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Analyst Following, Environmental Disclosure and Cost of Equity: Research Based on Industry Classification

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Abstract: Prior studies argue that an analyst is an important mediator between a firm and investors, and has a significant influence on the cost of equity. However, how analyst following influences the cost of equity has not been studied in depth. In the Chinese setting, where environmental information has attracted much attention, we explore the interaction among analyst following, environmental information disclosure, and cost of equity. With two linear regression methods of ordinary least squares (OLS) and two-Stage least squares (2SLS), we establish regressions to verify the relationships among them by using empirical data from 2004 to 2011 in China. The results show that analyst following can improve environmental information disclosure and lower the cost of equity. This interaction is more significant in the heavy-pollution industry and after new environmental policy is issued. We also find that environmental disclosure has a mediating effect, which determines how analyst following influences the cost of equity. The results expand the research on environmental information’s motivations and economic consequences.

Keywords: analyst following; environmental information disclosure; cost of equity; policy change

1. Introduction

Prior studies have confirmed that information disclosure, including Corporate Social Responsibility (CSR) disclosure and environmental disclosure, can relieve the information asymmetry and reduce the cost of equity capital [1]. According to information risk theory, because of information asymmetry between outside investors and managers, managers tend to harm the interests of outside investors by using internal information advantages [2]. Therefore, a stronger degree of information asymmetry between investors and corporations leads to a higher return on capital required by outside investors to protect their own interests. Thus, information asymmetry is the key factor affecting the efficiency of the market economy [3]. With growing concern about environmental issues, environmental information disclosure plays an important role in relieving information asymmetry and attracting attention from outside investors, so it can reduce the risk premium that investors require and lower the cost of equity capital. Prior studies also have shown that analyst following has effects on stock returns, short-term investment value, the effectiveness of earnings forecasts, and the optimization of corporate resource allocation [4–8]. Analyst following is generally regarded as an external supervision mechanism [9]; in theory, it can improve the information disclosure. However, existing studies only confirm that better disclosure can attract more analyst following, but do not investigate what effect on information disclosure comes from the analyst following. Furthermore, the endogenous problem among analyst following, environmental disclosure, and cost of equity is difficult to solve. Thus, we choose the promulgation and implementation of a new environmental
law in 2008 as a reference for the change in public pressure to analyze the interaction among analyst following, environmental disclosure, and cost of equity, which can efficiently reduce the influence of the endogenous problem.

In this paper, we select 2004–2006 and 2009–2011 listed companies in China’s manufacturing industry as the research sample and explore the relationship among analyst following, environmental disclosure, and cost of equity. We exclude years 2007 and 2008 since, as Measure was issued in April 2007 and became effective in May 2008, it is more difficult to identify the impact of Measure on financial constraints in those two years. The results show that both analyst following and environmental information disclosure can reduce the cost of equity; analyst following can improve environmental information disclosure and lower the cost of equity; the heavy-pollution industry has a moderating effect on the relationship between analyst following and environmental information disclosure; and, considering the influence of policy change, the mediating effect and moderating effect are more significant after new environmental policy is issued.

This paper contributes to the existing literature in the following ways. (1) We enrich the existing literature by examining the relationship between analyst following and environmental disclosure, and the link among analyst following, environmental disclosure, and cost of equity. Most literature concentrates on the relationship between environmental disclosure and cost of equity and ignores the effect of analyst following on environmental disclosure and cost of equity. (2) Using policy change as a background, we contrast the relationship among analyst following, environmental disclosure, and the cost of equity before and after new environmental policy is issued, and we can solve the endogenous problem of analyst following and environmental information disclosure, to a certain extent.

The rest of the paper is organized as follows. Section 2 presents theoretical analysis and the research hypothesis. Section 3 describes empirical methods. Section 4 reports empirical results. Section 5 concludes the study.

2. Background of Environmental Disclosure in China

On 1 May 2008, State Ministry of Environmental Protection (SMEP) issued the Measures for the Disclosure of Environment Information (Measure), the first administrative rules to mandate environmental disclosure by firms operating in 16 polluting industries such as coal power, steel, and cement. Although firms in non-polluting industries are not required to provide environmental disclosure, they are strongly encouraged by the government’s regulatory agencies, including CSRC (Chinese Security Regulatory Commission) and SMEP, to do so. Measure also details the scope of disclosure requirements and the methods of and procedures for disclosure. For firms in polluting industries, Measure requires detailed disclosure of pollutant discharges, environmental emergency plans, environmental protection facilities, etc. Measure is often viewed as the first environmental disclosure rule in China to require mandatory corporate environmental disclosure, and its introduction is considered a defining moment in environmental disclosure legislation in China. SMEP also gives the public the right to request environmental information from the government. The introduction of this law allows us to examine how a new environmental policy affects corporate environmental disclosure in an emerging market where economic growth is often given priority over environmental risks. SMEP enforces the regulation via its local environmental protection agencies and mandates its local agencies to enforce disclosure in their administrative regions. Local environmental protection agencies oversee monitoring the source and level of pollutants and ensuring proper measures are implemented to minimize environmental risks. Measure, as an exogenous event, provides a chance to compare the variation effect of environmental disclosure on analyst following and cost of equity capital.
3. Literature Review

3.1. Research on Information Disclosure and Cost of Equity

Most literature supports a negative association between information and cost of equity capital [10]. On the one hand, greater disclosure enhances stock market liquidity thereby reducing cost of equity capital either through reduced transactions costs or increased demand for a firm’s securities. On the other hand, greater disclosure reduces estimation risk arising from investors’ estimates of the parameters of an asset’s return or payoff distribution.

Botosan shows that greater disclosure in association with a lower cost of equity capital for firms that attract a low analyst following [10]. However, this relationship does not exist in firms with a high analyst following. Easley and O’Hara show that differences in the composition of information between public and private information affect the cost of capital, with investors demanding a higher return to hold stocks with greater private information and view that firms can influence their cost of capital by choosing features such as accounting treatments, analyst coverage, and market microstructure [11]. Francis et al. also find that more voluntary disclosure is associated with a lower cost of capital [12].

As a kind of voluntary disclosure, CSR or environmental disclosure also reduces the cost of equity capital. Reverte finds a significant negative relationship between CSR disclosure ratings and the cost of equity capital, and obtains that the negative relationship between CSR reporting quality and the cost of equity capital is more pronounced for those firms operating in environmentally sensitive industries [13]. Dhaliwal et al. examine a potential benefit associated with the initiation of voluntary disclosure of CSR activities: a reduction in firms’ cost of equity capital [1]. They find that firms with a high cost of equity capital in the previous year tend to initiate disclosure of CSR activities in the current year and that initiating firms with superior social responsibility performance enjoy a subsequent reduction in the cost of equity capital. Dhaliwal et al. also find a negative association between CSR disclosure and the cost of equity capital; this relationship is more pronounced in stakeholder-oriented countries [14]. They also find evidence that financial and CSR disclosures act as substitutes for each other in reducing the cost of equity capital. Harjoto and Jo find that legal (normative) CSR decreases (increases) analysts’ dispersion and cost of capital, while legal (normative) CSR increases (decreases) firm value [15].

3.2. Research on Analyst Following and Information Disclosure

Analysts play the role of external monitors [9] and exert supervisory pressure upon the decision of managers. Many studies generally document that firms with better disclosure quality tend to attract greater analyst following [16,17]. Other studies have found evidence that CSR is beneficial to the firm, such as higher analyst following [18]. Lang et al. find that analysts are less likely to follow firms with potential incentives to withhold or manipulate information, such as when the family/management group is the largest control rights blockholder. Furthermore, this relationship is stronger for firms from low-shareholder-protection countries [19]. Jo and Harjoto find a positive association between the level and change of CSR engagement and the level and change of analyst coverage after considering simultaneity and causality [20]. According to the existing literature, it is difficult to make sure that the information environment lead to analyst following. The relationship between them is probably interactive. Hong et al. find that analysts’ decisions to follow firms and managerial decisions to manage earnings are jointly determined [9]. Firms with lower levels of accrual-based earnings management offer a better information environment to attract analyst following. Analyst following, in turn, has important monitoring effects on managerial behavior and results in lower levels of both accrual-based and real earnings management.

In summary, prior studies agree that the CSR disclosure (including environmental disclosure) can reduce the cost of equity capital. However, the relationship between analyst following and environmental disclosure is not clear. Many studies view that better information environment attracts analyst following, but they do not answer whether analyst following, as a supervision mechanism,
can lead to increasing of environmental disclosure. Furthermore, the joint action on the cost of equity capital by analyst following and environmental disclosure is not studied in depth.

4. Hypotheses Development

4.1. Analyst Following and Environmental Disclosure

Previous studies have shown that analysts have powerful advantages in information identification. Compared to other sources of information, analysts’ forecasts have more significant data and more scientific research methods, which can provide more relevant information [4]. For the emerging market in China, the degree of information asymmetry between investors and corporations is so high that analysts’ forecasts become an important medium for investors to receive corporate information. As a result, investors’ perception of corporate information is largely influenced by analyst following, and firms tend to behave differently according to analyst following. In general, high analyst concern and high information asymmetry result in large differences in corporate performance. With the increasing demands for information, traditional financial information has been unable to meet the needs of investors. An increasing number of investors are concerned about corporate social responsibility information [21]. As an important aspect of corporate social responsibility information, environmental information has been given an increasing amount of attention by investors and analysts, and analyst concerns may have an important impact on corporations. Studies have shown that analysts can improve the corporate information environment through information collection, integration, and evaluation by using their professional ability and then assist stakeholders in corporate information interpretation [22]. In this way, analyst following can be a substitution for information disclosure regulation laws [23]. According to organizational legitimacy theory, in the face of high analyst concerns, the information distance between corporations and regulators has been greatly reduced, which can effectively inhibit the incentives for opportunistic disclosure of environmental information. To express organizational legitimacy and deal with regulation of environmental policy, corporations have tended to increase environmental information disclosure.

In addition, according to impression management theory, as the medium of information transmission, analyst following is a driving force for corporations to attract outside investors and reduce the cost of equity through increasing environmental information disclosure, which is presented as concerned corporate environmental confession behavior [24]. Therefore, analyst following can effectively promote the level of corporate environmental information disclosure.

Hypothesis 1 (H1). Analyst following is positively related to environmental information disclosure.

On 1 May 2008, SMEP issued Measure, which has had landmark significance in China’s environmental information disclosure [25]. Measure provides explicit guidance for environmental information disclosure of government and corporations and provides a legal basis for environmental information disclosure. At the same time, the Shanghai Stock Exchange also provides guidance on corporate environmental protection and environmental information disclosure. Therefore, the public pressure on corporate environmental information disclosure has been significantly strengthened. On the one hand, in the face of enormous public pressure, to deal with strengthened environmental regulation from local government, corporations have tended to increase environmental information disclosure to improve organizational legitimacy. On the other hand, the stakeholders will pay more attention to corporate environmental information for their investment behavior. With the increasing need for environmental information, environmental information has become important for the analyst. Therefore, after the issue of Measures, analyst following in the role of environmental information disclosure should be more significant. According to the Guide of Environmental information, heavy-pollution industries include thermal power, steel, cement, electrolytic aluminum, coal, metallurgy, chemistry, petrochemical, building materials, paper making, brewing, pharmaceuticals, fermentation, textiles, leather, and mining. In heavy-pollution industries, analyst following can
cause greater pressure for environmental disclosure because the investors are sensitive to the environmental information.

**Hypothesis 2 (H2).** Analyst following’s enhancing effect on environmental information disclosure has been more significant after Measures was issued.

### 4.2. Environmental Disclosure and Cost of Equity

According to information risk theory, information asymmetry is the primary cause of the differences in the cost of equity. Investors believe that managers tend to use their information superiority to manage investors’ interests. For external investors, the higher the degree of information asymmetry between them and corporations is, the higher the risk premium that will be required, which leads to a higher cost of equity [2]. As an efficient way to improve the ability of investors to reduce the information asymmetry, information disclosure can significantly lower the cost of equity.

In the context of serious environmental problems and increasingly strengthened environmental regulation, corporate environmental information has become an important factor that affects capital market risk. On the one hand, considering violation risk and policy pressure, investors tend to be concerned about environmental risk while making decisions. Generally, investors will get to know the corporate’s environment situation through its regular reports. On the other hand, as more environmental information is disclosed, information asymmetry between corporations and investors will be greatly reduced, so that risk premiums will be effectively curbed, and the cost of equity will be lower. In addition, after the Measure was issued, the status of environmental information was greatly improved, so the relationship between environmental information disclosure and cost of equity should have become more significant.

**Hypothesis 3 (H3).** Environmental disclosure is negatively related to cost of equity, and the relationship became more significant after the Measures was issued.

### 4.3. Analyst Following, Environmental Disclosure and Cost of Equity

Information asymmetry is an important cause of the cost of equity premiums. Analyst following and environmental information disclosure can reduce the degree of information asymmetry and lower the cost of equity. As a third party, analyst following impels corporations to strengthen impression management in environmental information disclosure, to enhance corporate environmental information disclosure. As a result, on the one hand, both analyst following and environmental information disclosure can lower the cost of equity; on the other hand, environmental information disclosure has a mediating effect. In other words, analyst following can lower the cost of equity by increasing environmental information disclosure. In addition, considering the increasing public pressure brought about by environmental protection policy, the mediating effect of environmental information disclosure may be more significant.

**Hypothesis 4 (H4).** Environmental information disclosure has a mediating effect on the relationship between analyst following and cost of equity; the mediating effect was more significant after the Measures was issued.

### 5. Empirical Designs

#### 5.1. Sample and Data

Measures was issued in 2007 and implemented in 2008. To eliminate the year effects of implementation, we define 2004–2006 as pre-Measures and 2009–2011 as post-Measures. We select the manufacturing listed companies during the two periods as our sample, and the observations are treated as follows: (1) delete the parts of the sample with missing values, (2) delete the parts of the sample with an asset-liability ratio of more than 90%, (3) delete the parts of the sample that
lack an annual report, (4) delete the parts of the sample for which a PEG model cannot be estimated, and (5) delete the parts of the sample that cannot be calculated with one-period lag. Finally, 2383 observations are obtained. The data on environmental information disclosure are collected manually from corporate annual reports and social responsibility reports. Financial data are collected from the CSMAR and Wind databases.

5.2. Variables

(1) Dependent variable: COE (cost of equity)

For the estimation of cost of equity, prior research mainly includes five methods: the Gordon model, CAPM model, OJ model, GLS model and PEG ratio. Mao et al. investigated the effectiveness of different estimation methods in China’s market background, verifying that the PEG and MPEG model are more appropriate [26]. Therefore, we choose the PEG ratio as the method of estimating the cost of equity. The detailed calculation method is as follows.

\[ \text{COE} = \sqrt{\frac{\text{EPS}_2 - \text{EPS}_1}{P_0}} \]  

COE is the estimation of the cost of equity; \( \text{EPS}_2 \) is the predicted value of earnings per share in two years; \( \text{EPS}_1 \) is the predicted value of earnings per share in one year; \( P_0 \) is the current stock price.

(2) Explanatory variable: Analyst_follow and EID (environmental information disclosure)

In this paper, we choose the frequency of analyst following to measure the degree of attention. It is defined as the natural logarithm of forecast reports towards target stock of the year plus one.

With a set of 10 components for evaluating the level of EID, we develop the indicators for content analysis based on the Chinese listed companies’ annual reports, including: investment in environmental protection; government funds, finance allowance and tax reference related to environment; disposal and treatment of waste products; information about ISO certification; improvement of the environment; environmental policy; bank loans related to environmental protection; lawsuits, bounties and penalties related to environmental protection; firms’ environmental protection strategies, goals and policies; and other environmental-related information [27]. The score is calculated as follows: 3 for monetary items, 2 for amount items but not monetary items, 1 for general items and 0 for no information. The score of EID is equal to the sum of the items above. Table A1 provides the definition of all variables.

5.3. Models

Before establishing models, we introduce the two methods used in our paper. Ordinary least squares (OLS) is a type of linear least squares method for estimating the unknown parameters in a linear regression model. OLS chooses the parameters of a linear function of a set of explanatory variables by the principle of least squares: minimizing the sum of the squares of the differences between the observed dependent variable (values of the variable being predicted) in the given dataset and those predicted by the linear function. Two-Stage least squares (2SLS) regression analysis is a statistical technique that is used in the analysis of structural equations. This technique is the extension of the OLS method. It is used when the dependent variable’s error terms are correlated with the independent variables. Instrumental variable methods allow for consistent estimation when the explanatory variables (covariates) are correlated with the error terms in a regression model.

(1) Analyst following and environmental information disclosure

Policy changes have different effects on heavy-pollution industries and non-heavy-pollution industries. Therefore, we choose dummy variable Pollution as the moderating factor, testing the effect of analyst following on environmental information disclosure. Areas with a developed economy draw
more attention from analysts. Meanwhile, the economy has little impact on environmental information disclosure. Therefore, we choose Wage as a tool variable, solving the endogeneity problem of analyst following through 2SLS regression (model (2) and (3)).

\[
\text{Analyst}_{-\text{follow1-1}} = a_0 + a_1\text{Pollution}_{-\text{1-1}} + a_2\text{SOE}_{-\text{1-1}} + a_3\text{Herf}_{-\text{5-1}} + a_4\text{Size}_{-\text{1-1}} + a_5\text{LEV}_{-\text{1-1}} + a_6\text{Market}_{-\text{1-1}} + a_7\text{ROE}_{-\text{1-1}} + a_8\text{Beta}_{-\text{1-1}} + a_9\text{Wage}_{-\text{1-1}} + \epsilon
\]  

\[
\text{EID}_{\text{1-1}} = a_0 + a_1\text{Analyst}_{-\text{follow1-1}} + a_2\text{Pollution}_{-\text{1-1}} + a_3\text{Analyst}_{-\text{follow1-1}} \times \text{Pollution}_{-\text{1-1}} + a_4\text{SOE}_{-\text{1-1}} + a_5\text{Herf}_{-\text{5-1}} + a_6\text{Size}_{-\text{1-1}} + a_7\text{LEV}_{-\text{1-1}} + a_8\text{Market}_{-\text{1-1}} + a_9\text{ROE}_{-\text{1-1}} + a_{10}\text{Beta}_{-\text{1-1}} + \epsilon
\]  

As the coefficient of \(\text{Analyst}_{-\text{follow1-1}} \times \text{Pollution}_{-\text{1-1}}\), \(a_3\) represents the moderating effect of industry. If \(a_3\) is positively significant, the effect of analyst following on environmental information disclosure is more significant in heavy-pollution industries; if \(a_3\) is negatively significant, the effect of analyst following on environmental information disclosure is less significant in heavy-pollution industries; if \(a_3\) is not significant, the moderating effect of industry is not significant.

(2) Environmental disclosure and cost of equity

Local environmental conditions have an important impact on corporate environmental information disclosure. The more waste drainage in the area, the more environmental information should be disclosed. Meanwhile, local environmental conditions have little impact on the cost of equity. Therefore, we choose Waste as a tool variable to solve the endogeneity problem of environmental information disclosure through 2SLS regression (model (4) and (5)).

\[
\text{EID}_{\text{1-1}} = a_0 + a_1\text{Pollution}_{-\text{1-1}} + a_2\text{SOE}_{-\text{1-1}} + a_3\text{Herf}_{-\text{5-1}} + a_4\text{Size}_{-\text{1-1}} + a_5\text{LEV}_{-\text{1-1}} + a_6\text{ROE}_{-\text{1-1}} + a_7\text{FCF}_{-\text{1-1}} + a_8\text{Beta}_{-\text{1-1}} + a_9\text{Wage}_{-\text{1-1}} + \epsilon
\]  

\[
\text{COE}_{\text{1-1}} = a_0 + a_1\text{EID}_{-\text{1-1}} + a_2\text{Pollution}_{-\text{1-1}} + a_3\text{SOE}_{-\text{1-1}} + a_4\text{Herf}_{-\text{5-1}} + a_5\text{Size}_{-\text{1-1}} + a_6\text{LEV}_{-\text{1-1}} + a_7\text{ROE}_{-\text{1-1}} + a_8\text{FCF}_{-\text{1-1}} + a_9\text{Beta}_{-\text{1-1}} + a_{10}\text{Beta}_{-\text{1-1}} + \epsilon
\]  

(3) Analyst following, environmental disclosure and cost of equity

To investigate the mediating effect of environmental information disclosure on the relationship between analyst following and the cost of equity, we further set model (6) as follows.

\[
\text{COE}_{\text{1-1}} = a_0 + a_1\text{EID}_{-\text{1-1}} + a_2\text{Analyst}_{-\text{follow1-1}} + a_3\text{Pollution}_{-\text{1-1}} + a_4\text{SOE}_{-\text{1-1}} + a_5\text{Herf}_{-\text{5-1}} + a_6\text{Size}_{-\text{1-1}} + a_7\text{LEV}_{-\text{1-1}} + a_8\text{ROE}_{-\text{1-1}} + a_9\text{FCF}_{-\text{1-1}} + a_{10}\text{Beta}_{-\text{1-1}} + a_{11}\text{Beta}_{-\text{1-1}} + \epsilon
\]  

5.4. Descriptive Analysis

Table 1 reports the descriptive statistics. \(\text{EID}\)’s median is 3.000, and its mean is 3.706, presenting that the level of corporate environmental information disclosure is generally low. The median of \(\text{COE}\) is 0.122, and its mean is 0.147. It shows that the cost of equity capital is very high and almost to 15%. There is a sharp contrast between low environmental disclosure and high cost of equity capital. The median of analyst following is 2.303, and its mean is 2.178. The differences of their median and mean are slight; the data of \(\text{COE}\) and analyst following are stable.
Table 1. Descriptive statistics.

| Variable | N   | Min  | Max  | Mean | SD   | Median | P25   | P75   |
|----------|-----|------|------|------|------|--------|-------|-------|
| COE      | 2383 | 0.011| 0.499| 0.147| 0.083| 0.122  | 0.094 | 0.177 |
| Analyst_follow | 2383 | 0.691| 6.103| 2.178| 1.628| 2.303  | 1.099 | 3.504 |
| EID      | 2383 | 0.000| 25.000| 3.706| 4.008| 3.000  | 0.000 | 6.000 |
| Pollution| 2383 | 0.000| 1.000| 0.561| 0.496| 1.000  | 0.000 | 1.000 |
| SOE      | 2383 | 0.000| 1.000| 0.573| 0.495| 1.000  | 0.000 | 1.000 |
| Herfi5   | 2383 | 0.005| 0.726| 0.199| 0.127| 0.171  | 0.102 | 0.271 |
| Size     | 2383 | 18.837| 26.487| 21.587| 1.070| 21.454 | 20.850| 22.157|
| LEV      | 2383 | 0.003| 0.899| 0.455| 0.185| 0.472  | 0.324 | 0.600 |
| Market   | 2383 | 1.550| 12.604| 8.556| 2.181| 8.460  | 6.840 | 10.420|
| ROE      | 2383 | −2.771| 0.495| 0.074| 0.139| 0.074  | 0.037 | 0.121 |
| FCF      | 2383 | −0.470| 4.042| 0.056| 0.129| 0.049  | 0.010 | 0.095 |
| Growth   | 2383 | −3.069| 18.345| 0.179| 0.634| 0.087  | −0.059| 0.279 |
| Beta     | 2383 | 0.105| 1.865| 1.123| 0.231| 1.139  | 0.993 | 1.274 |
| Wage     | 2383 | 1.146| 6.568| 2.812| 1.132| 2.867  | 1.723 | 3.434 |
| Waste    | 2383 | 0.000| 6.051| 1.718| 1.276| 1.324  | 0.684 | 2.275 |

5.5. Analyst Following and Environmental Disclosure

In terms of environmental information, whether corporations are in heavy-pollution industries or not lead to different sensitivities. In addition, policy changes have different effects on different industries. As a result, the effects of analyst following in different types of industry are different. Based on considering the difference in the industry, this section investigates in depth the impact of analyst following on environmental information disclosure.

5.5.1. Baseline Regression

Table 2 reports the role of analyst following on environmental information disclosure in the condition of both considering endogeneity and not considering endogeneity. According to the results of OLS regression, Analyst_follow_{t−1} is positively related to EID at the 1% significance level, and the regression coefficient is 0.237, which indicates that analyst following can effectively improve the level of corporate environmental information disclosure. According to the result of 2SLS regression, Analyst_follow_{t−1} is also positively related to EID at the 1% significance level, and the regression coefficient is 0.244. In general, analyst following is positively related to EID, which verifies H1.

Considering the moderating effect of industry, according to the result of OLS, Analyst_follow_{t−1} is positively related to EID at the 1% significance level, and the regression coefficient is 0.165. Analyst_follow_{t−1} × Pollution_{t−1} is positively related to EID at the 5% significance level, and the regression coefficient is 0.125. The result indicates that the effect of analyst following is more significant in heavy-pollution industries.

Considering the endogeneity, the results of 2SLS regression are consistent with OLS regression. Specifically, Analyst_follow_{t−1} is positively related to EID at the 1% significance level, and the regression coefficient is 0.167. Analyst_follow_{t−1} × Pollution_{t−1} is positively related to EID at the 5% significance level, and the regression coefficient is 0.130. The result verifies that analyst following has promoting effect on corporate environmental information disclosure, and the effect of analyst following is more significant in heavy-pollution industries.
5.5.2. Effect of Policy Change

Considering the impact of policy change, we make a comparison of the industry moderating effect before and after the issue of Measures. Without considering the endogeneity, Table 3 reports the effect of analyst following on environmental information disclosure before and after the implementation of Measures. Before the Measures was issued, the relationship between Analyst_follow_{-1} and EID was not significant; after the Measures was issued, Analyst_follow_{-1} was positively related to EID at the 5% significance level, and the regression coefficient was 0.179. The relationship between Analyst_follow_{-1} × Pollution_{-1} and EID is not significant because of the endogeneity problem.

### Table 3. Industrial moderating effect in policy changes.

| Dep: EID | Pre-Measure | Post-Measure |
|----------|-------------|--------------|
|          | OLS         | First Stage  | OLS         | First Stage  |
| Analyst_follow_{-1} | 0.205       | 0.352        | 0.179 **    | 0.194 ***   |
| SOE_{-1}  | 0.327       | 0.283        | 0.067       | 0.416 ***   |
| Herfi5_{-1} | 0.214      | 0.152        | 0.016       | 0.331 **    |
| Size_{-1}  | 0.077       | 0.072        | 0.013       | 0.567 **    |
| LEV_{-1}   | 0.53        | -0.109       | -0.088      | -0.279      |
| Market_{-1} | -0.031     | -0.134       | -0.018      | 0.005       |
| ROE_{-1}   | 0.224       | -1.197 **    | 3.833 ***   | -0.725      |

Significance at 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.
Table 3. Cont.

| Pre-Measure | Post-Measure | OLS First Stage | Second Stage | Post-Measure | OLS First Stage | Second Stage |
|-------------|--------------|-----------------|--------------|--------------|-----------------|--------------|
| Beta\(_t-1\) | 0.269 (0.89) | –0.342 ** (–2.41) | 1.252 (0.16) | 1.304 *** (3.79) | –0.414 *** (–2.23) | 0.787 ** (2.32) |
| Wage\(_t-1\) | 0.330 * (1.85) | –0.035 (–0.79) | –0.414 ** (–2.23) | 0.787 ** (2.32) |
| Constant | –1.629 (–0.84) | –7.694 *** (–8.81) | 13.999 (0.28) | –0.628 (–0.38) | –11.160 *** (–13.15) | 10.309 (1.55) |
| Adj R\(^2\) | 0.47 | 0.19 | 0.56 | 0.69 | 0.31 | 0.32 |
| N | 968 | 968 | 968 | 1415 | 1415 | 1415 |

Significance at 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

According to the result of 2SLS regression in Table 4, before the Measures was issued, the relationship between Analyst\(_{\text{follow}}\)\(_{t-1}\) and EID was not significant; after the Measures was issued, Analyst\(_{\text{follow}}\)\(_{t-1}\) was positively related to EID at the 1% significance level, and the regression coefficient was 0.194. Analyst\(_{\text{follow}}\)\(_{t-1}\) × Pollution\(_{t-1}\) is positively related to EID at the 10% significance level, and the regression coefficient is 0.142. The results indicate that industry moderating effect became more significant after the Measures was issued, which verifies H2.

Table 4. Environmental disclosure and cost of equity.

| Dep | OLS | 2SLS |
|-----|-----|------|
|     | COE\(_t\) | First Stage | Second Stage | COE\(_t\) | First Stage | Second Stage |
| EID\(_t-1\) | –0.004 *** (–6.94) | –0.078 *** (–5.91) | 2.169 *** (14.83) | 0.158 *** (5.34) |
| Pollution\(_t-1\) | 0.006 (1.30) | 0.069 *** (4.30) | 1.194 *** (14.83) | 0.073 *** (5.34) |
| SOE\(_t-1\) | 0.022 *** (4.47) | 0.062 *** (4.30) | –3.259 *** (–5.54) | –0.155 ** (–2.25) |
| Herfi5\(_t-1\) | 0.128 *** (6.99) | –0.155 ** (–2.25) | 0.091 *** (4.78) | 0.075 *** (5.34) |
| Size\(_t-1\) | –0.010 *** (–3.76) | 1.254 *** (15.80) | 0.110 *** (4.78) | 0.073 *** (5.34) |
| LEV\(_t-1\) | 0.046 *** (3.34) | 0.089 *** (2.50) | –0.110 *** (–2.25) | 0.055 *** (2.50) |
| ROE\(_t-1\) | –0.023 (–1.45) | 0.126 ** (0.25) | 0.046 ** (0.25) | 0.022 ** (0.25) |
| FCF\(_t-1\) | 0.025 (1.49) | 1.125 ** (2.06) | 0.086 * (1.93) | 0.055 ** (2.50) |
| Growth\(_t-1\) | –0.003 (–1.11) | –0.001 (–0.11) | –0.001 (–0.11) | –0.022 ** (–0.22) |
| Beta\(_t-1\) | 0.002 (0.15) | 0.818 ** (2.48) | 0.055 ** (1.96) | 0.055 ** (2.50) |
| Wast\(_t-1\) | 0.413 *** (6.08) | –0.413 *** (6.08) | –0.413 *** (6.08) | –0.413 *** (6.08) |
| Constant | 0.296 *** (5.62) | –26.767 *** (–16.85) | –1.730 *** (–4.50) | –1.730 *** (–4.50) |
| Adj R\(^2\) | 0.09 | 0.25 | 0.13 | 0.13 |
| N | 2383 | 2383 | 2383 | 2383 |

Significance at 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

5.6. Environmental Disclosure and the Cost of Equity

Table 4 reports the role of environmental information disclosure on the cost of equity, in the conditions of both considering endogeneity and not considering endogeneity. According to the results of OLS regression, EID\(_t-1\) is negatively related to COE\(_t\) at the 1% significance level, and the regression
coefficient is $-0.004$, which indicates that environmental information disclosure can effectively reduce cost of equity. According to the result of the 2SLS regression, $EID_{t-1}$ is negatively related to $COE_t$ at the 1% significance level, and the regression coefficient is $-0.078$. Therefore, environmental information disclosure is negatively related to the cost of equity, verifying H3.

5.7. Analyst Following, Environmental Disclosure and Cost of Equity

5.7.1. Baseline Regression

We investigate the interaction among analyst following, environmental information disclosure, and cost of equity with OLS and 2SLS regression analysis. The results are shown in Table 5. Without considering the endogeneity, $Analyst\_follow_{t-1}$ is positively related to $EID_t$ at the 1% significance level, and the regression coefficient is $0.237$, which indicates that analyst following can effectively improve the level of corporate environmental information disclosure. $EID_{t-1}$ is negatively related to $COE_t$ at the 1% significance level, and the regression coefficient is $-0.004$, which indicates that environmental information disclosure can effectively reduce the cost of equity. Considering the interaction among analyst following, environmental information disclosure, and cost of equity, $EID_{t-1}$ is negatively related to $COE_t$ at the 1% significance level, and the regression coefficient is $-0.004$; $Analyst\_follow_{t-1}$ is negatively related to $COE_t$ at the 1% significance level, and the regression coefficient is $-0.017$. The results show that analyst following can improve environmental information disclosure and lower the cost of equity, verifying H4.

Table 5. Analyst following, environmental disclosure and the cost of equity.

| Dep                      | OLS         |             |             | 2SLS         |             |             |
|--------------------------|-------------|-------------|-------------|--------------|-------------|-------------|
|                          | $EID_t$     | $COE_t$     | $COE_t$     | $EID_t$      | $COE_t$     | $COE_t$     |
| $Analyst\_follow_{t-1}$  | 0.237 ***   | $-0.017$ ***| $0.244$ *** | $-0.001$     |             |             |
|                          | (6.61)      | (10.65)     | (5.64)      |              |             |             |
| $EID_{t-1}$              | 0.770 ***   | $-0.004$ ***| $-0.004$ ***| $0.737$ ***  | $-0.078$ ***| $-0.077$ ***|
|                          | (53.91)     | (6.94)      | (6.14)      | (3.96)       | (-5.91)     | (-4.89)     |
| $Pollution_{t-1}$        | 0.712 ***   | 0.006       | 0.002       | $0.784$ **   | $0.158$ *** | $0.156$ *** |
|                          | (6.67)      | (1.30)      | (0.46)      | (2.07)       | (5.34)      | (4.45)      |
| $SOE_{t-1}$              | 0.177       | $0.022$ **  | $0.012$ **  | $0.203$      | $0.062$ *** | $0.061$ *** |
|                          | (1.54)      | (3.47)      | (2.43)      | (1.18)       | (4.30)      | (3.71)      |
| $Herfi5_{t-1}$           | $-0.448$    | 0.128 ***   | $0.103$ *** | $-0.562$     | $-0.155$ ** | $-0.154$ ** |
|                          | (-1.09)     | (6.99)      | (5.70)      | (-0.78)      | (-2.25)     | (-2.13)     |
| $Size_{t-1}$             | 0.022       | $-0.010$ ***| 0.003       | $0.061$      | $0.091$ *** | $0.091$ *** |
|                          | (0.34)      | (3.76)      | (1.08)      | (0.29)       | (4.78)      | (4.51)      |
| $LEV_{t-1}$              | 0.728 **    | 0.046 ***   | $0.012$     | $0.764$ **   | $0.089$ **  | $0.087$ **  |
|                          | (2.34)      | (3.34)      | (0.84)      | (2.35)       | (2.50)      | (2.24)      |
| $ROE_{t-1}$              | $-0.352$    | $-0.023$    | $0.016$     | $-0.357$     | $-0.004$    | $-0.003$    |
|                          | (-0.98)     | (1.45)      | (0.99)      | (-1.62)      | (-0.11)     | (-0.07)     |
| $Market_{t-1}$           | $-0.012$    |             |             | $-0.009$     |             |             |
|                          | (-0.46)     |             |             |              |             |             |
| $FCF_{t-1}$              | 0.025       | 0.030 *     |             | $0.903$ ***  | $0.086$ *   | $0.086$ *   |
|                          | (1.49)      | (1.83)      |             | (4.59)       | (1.93)      | (1.92)      |
| $Growth_{t-1}$           | $-0.003$    | $-0.002$    |             | $0.244$ ***  | $-0.001$    | $-0.001$    |
|                          | (-1.11)     | (-1.11)     |             | (5.64)       | (-0.22)     | (-0.22)     |
| $Beta_{t-1}$             | 0.877 ***   | 0.002       | $-0.006$    | $0.784$ **   | $0.055$ **  | $0.054$ *   |
|                          | (3.83)      | (0.15)      | (-0.58)     | (2.07)       | (1.96)      | (1.85)      |
| $Constant$               | $-1.436$    | 0.296 ***   | $0.090$     | $-2.268$     | $-1.730$ ***| $-1.722$ ***|
|                          | (-1.14)     | (5.62)      | (1.64)      | (-0.55)      | (-4.50)     | (-4.16)     |
| $F$                      | 454.54      | 18.50       | 27.92       | 256.63       | 56.13       | 64.15       |
| $N$                      | 2383        | 2383        | 2383        | 2383         | 2383        | 2383        |

Significance at 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.
Considering the endogeneity, \( \text{Analyst\_follow}_{t-1} \) is positively related to \( \text{EID}_t \) at the 1% significance level, and the regression coefficient is 0.244. \( \text{EID}_{t-1} \) is negatively related to \( \text{COE}_t \) at the 1% significance level, and the regression coefficient is \(-0.078\). Considering the interaction among analyst following, environmental information disclosure, and cost of equity, \( \text{EID}_{t-1} \) is negatively related to \( \text{COE}_t \) at the 1% significance level, and the regression coefficient is \(-0.077\); the relationship between \( \text{Analyst\_follow}_{t-1} \) and \( \text{COE}_t \) is not significant. The result also shows that analyst following can improve environmental information disclosure and lower the cost of equity, further verifying H4.

5.7.2. Effect of Policy Change

(1) Analyst following effect in policy changes

Furthermore, we consider the impact of policy change on the relationship between analyst following and environmental information disclosure by using 2SLS regression. The results are shown in Table 6. Before the Measures was issued, the relationship between \( \text{Analyst\_follow}_{t-1} \) and \( \text{EID}_t \) was not significant. After the Measures was issued, \( \text{Analyst\_follow}_{t-1} \) became positively related to \( \text{EID}_t \) at the 1% significance level, and the regression coefficient was 0.275. The result indicates that the effect of analyst following on environmental information disclosure became more significant after the Measures was issued, which further verifies H1.

| Dep                        | Pre-Measure  | Post-Measure |
|----------------------------|--------------|--------------|
|                            | First Stage  | Second Stage | First Stage  | Second Stage |
| \( \text{Analyst\_follow}_{t-1} \) |             |             | \( \text{EID}_t \) | \( \text{Analyst\_follow}_{t-1} \) | \( \text{EID}_t \) |
| \( \text{Pollution}_{t-1} \) | \(-0.043\)   | \(-1.629\)   | \(-0.088\)   | \(-0.104\)   |
|                            | \((-0.59)\)  | \((-0.98)\)  | \((-1.12)\)  | \((-0.18)\)  |
| \( \text{SOE}_{t-1} \)     | \(-0.136\)   | \(-0.298\)   | \(-0.416***\) | \(-0.252\)   |
|                            | \((-1.68)\)  | \((-0.52)\)  | \((-4.99)\)  | \((-1.24)\)  |
| \( \text{Herfi5}_{t-1} \)   | \(-0.550**\) | \(0.566\)    | \(0.016\)    | \(0.352\)    |
|                            | \((-2.00)\)  | \((0.29)\)   | \((0.05)\)   | \((0.35)\)   |
| \( \text{Size}_{t-1} \)    | \(0.413***\) | \(-0.755\)   | \(0.717***\) | \(-0.549\)   |
|                            | \((9.67)\)   | \((-1.01)\)  | \((17.30)\)  | \((-1.62)\)  |
| \( \text{LEV}_{t-1} \)     | \(-0.472**\) | \(-0.818\)   | \(-1.892***\) | \(0.577\)    |
|                            | \((-2.04)\)  | \((-0.59)\)  | \((-8.80)\)  | \((1.30)\)   |
| \( \text{Wage}_{t-1} \)    | \(0.058**\)  | \(-0.141\)   | \(-0.018\)   | \(0.006\)    |
|                            | \((2.30)\)   | \((-1.24)\)  | \((-0.89)\)  | \((0.18)\)   |
| \( \text{ROE}_{t-1} \)     | \(1.367***\) | \(-0.99\)    | \(3.833***\) | \(-0.751\)   |
|                            | \((7.10)\)   | \((-0.84)\)  | \((11.37)\)  | \((-0.96)\)  |
| \( \text{Market\_idx}_{t-1} \) | \(-0.342**\) | \(1.298\)   | \(-0.414**\) | \(0.784**\)  |
|                            | \((-2.41)\)  | \((1.40)\)   | \((-2.23)\)  | \((2.30)\)   |
| \( \text{Beta}_{t-1} \)    | \(0.130*\)   | \(-0.035\)   | \(-0.035\)   | \(-0.035\)   |
|                            | \((1.85)\)   | \((-0.79)\)  | \((-0.79)\)  | \((-0.79)\)  |
| \( \text{Constant} \)     | \(-7.694***\) | \(13.993***\) | \(-11.160***\) | \(9.709\)    |
|                            | \((-8.81)\)  | \((2.34)\)   | \((-13.15)\) | \((1.15)\)   |
| \( \text{Adj\_R}^2 \)      | \(0.309\)    | \(0.42\)     | \(0.19\)     | \(0.16\)     |
| \( N \)                    | \(968\)      | \(968\)      | \(1415\)     | \(1415\)     |

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

(2) Environmental disclosure effect in policy changes

We investigate the impact of policy change on the relationship between environmental information disclosure and the cost of equity by using 2SLS regression. The results are shown in Table 7. Before the Measure was issued, the relationship between \( \text{EID}_{t-1} \) and \( \text{COE}_t \) was not significant. After the Measure was issued, \( \text{EID}_{t-1} \) was negatively related to \( \text{COE}_t \) at the 5% significance level, and the regression
The coefficient was $-0.01$. The results indicate that the effect of environmental information disclosure on cost of equity was more significant after the measure was issued, which further verifies H3.

**Table 7. Environmental information differential disclosure effect in policy changes.**

| COE$_t$ | Pre-Measure | Post-Measure |
|---------|-------------|--------------|
|         | First Stage | Second Stage | First Stage | Second Stage |
| $EID_{t-1}$ | −0.101 | 2.554 *** | −0.010 ** |
| $Pollution_{t-1}$ | 1.236 *** | 0.113 | 0.022 * |
| $SOE_{t-1}$ | 0.318 | 0.031 | 0.014 ** |
| $Herf_{t-1}$ | −0.140 | −0.052 | −0.024 |
| $Size_{t-1}$ | 0.495 *** | 0.046 | 0.155 ** |
| $LEV_{t-1}$ | 0.747 | 0.062 | 0.006 |
| $ROE_{t-1}$ | 0.500 | 0.050 | 0.004 |
| $FCF_{t-1}$ | 1.482 *** | 1.717 | −0.046 * |
| $Growth_{t-1}$ | (−0.39) | (−0.59) | (−0.44) | (−0.97) | (−0.19) | (−0.29) | (0.19) | (−0.19) | (−0.76) | (2.83) | (1.84) |
| $Beta_{t-1}$ | −0.031 | −0.050 | 0.000 |
| $Waste_{t-1}$ | −9.220 *** | −0.601 | −27.417 *** | −0.220 |
| Constant | 0.09 | 0.11 | 0.31 | 0.18 |
| N | 968 | 968 | 1415 | 1415 |

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

(3) Comprehensive effect analysis of policy changes

We investigate the impact of policy change on the interaction among analyst following, environmental information disclosure, and cost of equity by using 2SLS regression. The results are shown in Table 8. Before the measures was issued, the relationship between Analyst follow$_{t-1}$ and COE$_t$ was not significant; $EID_{t-1}$ was also not significantly related to COE$_t$. After the measures was issued, $EID_{t-1}$ was negatively related to COE$_t$ at the 5% significance level, and the regression coefficient was $-0.01$; Analyst follow$_{t-1}$ was not significantly related to COE$_t$. Overall, the mediating effect of environmental information disclosure was more significant after the measures was issued, which verifies H4.
Table 8. Comprehensive effect of policy changes.

|                | Pre-Measure | Post-Measure |
|----------------|-------------|--------------|
|                | First Stage | Second Stage | First Stage | Second Stage |
| Analyst_follow | -0.055      | -0.014       | -0.100      | -0.001       |
|                | (-0.64)     | (-1.59)      | (-1.41)     | (-0.37)      |
| EIDt−1         | -0.085      |              | -0.010 **   |              |
|                | (-1.60)     |              | (-2.08)     |              |
| Pollutiont−1   | 1.232 ***   | 0.092        | 2.542 ***   | 0.022 *      |
|                | (6.49)      | (1.37)       | (12.99)     | (1.70)       |
| SOEt−1         | 0.308       | 0.023        | 0.975 ***   | 0.014 **     |
|                | (1.46)      | (0.90)       | (4.61)      | (2.34)       |
| Herfi5t−1      | -0.171      | 0.047        | -2.387 ***  | -0.024       |
|                | (-0.23)     | (0.66)       | (-2.79)     | (-1.28)      |
| Sizet−1        | 0.519 ***   | 0.045        | 1.457 ***   | 0.015 **     |
|                | (4.39)      | (1.47)       | (12.69)     | (2.16)       |
| LEVt−1         | 0.720       | 0.043        | 0.967       | 0.005        |
|                | (1.17)      | (0.63)       | (1.64)      | (0.40)       |
| ROEt−1         | 0.571       | 0.059        | -1.757 *    | 0.006        |
|                | (1.08)      | (1.01)       | (-1.80)     | (0.30)       |
| FCFt−1         | 1.523 ***   | 0.137        | 1.725       | -0.046 *     |
|                | (3.06)      | (1.46)       | (1.32)      | (-1.88)      |
| Growtht−1      | -0.030      | -0.005       | -0.058      | 0.000        |
|                | (-0.38)     | (-0.58)      | (-0.50)     | (0.08)       |
| Betat−1        | -0.528      | -0.072       | 1.360 ***   | 0.020 *      |
|                | (-1.40)     | (-1.59)      | (2.74)      | (1.85)       |
| Waste t−1      | 0.139       | 0.395 ***    |             |              |
|                | (0.97)      |              | (-3.66)     |              |
| Constant       | -9.650 ***  | -0.562       | -28.501 *** | -0.223       |
|                | (-4.02)     | (-1.00)      | (-12.78)    | (-1.57)      |
| Adj. R²        | 0.09        | 0.15         | 0.32        | 0.11         |
| N              | 968         | 968          | 1415        | 1415         |

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

5.8. Robust Test

The robust test mainly considers the impact of the industry average environmental information disclosure, introducing environmental information excessive disclosure (NEID) as the substitution for the main dependent variable. Corporate environmental information disclosure may be affected by peer firm imitation. According to the method of Ghosh and Olsen, we measure environmental information excessive disclosure as NEID = EID - EID_IND. EID_IND is the industry average environmental information disclosure [28]. Table 9 reports the regression result of analyst following and environmental information excessive disclosure. Without considering the interaction with analyst following and heavy-pollution industry, Analyst_followt−1 is positively related to NEID at the 1% significance level in both the OLS and 2SLS regressions. Considering the interaction with analyst following and heavy-pollution industries, Analyst_followt−1 × Pollutiont−1 is positively related to NEID at the 10% significance level in both the OLS and 2SLS regressions.

Table A2 reports the regression result of environmental information differential disclosure and cost of equity. According to the results of the OLS regression, NEIDt−1 is negatively related to COEt at the 1% significance level, and the regression coefficient is −0.004. According to the results of the 2SLS regression, NEIDt−1 is negatively related to COEt at the 1% significance level, and the regression coefficient is −0.064. The results are consistent with prior regressions. The results of the interaction among analyst following, environmental information differential disclosure and cost of equity are can be seen in Table A3.

In addition, we choose environmental information quantitative disclosure (EID_amount) and environmental information significant disclosure (EID_sig) as the substitution of environmental
information disclosure. The definitions of EID_amount and EID_sig are consistent with Patten, Freedman and Stagliano, and Darrell and Schwartz [29–31]. EID_amount equals one if the description is textual, equals two if the description is phrased in quantitative but non-monetary terms, and equals three if the description is phrased in monetary terms. Annual reports are divided into a financial section and a non-financial section. EID_sig equals one if environmental information is disclosed in the non-financial section, equals two if it is disclosed in the financial section, and equals three if both parts are disclosed. The results of the OLS and 2SLS regressions are consistent with prior studies and are not listed in this paper.

Table 9. Robust test of analyst following effect.

| Dep: NEIDt | OLS | 2SLS |
|------------|-----|------|
| Analyst_followt−1 | 0.238 *** (7.09) | 0.186 *** (4.01) | 0.236 *** (5.27) | 0.185 *** (3.91) |
| Pollutiont−1 | 0.190 ** (1.98) | 0.005 (0.03) | 0.190 (0.86) | 0.009 (0.04) |
| Analyst_followt−1 × Pollutont−1 | 0.091 * (1.65) | 0.089 * (1.73) |
| SOEt−1 | 0.158 (1.47) | 0.154 (1.43) | 0.149 (1.13) | 0.147 (1.11) |
| Herfi5t−1 | −0.648 * (−1.67) | −0.681 * (−1.76) | −0.596 (−0.82) | −0.638 (−0.86) |
| Sizet−1 | 0.020 (0.34) | 0.023 (0.39) | 0.007 (0.04) | 0.012 (0.08) |
| LEVt−1 | 0.614 ** (2.11) | 0.621 ** (2.13) | 0.606 * (1.80) | 0.614 * (1.80) |
| Markett−1 | 0.008 (0.35) | 0.008 (0.33) | 0.007 (0.24) | 0.007 (0.24) |
| ROEt−1 | −0.368 (−1.09) | −0.353 (−1.05) | −0.368 (−1.22) | −0.353 (−1.18) |
| Betat−1 | 0.815 *** (2.008) | 0.813 *** (−1.956) | 0.812 *** (−1.705) | 0.810 *** (−1.709) |
| Constant | −2.008 * (−1.70) | −1.956 * (−1.66) | −1.705 (−0.52) | −1.709 (−0.51) |
| Adj_R2 | 0.64 (0.64) | 0.64 (0.21) | 0.64 (0.31) | 0.64 (0.31) |
| N | 2383 | 2383 | 2383 | 2383 |

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

6. Summary and Conclusions

In this paper, we choose 2004–2006 and 2009–2011 manufacturing listed companies in China as our sample, considering Measure was issued in 2008, and investigate the interaction among analyst following, environmental information disclosure, and cost of equity. The results show that environmental information disclosure has a significant mediating effect on the relationship between analyst following and cost of equity. Analyst following can lower the cost of equity through increasing environmental information disclosure. In addition, the mediating effect became more significant after Measure was issued. Furthermore, the relationship among them is more significant if the corporation is in a heavy-pollution industry.

According to our conclusions, some suggestions are made as follows. Firstly, as an information medium in the capital market, the role of analyst following should be fully valued, and the professional quality of analyst following should be strengthened. Secondly, firms should be encouraged to disclose more and higher quality environmental information, until they are required to make a mandatory environmental disclosure step by step. Thirdly, the improvement of environmental policy is of great importance for increasing environmental information disclosure and reducing the cost of equity. Thus, government should establish relatively comprehensive laws and regulations and make full use of the positive effect of a new environmental law on the cost of equity capital.
Our paper has some limitations. It has resolved the endogenous problem of environmental disclosure and cost of equity capital to some extent, but the endogenous problem of analyst following and environmental disclosure still exist. In future studies, we need to look for an exogenous event regarding analyst following that can resolve this problem efficiently.

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**Appendix A**

Table A1. Variable Definition.

| Variable Name | Calculation Explanation |
|---------------|-------------------------|
| **COE**       | Cost of equity. It is calculated according to the PEG model (1).        |
| **Analyst_follow** | Analyst following. The natural logarithm of forecast reports towards the target stock of the year plus one. |
| **EID**       | If the company annual report provides the monetary impact of environmental risk it will score 3; if the report provides specific information about environmental risk but does not provide monetary information it will score 2, if the disclosure is a generic statement of company environmental exposure it will score 1, and finally if the report contains no discussion on environmental disclosure it will score 0. This is done for all environmental disclosures and then aggregated to get an overall disclosure quantity score. |
| **Pollution** | A dummy variable that equals 1 if the corporation belongs to a heavy-pollution industry and 0 otherwise. |
| **SOE**       | A dummy variable that equals 1 if the ultimate controller is a state-owned firm and 0 otherwise. |
| **Herfi5**    | Sum of squares of the top five shareholders’ holding ratio. |
| **Market**    | The Market level score of the place where the sample is located based on the Chinese Marketization Report [32]. |
| **Size**      | The natural logarithm of the corporate asset. |
| **LEV**       | The leverage of the corporation. |
| **ROE**       | Rate of return on common stockholders’ equity. Net profit/Shareholder equity. |
| **FCF**       | Cash flow. Net Operating cash flow/Total assets. |
| **Growth**    | Increase in the rate of the main business’ revenue. (Current operating income—Previous period’s operating income)/Previous period’s operating income. |
| **Beta**      | Beta coefficient in the current year. |
| **Wage**      | 2SLS instrumental variable. Current per-capita wage of the place where the sample is located. |
| **Waste**     | 2SLS instrumental variable. Current total wastewater emissions of the place where the sample is located. |
| **Year**      | Dummy variable that equals 1 if it belongs to the current year and 0 otherwise. |
| **Industry**  | Dummy variable that equals 1 if it belongs to this industry and 0 otherwise. |
Table A2. Robust test of environmental information excessive disclosure effect.

| Dep:          | OLS    | First Stage | Second Stage |
|---------------|--------|-------------|--------------|
|               | COE\textsubscript{t} | NEID\textsubscript{t-1} | COE\textsubscript{t} |
| NEID\textsubscript{t-1} | $-0.004^{***}$ | $0.130^{**}$ | $-0.004$ |
|                | ($-6.71$) | (2.52)      | ($-9.05$)    |
| Pollution\textsubscript{t-1} | $-0.004$ | $0.183$     | $0.001$      |
|                | ($-0.77$) | (1.24)      | (0.11)       |
| SOE\textsubscript{t-1} | $0.021^{***}$ | $0.454^{***}$ | $0.040^{***}$ |
|                | ($4.34$) | (2.88)      | (3.68)       |
| Herfi5\textsubscript{t-1} | $0.125^{***}$ | $-3.908^{***}$ | $-0.151^{***}$ |
|                | (6.77) | ($-6.60$)   | ($-2.62$)    |
| Size\textsubscript{t-1} | $-0.010^{***}$ | $1.029^{***}$ | $0.059^{***}$ |
|                | ($-4.05$) | (12.88)     | (4.99)       |
| LEV\textsubscript{t-1} | $0.043^{***}$ | $0.816^{*}$ | $0.056^{*}$ |
|                | (3.18) | (1.84)      | (1.90)       |
| ROE\textsubscript{t-1} | $-0.022$ | $0.428$     | $0.013$      |
|                | ($-1.40$) | (0.83)      | (0.38)       |
| FCF\textsubscript{t-1} | $0.025$ | $0.718$     | $0.045$      |
|                | (1.44) | (1.31)      | (1.22)       |
| Growth\textsubscript{t-1} | $-0.002$ | $0.013$     | $0.000$      |
| ROE\textsubscript{t-1} | $-0.001$ | $0.983^{***}$ | $0.054^{**}$ |
|                | ($-0.07$) | (2.96)      | (2.28)       |
| Waste\textsubscript{t-1} | $0.303^{***}$ | $-24.430^{***}$ | $-1.207^{***}$ |
|                | (5.77) | ($-15.28$) | ($-4.73$)    |
| Constant      | $0.07$ | $0.15$      | $0.16$       |
| N             | 2383  | 2383        | 2383         |

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.

Table A3. Robust test of analyst following, excessive disclosure and cost of equity.

| Dep:          | OLS    | First Stage | Second Stage |
|---------------|--------|-------------|--------------|
|               | COE\textsubscript{t} | NEID\textsubscript{t-1} | COE\textsubscript{t} |
| Analyst\textsubscript{t-1} | $-0.004^{***}$ | $0.130^{**}$ | $-0.004$ |
|                | ($-5.82$) | (2.52)      | ($-9.05$)    |
| NEID\textsubscript{t-1} | $-0.017^{***}$ | $0.021$ | $-0.010$ |
|                | ($-10.62$) | (0.83)      | (0.38)       |
| Pollution\textsubscript{t-1} | $0.011^{**}$ | $0.598^{***}$ | $0.041^{***}$ |
|                | (2.31) | (3.87)      | (3.69)       |
| SOE\textsubscript{t-1} | $0.101^{***}$ | $-3.762^{***}$ | $-0.138^{**}$ |
|                | (5.53) | ($-6.35$)   | ($-2.50$)    |
| Herfi5\textsubscript{t-1} | $0.002$ | $1.005^{***}$ | $0.061^{***}$ |
|                | (0.83) | (11.80)     | (5.30)       |
| Size\textsubscript{t-1} | $0.010$ | $0.922^{**}$ | $0.041$      |
|                | (0.71) | (2.11)      | (1.45)       |
| LEV\textsubscript{t-1} | $0.017$ | $0.921^{*}$ | $0.061^{*}$ |
|                | (1.03) | (0.00)      | (0.35)       |
| ROE\textsubscript{t-1} | $0.030^{*}$ | $0.381$ | $0.010$ |
|                | (1.78) | (1.73)      | (1.77)       |
| Growth\textsubscript{t-1} | $-0.008$ | $0.041$ | $0.001$ |
|                | ($-1.03$) | (0.57)      | (0.23)       |
| Beta\textsubscript{t-1} | $-0.077$ | $1.19$ | $0.49$ |
|                | ($-0.77$) | (1.19)      | (0.49)       |
| Waste\textsubscript{t-1} | $0.460^{***}$ | $-23.641^{***}$ | $-1.202^{***}$ |
|                | (6.64) | ($-14.10$) | ($-4.81$)    |
| Constant      | $0.098^{*}$ | $-23.641^{***}$ | $-1.202^{***}$ |
|                | (1.79) | ($-14.10$) | ($-4.81$)    |
| Adj\_R\textsuperscript{2} | 0.11  | 0.17        | 0.52         |
| N             | 2383  | 2383        | 2383         |

Significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively.
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