.52
Constant	2.435***	6.25	2.265***	6.07	2.268***	6.13	2.248***	6.15
Industry and Year	Control		Control		Control		Control	
Observations	10,424		10,424		10,424		10,424	
Adjusted R^2	0.2251		0.2286		0.2291		0.2300	
F(p-value)	65.84***(<.0001)		65.41***(<.0001)		64.06***(<.0001)		63.19***(<.0001)	
Test ΔR^2			47.06***		7.98***		13.67***	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

In the first-stage regression, we use Tobit regression to estimate the fitted value of *ANALYST* (*ANALYST**). Brennan and Hughes (1991) find a significant increase in analyst coverage after M&A or recombination activities such as a stock split, major business restructuring, stock repurchase, and so on. Therefore, *M&A* and *RECOM* are incorporated in the first-stage model. *M&A* is a dummy variable that equals 1 if the firm has mergers and acquisitions and 0 otherwise. *RECOM* is an indicator variable that equals 1 if the firm has recombination activities and 0 otherwise.

After identifying the above instruments, we conduct three over-identification tests to judge whether these instrumental variables are appropriate. Untabulated results show that χ^2-values (p-values) for the Sargan test, Basmann test, and Wooldridge test are 1.1530 (0.2829), 1.1494 (0.2837), and 1.1236 (0.2891), respectively, suggesting the rationale of using the aforementioned variables as instruments in our study. In addition, Column (1) of

Table 8 reports the results of regressing analyst coverage (*ANALYST*) on its determinants. As expected, we observe the positive influence of M&A on analyst coverage.

Columns (2) and (4) present the OLS regression results using the fitted value of *ANALYST* (i.e. *ANALYST**) to test Hypothesis 1 and Hypothesis 2, respectively. Column (2) shows that the coefficient on *ANALYST** is significantly negative (-0.052 with t = -7.31), proving again that analyst coverage reduces environmental information opaqueness. This finding supports Hypothesis 1. In Column (4), the significantly negative coefficient of *ANALYST**×*IC_RESID* (-0.004 with t = -2.26) implies that internal control reinforces the reducing effect of analyst coverage on opaque environmental disclosure.

Table 8 Results Using 2SLS Regression Procedures to Control for the Endogeneity between Analyst Coverage and Environmental Information Opaqueness

Variable	Dependent Variable: *ANALYST*		Dependent Variable: *EIO*					
	(1)		(2)		(3)		(4)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
M&A	0.059**	2.53						
RECOM	-0.023	-0.98						
*ANALYST**			-0.052***	-7.31	-0.054***	-7.22	-0.053***	-7.70
IC_RESID					-0.005**	-2.50	-0.006***	-3.03
ANALYST×IC_RESID*							-0.004**	-2.26
BLOCK	0.145*	1.85	-0.021	-1.47	-0.021	-1.45	-0.021	-1.50
MAN_SHR	1.762***	24.14	0.048***	3.09	0.051***	3.17	0.050***	3.23
INDR	-0.436*	-1.91	0.000	0.01	-0.000	-0.01	0.000	0.01
DUAL	0.114***	3.99	0.007**	2.15	0.007**	2.23	0.008**	2.28
BOARD	0.040***	5.63	-0.000	-0.32	-0.000	-0.25	-0.000	-0.24
SIZE	0.913***	66.68	-0.006	-1.28	-0.004	-0.93	-0.004	-0.97
LEV	-2.038***	-25.86	0.000	0.02	-0.003	-0.25	-0.003	-0.25
ROA	4.672***	27.40	0.255***	6.37	0.263***	6.43	0.243***	6.33
BTM	-1.455***	-23.42	-0.031**	-2.20	-0.034**	-2.43	-0.034**	-2.50
ISSUE	0.068**	2.20	-0.010***	-3.12	-0.010***	-3.10	-0.011***	-3.16
RET_SD	-2.322***	-3.04	0.140**	2.23	0.136**	2.10	0.133**	2.11
CAP_INV	0.609***	9.39	0.035***	3.87	0.036***	3.99	0.036***	4.08
STATE	-0.152***	-5.50	-0.013***	-2.67	-0.014***	-2.74	-0.013***	-2.72
Constant	-16.810***	-60.85	1.155***	14.23	1.125***	13.86	1.125***	14.58
Industry and Year	Controlled		Controlled		Controlled		Controlled	
Observations	13,317		13,317		13,317		13,317	
Pseudo R^2/Adjusted R^2	0.1647		0.2674		0.2688		0.2700	
LR/F(p-value)	7510.14***(<.001)		74.43***(<.001)		73.12***(<.001)		72.09***(<.001)	
Test ΔR^2			90.65***(<.001)		27.34***(<.001)		23.20***(<.001)	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

4.8 Using Lagged One-Period Variables to Control for the Endogeneity

To mitigate the influence of the endogeneity, we employ lagged one-period independent variables to re-examine hypotheses 1 and 2. Table 9 reports the results using

lagged one-period variables. As shown in Columns (2) and (4), *ANALYST*, *IC*, and *ANALYST*×*IC* have negative and significant coefficients, providing additional support for hypotheses 1 and 2.

Table 9 Results Using Lagged One-Period Variables

Variable	Dependent Variable: *EIO*							
	(1)		(2)		(3)		(4)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
$ANALYST_{t-1}$			-0.010***	-3.32	-0.009***	-3.19	-0.009***	-3.16
IC_{t-1}					-0.007***	-3.59	-0.007***	-3.95
$ANALYST_{t-1} \times IC_{t-1}$							-0.004**	-2.25
$BLOCK_{t-1}$	-0.037**	-2.49	-0.035**	-2.44	-0.034**	-2.36	-0.035**	-2.48
MAN_SHR_{t-1}	-0.053***	-4.26	-0.040***	-3.50	-0.038***	-3.39	-0.039***	-3.44
$INDR_{t-1}$	0.006	0.23	0.003	0.12	0.003	0.12	0.004	0.16
$DUAL_{t-1}$	0.001	0.36	0.002	0.65	0.003	0.76	0.003	0.84
$BOARD_{t-1}$	-0.003**	-2.26	-0.002*	-1.88	-0.002*	-1.89	-0.002*	-1.79
$SIZE_{t-1}$	-0.052***	-12.01	-0.045***	-11.63	-0.042***	-11.66	-0.041***	-11.88
LEV_{t-1}	0.089***	6.21	0.076***	5.23	0.070***	4.79	0.070***	4.91
ROA_{t-1}	0.001	0.05	0.029	1.55	0.049**	2.16	0.045**	2.05
BTM_{t-1}	0.056***	4.57	0.043***	4.20	0.041***	4.15	0.037***	4.12
$ISSUE_{t-1}$	-0.009**	-2.41	-0.010***	-2.59	-0.009**	-2.32	-0.010***	-2.80
RET_SD_{t-1}	0.139	1.57	0.120	1.26	0.099	0.99	0.104	1.09
CAP_INV_{t-1}	0.008	0.79	0.013	1.23	0.010	1.00	0.011	1.02
$STATE_{t-1}$	-0.005	-1.06	-0.006	-1.31	-0.006	-1.25	-0.007	-1.37
Constant	2.029***	24.52	1.896***	26.18	1.889***	26.88	1.866***	28.81
Industry and Year	Control		Control		Control		Control	
Observations	12,004		12,004		12,004		12,004	
Adjusted R^2	0.2672		0.2720		0.2740		0.2761	
F(p-value)	69.26***(<.001)		72.38***(<.001)		71.17***(<.001)		70.81***(<.001)	
Test ΔR^2			79.98***(<.001)		32.87***(<.001)		37.23***(<.001)	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

4.9 Test for the Change in the Number of Following Analysts after Negative Environmental Events

We hand collect data about environmental events during the period 2008 to 2014 and pick out listed firms that are sanctioned by the government due to environmentally unfriendly behaviour or engaging in environmental litigation. The first column of Table 10 lists the stock codes of these firms, and the second column shows the event dates. The third and fourth columns report the number of following analysts in the event year and in the next year, respectively. The last column shows the change in the number of analysts following a firm. As expected, in the last row, the t-test for the change in the number of analysts is negative and significant at the 5% level, revealing that the number of following analysts

decreases after negative environmental events.

Table 10 Change in the Number of Following Analysts after Environmental Events

Stock Code	Event Date	The number of following analysts in the event year	The number of following analysts in the next year	The difference in the number of following analysts
		(1)	(2)	(2)-(1)
000060	2012-02-14	22	27	5
000488	2010-05-14	25	18	-7
000615	2011-11-09	0	0	0
002061	2011-07-08	2	2	0
002078	2008-06-07	25	26	1
002224	2011-09-15	3	2	-1
002276	2011-06-05	1	5	4
002321	2011-07-07	12	10	-2
002365	2011-12-28	4	0	-4
002365	2012-05-10	0	0	0
002496	2011-04-05	5	6	1
300068	2011-05-13	11	20	9
600063	2010-07-20	15	6	-9
600132	2013-12-31	0	0	0
600226	2011-06-05	3	0	-3
600283	2012-09-04	0	1	1
600362	2011-12-07	28	22	-6
600486	2009-05-25	26	12	-14
600489	2008-07-15	36	20	-16
600531	2009-08-20	9	5	-4
600580	2011-05-13	14	11	-3
600664	2011-06-05	21	1	-20
600789	2013-12-30	0	0	0
600808	2013-12-21	14	12	-2
601857	2010-07-16	32	24	-8
601899	2010-12-27	30	23	-7
601899	2011-02-01	23	25	2
T-test for the difference in the number of following analysts				-2.50**(0.0192)

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests.

4.10 Additional Tests for the Differences between Polluting Industries and Other Industries

We identify the polluting industries subsample from an official document[16] and set a dummy variable, labelled *POLLUT*, indicating whether a firm is in a polluting industry.

[16] The official document is "Notice on the List of Industries for Environmental Protection Verification in Listed Companies" available at http://www.gdep.gov.cn/zcfg/bmguizhang/201305/t20130530_153013.html.

Then, we use an interactive item that integrates analyst coverage and this indicator to examine the impact of analyst coverage on environmental information opacity in polluting industries. Table 11 presents the regression results using the interactive item between analyst coverage and polluting industries. As shown in Column (2), the coefficients on *ANALYST*, *POLLUT*, and *ANALYST×POLLUT* are significantly negative, revealing that the impact of analyst coverage on opaque environmental information is more pronounced in polluting industries than in other industries. Moreover, Column (4) shows the negative and significant coefficients on *ANALYST*, *ANALYST×IC*, and *ANALYST×IC×POLLUT*, suggesting that the interactive effects between analyst coverage and internal control are more pronounced in polluting industries than in other industries.

Table 11 Results Using the Interactive Item between Analyst Coverage and Polluting Industries

Variable	Dependent Variable: *EIO*							
	(1)		(2)		(3)		(4)	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ANALYST	-0.008***	-3.81	-0.004**	-2.14	-0.003*	-1.73	-0.003*	-1.75
ANALYST×POLLUT			-0.011***	-3.60	-0.011***	-3.58	-0.010***	-3.67
ANALYST×IC					-0.005***	-2.89	-0.005***	-2.80
ANALYST×IC×POLLUT							-0.001*	-1.65
POLLUT	-0.032***	-3.90	-0.032***	-3.93	-0.032***	-3.92	-0.032***	-3.77
IC					-0.007***	-3.29	-0.007***	-3.30
BLOCK	-0.030**	-2.08	-0.029**	-2.02	-0.030**	-2.09	-0.030**	-2.10
MAN_SHR	-0.031***	-3.03	-0.030***	-2.96	-0.029***	-2.85	-0.029***	-2.85
INDR	0.013	0.38	0.013	0.39	0.017	0.51	0.017	0.50
DUAL	0.002	0.69	0.002	0.65	0.003	0.78	0.003	0.79
BOARD	-0.002*	-1.89	-0.002*	-1.86	-0.002*	-1.76	-0.002*	-1.75
SIZE	-0.045***	-11.66	-0.045***	-11.67	-0.041***	-13.00	-0.041***	-13.02
LEV	0.081***	6.32	0.079***	6.10	0.075***	6.27	0.075***	6.26
ROA	0.068***	3.21	0.069***	3.18	0.086***	3.85	0.086***	3.86
BTM	0.037***	3.74	0.037***	3.74	0.030***	3.35	0.030***	3.35
ISSUE	-0.010***	-3.05	-0.010***	-2.90	-0.011***	-3.12	-0.011***	-3.12
RET_SD	0.217***	3.11	0.210***	3.03	0.195***	2.91	0.195***	2.90
CAP_INV	0.009	1.03	0.010	1.14	0.008	0.92	0.008	0.93
STATE	-0.005	-1.08	-0.005	-1.02	-0.005	-1.07	-0.005	-1.07
Constant	1.868***	26.80	1.859***	26.96	1.834***	30.29	1.835***	30.29
Industry and Year	Control		Control		Control		Control	
Observations	13,317		13,317		13,317		13,317	
Adjusted R^2	0.2680		0.2707		0.2748		0.2765	
F(p-value)	72.95***(<.001)		74.51***(<.001)		73.74***(<.001)		72.12***(<.001)	
Test ΔR^2			49.01***(<.001)		78.18***(<.001)		2.85*(0.0952)	

Note: ***, **, and * represent the 1%, 5%, and 10% levels of significance, respectively, for two-tailed tests. All reported t-statistics are based on standard errors adjusted for clustering at the firm level and the year level (Petersen, 2009).

V. Discussion

5.1 Policy Implications

Our study has several policy implications. First, we document that analyst coverage is associated with a reduction in opaque environmental information. By referring to the stakeholder theory, the government, regulators, and practitioners are able to understand the roles of analysts in the demands for value-relevant information and thus help firms to improve the transparency of their voluntary disclosures. Second, governmental agencies should consider the reinforced effect between internal control and analyst coverage when making decisions about environmental disclosure because this interactive relation is conducive to a reduction in the cost of social governance. Not only should practitioners consider the effect of a single factor on environmental disclosure, but they also need to take the interactions among determinants into account. Lastly, our findings imply that analyst coverage can be recognised as an informative signal of environmental information transparency. Therefore, external stakeholders should consider this signal before making investment, lending, or other decisions.

5.2 Limitations and Future Research Directions

Our research has several limitations that suggest several avenues for future studies. First, there is no widely recognised definition and measurement of environmental information opaqueness at present. Therefore, future research can provide superior measurements. Second, we focus on the role of analysts in reducing environmental information opaqueness but seldom explore the effects of the accuracy of analysts' forecasts and recommendations. Thus, future studies can extend our research by examining the impact of other characteristics of analysts' behaviour on environmental information opaqueness. Finally, due to data limitations, we cannot distinguish between the positive and negative statements in analysts' recommendations. In this regard, future research can further investigate the impact of this distinction.

VI. Conclusion

Previous studies mainly focus on the role of analyst coverage as one capital market consequence of information disclosure. In this study, however, we theoretically explain how analyst coverage can reduce environmental information opaqueness and further provide robust empirical results to support this proposition. Moreover, our study shows that internal control can reinforce the negative effect of analyst coverage on environmental information opaqueness. Overall, our study sheds light on the relation between corporate governance and information transparency in the context of environmental disclosure, and we find that external and internal governance mechanisms can interactively reduce environmental

information opaqueness. Consequently, it seems promising that firms can increase environmental information transparency by improving both external and internal governance mechanisms.

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