

ESG Information Disclosure and Corporate Earnings Management——Research on the Moderating Effect Based on Media Attention

Pu Zhang^{1,*,#}, Juan Wei^{2,#}, Junhui Jiang^{3,#}

¹ School of Business, Zhengzhou University of Aeronautics, Zhengzhou, China, 450046

² School of Business and Tourism, Sichuan Agricultural University, Chengdu, China, 610000

³ School of Accountancy, Nanfang College of Sun Yat-Sen University, Guangzhou, China, 510970

* Corresponding Author Email: Zhangpu289@163.com

#These authors contributed equally

Abstract. ESG information disclosure includes environmental conservation, social responsibility and corporate governance. It concerns the sustainable development of the company. The internal relationship between ESG disclosure level and earnings management and its action mechanism is an urgent problem to be solved. This paper takes A-share listed companies in Shanghai and Shenzhen from 2009 to 2021 as the research object to empirically study the correlation between ESG disclosure and corporate performance management. While introducing media attention as a moderating variable, we will empirically study the moderating effect of media attention on the relationship between ESG disclosure and enterprise performance management. The empirical results show that: (1) there is a negative correlation between the level of ESG disclosure and earnings management, that is, the higher the level of ESG disclosure, the lower the level of earnings management; (2) Media attention makes up for the gap caused by the lack of ESG information disclosure. In companies with low media exposure, ESG disclosure has a more significant deterrent effect on corporate performance management. The research in this paper reveals the governance effect of ESG information disclosure on corporate earnings management, verifies that ESG information has the effect of transmitting higher quality earnings information, and provides a reference for the research on ESG information disclosure in China.

Keywords: Earnings Management, ESG Information Disclosure, Media Attention.

1. Introduction

With increasing industrialization, the environmental, climate and resource crisis is becoming more acute and many social problems are gradually being exposed. In order to improve the current situation, the 18th party congress included the construction of “ecological civilization” in the general plan of the five-in-one. Sustainable development has become a new trend in current economic development. The public’s attention to environmental protection and social responsibility has been unprecedentedly closed, and it has become a corporate consensus to assume social responsibility on a larger scale. In the current context of intense downward pressures on the economy to expand access to finance, reduce financing costs and reduce information asymmetries in the capital markets, more and more companies are beginning to give importance to coordinating their relations with investors. Under this premise, ESG information disclosure, as a disclosure method covering environmental protection (Environment), social responsibility (Social), and corporate governance (Governance), is in line with the concept of sustainable development and high-quality development of enterprises and has received widespread public attention.

Although China’s economy has developed rapidly in recent years, there are still many problems in the capital market, such as severe information opacity and weak investor protection. Earnings information distortion is one of the representative problems. It has become common for enterprises to use false financial information to defraud financial resources. Compared with financial fraud, earnings management has the characteristics of solid concealment and low cost, which makes it

widely appear in the capital market. With the rise of the concept of ESG, the disclosure of non-financial information such as ESG must be addressed in the potential governance of corporate earnings management [1]. With the development of the Internet, new media, as an external mechanism, has also played an influential supervisory role. Enterprises and the public transmit and exchange enterprise information through new media platforms, and the information transmitted by the media supplements the information that enterprises disclose. The public affects enterprises' business activities and thus affects enterprises' earnings management behaviour by identifying and evaluating enterprise information.

The marginal contribution of this article is as follows: Firstly, academics are currently focusing on the impact of ESG disclosure on corporate performance. At the same time, more research needs to be conducted on the relationship between ESG disclosure and results management. This paper further improves the research on the relationship between them. Secondly, the research on media attention mainly focuses on corporate social responsibility, and there needs to be more research on the regulatory role between ESG and corporate earnings management. Therefore, this paper takes media attention as a moderating variable to study its role in ESG information disclosure and corporate earnings management. This study will enrich the relevant literature in this field and provide practical significance for the behaviour of enterprises, media and stakeholders.

2. Research Hypothesis

2.1. ESG Information Disclosure and Earnings Management

More corporate ESG information disclosure means it is more active in fulfilling its environmental, social and corporate governance responsibilities. Enterprises that actively practice the ESG concept will pay more attention to and balance the demands of multiple stakeholders [2]. They will also consider their development's sustainability and long-term value realization. In order to maximize business value, companies well disclosed by ESG focus on reconciling their short-term and long-term interests. Their behaviour of damaging stakeholders' interests will be weakened. Based on the signal theory, enterprises' active implementation of ESG responsibilities can send positive signals to stakeholders, obtain financing convenience, reduce information asymmetry, improve performance, and reduce the motivation of management to manage earnings [3]. Increased ESG disclosure requirements have improved the transparency of surplus reporting. The better a company performs on ESG responsibility, the lower the level of accrual earnings management [4]. Studies such as Gao Yanyan et al. [5] have shown that ESG can discourage companies' real earnings management activities by reducing incentives for natural earnings management and increasing the effects of external attention. On this basis, the following assumptions are made:

Hypothesis 1: The level of ESG Information Disclosure negatively correlates with the degree of Earnings Management.

2.2. Media Attention and Earnings Management

According to the information asymmetry theory, in the various business activities of the enterprise, the degree of understanding of the relevant information of the enterprise by all kinds of personnel is different. In this case, moral hazard and adverse selection are easy to occur, brewing earnings management problems. Today, with the rapid development of information, the media can improve information circulation speed while safeguarding information quality and playing the efficiency of the "transmission of information". At the same time, it can guarantee a good information dissemination environment and play a "supervisory governance" role in the existing formal and informal systems [6]. The news media will verify and supervise the non-financial information disclosed by enterprises and reduce enterprises' management costs and inhibit their self-interested behaviour[7]. Based on the idea of sustainable development, ESG information disclosure will alleviate the financing constraints of enterprises. Positive media coverage will further enhance the corporate image and reputation, form a brand effect, and effectively improve the financing constraints

faced by enterprises [8]. Adverse media reports interact with positive, sustainable information disclosure, resulting in information noise, and investors' expectations will be reduced [9]. The interaction between media attention and ESG disclosure can mitigate information asymmetry and effectively restrict corporate surplus management behaviours, becoming a vital governance tool for social surveillance. The more the media gets the company's attention, the more likely management is to reduce its surplus management activities and keep them within reasonable limits. On this basis, the following assumptions are made:

Hypothesis 2: Media Attention moderates the negative impact of ESG Information Disclosure on Earnings Management.

3. Research design

3.1. Research Samples and data sources

In this paper, A-share listed companies in Shanghai and Shenzhen during 2009-2021 are selected as research samples, and Stata17 and Excle 2019 are used to process the data as follows: (1)Excluding the sample of companies in the financial industry; (2)Excluding *ST, ST, PT and samples of companies that were newly listed, delisted or suspended; (3)Excluding the company samples with missing relevant variables; (4)The continuous variables are winsorized on the level of 1% and 99% to eliminate the influence of extreme values, and finally the annual observations of 24,153 companies are obtained. The media attention data in this paper is derived from the China Research Data Service Platform (CNRDS) financial news database. The ESG information disclosure data is derived from the domestic rating agency Huazheng ESG rating. The remaining relevant data are derived from the CSMAR database.

3.2. Variable Definition and model setting

3.2.1 Explanatory variables: Enterprise earnings management level

About Lian Junxin [12] and others' understanding of earnings management, earnings management is defined as using accounting methods or actual transactions to change the company's book performance to mislead stakeholders in decision-making. Among them, the use of appropriate accounting methods to change the earnings distribution of enterprises in different periods and then change the book performance is called accrued earnings management; the means of changing the cash flow of enterprises by arranging actual trading activities is called natural earnings management. This paper chooses accrual earnings management (DA) and natural earnings management (REM) as the company's earnings management level proxy variables.

(1) Accrued earnings management

Drawing on the research of Chen Kejing [11] and Guo Lingxiu[13], in this paper, we use the modified Jones model regression residual $\varepsilon_{i,t}$ to measure discretionary accruals, and use its absolute value to represent the level of accrual earnings management (DA), as shown in Model (1):

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

Among them, $TA_{i,t}$ is the total accrued profit of the enterprise in year t ; $A_{i,t-1}$ is the total assets of the enterprise in the $t-1$ year of the enterprise, and $\Delta REV_{i,t}$ is the change of operating income in the t year of the enterprise; $\Delta REC_{i,t}$ is the difference between the change of accounts receivable in year t and the change of accounts receivable in year $t-1$; $PPE_{i,t}$ is the net fixed assets of the enterprise in the t year.

(2) Real Earnings Management

This paper draws on the research of Gao Yanyan et al. [5] and uses Roychowdhury [14] Model to quantify natural earnings management. Through the regression of model (2) to model (4), the residual $\varepsilon_{i,t}$ is obtained, and the abnormal operating cash flow ($ABCFO$), abnormal product cost ($ABPROD$)

and abnormal discretionary cost (*ABDISEXP*) are measured, respectively. The comprehensive index of natural earnings management is calculated by model (5), and its absolute value is taken to measure enterprises' natural earnings management (*REM*).

Sales manipulation forms negative abnormal operating cash flow (*ABCFO*). The estimated equation is as follows:

$$\frac{CFO_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{SALE_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{\Delta SALE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (2)$$

Among them, *CFO* is operating cash flow; *A* is total assets, *SALE* is sales revenue, and $\Delta SALE$ is the current sales revenue growth.

Product cost manipulation forms favourable abnormal product cost (*ABPROD*). The estimation equation is as follows:

$$\frac{PROD_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{SALE_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{\Delta SALE_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{\Delta SALE_{i,t-1}}{A_{i,t-1}} \quad (3)$$

Among them, *PROD* is the product cost, equal to the sum of product sales cost and inventory change.

The cost manipulation forms a negative abnormal discretionary expense (*ABDISEXP*). The estimation equation is as follows:

$$\frac{DISEXP_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{SALE_{i,t-1}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (4)$$

Among them, *DISEXP* represents discretionary costs, equal to the sum of sales costs and management costs.

The accurate earnings management level index equation is as follows:

$$REM_{i,t} = ABPROD_{i,t} - ABCFO_{i,t} - ABDISEXP_{i,t} \quad (5)$$

3.2.2 Explanatory variables: ESG information disclosure

With the rise of the sustainable concept and socially responsible investment, a lot of disclosure and rating standards have emerged in the ESG of enterprises. Several institutions have released ESG rating data of listed companies in China. Compared with other institutional data, the data released by Huazheng has the advantages of comprehensive coverage and an extended period. Therefore, this paper refers to the practice of Li Zhibin et al. [10] and selects the ESG rating data released by Huazheng. Huazheng's ESG rating is divided into nine grades from low to high: C-AAA. In order to facilitate empirical research, it is assigned 1-9, respectively. The higher the value of this variable, the more ESG information disclosure of listed companies.

3.2.3 Regulating variable: media attention

This paper draws on the research of Li Zhibin et al. [10] and uses the Janis-Fadner coefficient (*J-F*) to construct the media attention index, as shown in formula (6).

$$J - F = \begin{cases} \frac{e^2 - ec}{t^2} & \text{if } e > c \\ \frac{ec - e^2}{t^2} & \text{if } e < c \\ 0 & \text{if } e = c \end{cases} \quad (6)$$

Among them, *e* is the number of positive media reports, *c* is the number of adverse media reports, and *t* is the sum of positive and adverse reports. The value range of the *J-F* coefficient is [-1,1]. As the *J-F* coefficient gets closer to 1, enterprises' media attention pressure is more diminutive. The closer to -1, the greater the pressure of media attention enterprises face.

3.2.4 Control variables

This paper draws on the research of Xu Xiangbing et al.[4], and selects a series of variables that affect the company's earnings management level at the enterprise level as control variables, as follows:

company size (*SIZE*), asset-liability ratio (*LEV*), total asset net profit margin (*ROA*), total asset turnover ratio (*ATO*), cash flow ratio (*CASHFLOW*), accounts receivable ratio (*REC*), inventory ratio (*INV*), fixed assets ratio (*FIXED*), independent director ratio (*INDEP*), institutional investor shareholding ratio (*INST*). In addition, the article also controls the industry and time-fixed effects.

3.2.5 Model design

Firstly, to verify hypothesis 1: ESG information disclosure has a governance effect on corporate earnings management behaviour, model (7) is set; secondly, to verify Hypothesis 2: Media attention plays a regulatory role in the negative impact of ESG information disclosure on earnings management, the cross term of media attention and ESG information disclosure is added to the regression equation, and Model (8) is set as follows:

$$EM_{i,t} = \alpha_0 + \alpha_1 ESG_{i,t} + \sum Controls_{i,t} + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (7)$$

$$EM_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 ESG_{i,t} \cdot J - F_{i,t} + \beta_3 J - F_{i,t} + \sum Controls_{i,t} + \sum Industry + \sum Year + \varepsilon_{i,t} \quad (8)$$

Among them, *EM* represents the level of corporate earnings management, which is replaced by accrued earnings management (*DA*) and natural earnings management (*REM*). *ESG* is the information disclosure level of ESG, *J-F* is the media attention, *i* and *t* represent different enterprises and years, respectively, *Controls* are the control variable, and *Industry* and *Year* are the industry fixed effect and annual fixed effect. This paper adopts robust standard error.

4. Empirical research results and analysis

4.1. Descriptive statistical analysis

Table 1 shows the results of descriptive statistics of samples. Among them, the minimum value of the accrual earnings management level (*DA*) is 0.001, the maximum value is 0.380, and the standard deviation is 0.067; the minimum value of natural earnings management (*REM*) is 0.001, the maximum value is 0.284, and the standard deviation is 0.062, which means that there are differences in earnings management activities among different enterprises. The minimum value of the core explanatory variable ESG information disclosure (*ESG*) is 1, the maximum value is 8, and the standard deviation is 1.092, indicating that there are also significant differences in the implementation of ESG concepts among different enterprises. The average value of the moderating variable media attention (*J-F*) is 0.208, which shows that the media reports in the sample data are generally positive, consistent with the current positive media sentiment in China. The descriptive statistical results of the other indexes are basically consistent with the existing literatures.

Table.1. Descriptive statistics of main variables

Variable	N	Mean	SD	Min	Max
DA	24153	0.066	0.067	0.001	0.380
REM	24153	0.065	0.062	0.001	0.284
ESG	24153	4.168	1.092	1.000	8.000
J-F	24153	0.208	0.268	-0.454	0.960
SIZE	24153	22.294	1.288	20.072	26.337
LEV	24153	0.425	0.201	0.056	0.867
ROA	24153	0.044	0.059	-0.192	0.221
ATO	24153	0.656	0.445	0.087	2.659
CASHFLOW	24153	0.050	0.068	-0.143	0.246
REC	24153	0.120	0.102	0.000	0.457
INV	24004	0.147	0.134	0.000	0.704
FIXED	24153	0.213	0.161	0.002	0.698
INDEP	24152	0.376	0.054	0.333	0.571
INST	24153	0.399	0.236	0.001	0.885

4.2. Correlation test

Table 2 shows the results of the variable correlation test. As can be seen from the table, core explanatory variable ESG information disclosure (*ESG*) has a significant negative correlation with the explained variable enterprise earnings management level (*EM*), which can initially support Hypothesis 1. At the same time, absolute values of correlation coefficients among explanatory variables are all less than 0.6, meeting the critical value requirement of less than 0.8, indicating that there is no strong correlation between the variables; that is, no severe multicollinearity problem will occur. In addition, the results of the multicollinearity test show that the average value of VIF is 1.37, less than 10, which further shows no severe multicollinearity problem among the selected variables.

Table.2. Correlation test

	DA	REM	ESG	J-F	SIZE	LEV	ROA	ATO	CASHFLOW	REC	INV	FIXED	INDEP	INST
DA	1	1.000	-0.025	-0.046	-0.060	0.037	0.027	0.040	-0.140	0.010	0.106	-0.083	0.010	-0.032
REM	0.990	1	-0.025	-0.046	-0.061	0.037	0.027	0.040	-0.140	0.010	0.106	-0.083	0.010	-0.032
ESG	-0.047	-0.046	1	0.145	0.190	-0.020	0.202	0.034	0.080	-0.072	0.048	-0.053	0.083	0.104
J-F	-0.062	-0.060	0.150	1	0.120	-0.018	0.211	0.077	0.060	0.120	-0.019	-0.009	-0.004	0.047
SIZE	-0.062	-0.064	0.211	0.096	1	0.522	-0.074	0.020	0.061	-0.243	0.015	0.032	-0.012	0.426
LEV	0.065	0.064	-0.030	-0.025	0.521	1	-0.410	0.126	-0.156	-0.051	0.239	0.027	-0.012	0.205
ROA	-0.069	-0.071	0.208	0.175	-0.025	-0.365	1	0.245	0.422	0.013	-0.092	-0.073	-0.020	0.077
ATO	0.030	0.036	0.022	0.024	0.049	0.160	0.163	1	0.173	0.232	0.203	0.106	-0.030	0.078
CASHFLOW	-0.174	-0.173	0.075	0.046	0.057	-0.164	0.419	0.108	1	-0.198	-0.204	0.245	-0.027	0.135
REC	0.032	0.034	-0.070	0.090	-0.211	0.007	-0.037	0.155	-0.210	1	0.067	-0.212	0.021	-0.223
INV	0.146	0.146	0.069	-0.053	0.116	0.321	-0.080	0.040	-0.207	-0.101	1	-0.223	0.022	-0.019
FIXED	-0.102	-0.101	-0.043	-0.026	0.101	0.072	-0.075	0.001	0.227	-0.292	-0.318	1	-0.058	0.076
INDEP	0.015	0.015	0.079	-0.001	0.011	-0.008	-0.017	-0.024	-0.024	0.023	0.016	-0.055	1	-0.065
INST	-0.035	-0.034	0.109	0.033	0.442	0.206	0.108	0.101	0.132	-0.193	0.031	0.112	-0.060	1

Note: The upper triangle in the table is the Spearman correlation coefficient matrix, the lower triangle is the Pearson correlation coefficient matrix, and the bold font is significant at the 1 % level.

4.3. Benchmark regression results

According to Model (7), the article respectively corresponds to accrued earnings management (*DA*) and natural earnings management (*REM*) stepwise regression, and regression results are shown in Table 3. Among them, columns (1) and (2) are the estimation results of control variables at the uncontrolled enterprise level. Columns (3) and (4) show the regression results of control variables added at the enterprise level. The table shows that ESG information disclosure (*ESG*) and enterprise earnings management level (*EM*) is significantly negative at the 1% confidence level. After adding control variables, although the coefficients of core explanatory variables fluctuate after adding control variables, both earnings management levels are significantly harmful at the 1% confidence level. This indicates that the higher the ESG information disclosure is, the lower the earnings management level is. The results support hypothesis 1 proposed above ESG information disclosure has a governance effect on corporate earnings management behaviour.

Model (8) was regression, and the results were shown in columns (5) and (6) of Table 3. Among them, there is a significant negative correlation between media attention (*J-F*) and the two earnings management levels at the level of 1%, indicating that media attention can effectively constrain the earnings management behaviour of listed companies. For further study the typical impact of ESG information disclosure and media attention on corporate earnings management, the cross-term (*J-F*•*ESG*) variable of the two is introduced. The results show that the cross-term is significantly positively correlated with both earnings management. This shows that for companies lacking media attention, ESG information disclosure strongly constrains their earnings management behaviour. In companies with more media attention, this constraint is significantly weakened. That is, ESG information disclosure and media attention have a significant moderating effect on the governance of earnings management, and this moderating effect is a substitution effect. When the mandatory

correction mechanism at the data disclosure level cannot effectively restrain the earnings management of enterprises, the media attention as an alternative correction mechanism derived from the market can make up for the defects caused by the lack of ESG information disclosure, hypothesis 2 is verified.

Table.3. Benchmark regression results

VARIABLES	(1) DA	(2) REM	(3) DA	(4) REM	(5) DA	(6) REM
ESG	-0.0033***	-0.0029***	-0.0017***	-0.0015***	-0.0018***	-0.0016***
	(-6.7220)	(-6.4636)	(-3.4632)	(-3.2369)	(-4.0274)	(-3.9344)
J-F					-0.0071***	-0.0062***
					(-3.8890)	(-3.6943)
J-F•ESG					0.0026*	0.0024*
					(1.7449)	(1.7507)
SIZE			-0.0048***	-0.0045***	-0.0043***	-0.0040***
			(-8.0825)	(-8.1086)	(-9.1569)	(-9.1886)
LEV			0.0191***	0.0171***	0.0154***	0.0134***
			(4.4991)	(4.3897)	(4.3846)	(4.2024)
ROA			-0.0102	-0.0171	0.0090	0.0023
			(-0.5385)	(-1.0120)	(0.5330)	(0.1567)
ATO			0.0092***	0.0093***	0.0083***	0.0083***
			(6.0077)	(6.5771)	(6.5730)	(7.1523)
CASHFLOW			-0.1383***	-0.1244***	-0.1388***	-0.1251***
			(-10.0717)	(-10.3444)	(-10.4587)	(-10.7209)
REC			0.0007	0.0034	-0.0000	0.0019
			(0.0960)	(0.5233)	(-0.0065)	(0.3719)
INV			0.0301***	0.0283***	0.0302***	0.0285***
			(4.3717)	(4.6800)	(5.6110)	(5.9863)
FIXED			-0.0153***	-0.0140***	-0.0116***	-0.0104***
			(-3.6348)	(-3.6020)	(-3.2857)	(-3.1878)
INDEP			0.0202**	0.0181**	0.0193**	0.0178**
			(2.1853)	(2.1213)	(2.4057)	(2.4312)
INST			0.0001	0.0009	-0.0005	0.0001
			(0.0452)	(0.4448)	(-0.2403)	(0.0303)
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Observations	24,153	24,153	24,003	24,003	24,003	24,003
R-squared	0.0245	0.0243	0.0521	0.0520	0.0802	0.0796

Note: The values in parentheses are t values; *, **, and *** are significant at the 1%, 5%, and 10% levels, respectively.

5. Stability and endogenous test

5.1. Change the core explanatory variables

In order to verify the universality of the application of the model in this paper, the article selects ESG indicators that are different from the core explanatory variable Huazheng ESG rating measurement method to replace. Considering the data's availability, period and reliability, this paper uses the Bloomberg ESG index (*ESG-I*) to replace the core explanatory variables for further verification. Compared with Huazheng ESG, in addition to reporting ESG scores, it includes environmental, social, and governance scores. The regression results are shown in columns (1) and (2) of Table 4. Both industries fixed effects and annual fixed effects are controlled in this table. It can be seen from the table that the regression coefficients of ESG information disclosure (*ESG-I*) and the two earnings management levels of enterprises are still significantly negative, which is consistent with the main conclusions above, indicating that the findings of this paper have good robustness.

5.2. Change the sample year

Since the *Environmental Protection Law* was formally implemented in 2015, new regulations and requirements have been made for enterprises to strengthen environmental governance, assume responsibility for pollution prevention and control, and raise public and investor awareness of environmental protection and pollution prevention and control^[10]. It may impact the relationship between ESG information disclosure and corporate earnings management. Before implementing the *Environmental Protection Law*, ESG information disclosure received little attention from investors. After its implementation, corporate information disclosure will become more transparent, exposing companies to other problems and attracting the attention of external supervisors such as governments, analysts, and auditors. Managers may adopt earnings management behaviour to ease this market pressure. Therefore, this paper adjusts the sample year from 2009 – 2021 to 2015 – 2021 and regresses again. The regression results are shown in columns (3) and (4) of Table 4, and the research results remain robust.

5.3. Introducing provincial fixed effects

We consider the possible regional preference for the ESG rating. Therefore, this paper further controls the provincial fixed effect, and the regression results are shown in columns (5) and (6) of Table 4. It can be seen from the table that the estimated coefficients of the core explanatory variables and the explained variables are still significantly negative, and the research results are still robust.

Table.4. The results of Robustness test

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	DA	REM	DA	REM	DA	REM
ESG-1	-0.0002*	-0.0002*				
	(-1.8262)	(-1.8992)				
ESG			0.0019***	0.0017***	-0.0021***	-0.0019***
			(0.0005)	(0.0005)	(0.0004)	(0.0004)
CONTROL	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES
Province FE	NO	NO	NO	NO	YES	YES
Observations	7,643	7,643	16,941	16,941	24,003	24,003
R-squared	0.0895	0.0927	0.0713	0.0716	0.0813	0.0808

5.4. Treatment of endogenous problems

In order to overcome the endogenous problem caused by sample selection bias, this paper uses the propensity score matching method (PSM) to re-estimate the sample by referring to the practice of Yin Xiyang et al.[15].The specific approach is to first group according to the median of ESG information disclosure (*ESG*) in the sample, and if the *ESG* is greater than the median as the experimental group. Subsequently, the remaining samples were matched with the companies in the experimental group in a 1:1 ratio. The covariates were company size, asset-liability ratio, total asset net profit margin, cash flow ratio, receivable ratio, inventory ratio, and fixed asset ratio, then establish a control group. The regression results are shown in columns (1) and (2) of Table 5, and the coefficients are still significantly negative.

In addition, the problem studied in this paper is whether ESG information disclosure will inhibit corporate earnings management activities. However, at the same time, corporate earnings management may also reversely reduce ESG information disclosure. Considering that the reverse causality problem may impact the estimation results of this paper, this paper uses the instrumental variable method and performs two-stage least squares estimation. This paper selects the mean value of ESG information disclosure of the same industry, excluding the company as the instrumental variable, and columns (3)-(5) of Table 5 are the corresponding regression results. The estimated coefficients of instrumental variables are highly significant, indicating that they correlate highly with

ESG information disclosure. The KP-rk LM statistic is greater than the critical value, rejecting the null hypothesis that the instrumental variable is unrecognized. The value of the Cragg-Donald F statistic is greater than the critical value at the 10% quantile level, indicating no problem with weak instrumental variables. The results of the above statistics show the rationality of this paper's selection of instrumental variables. The coefficient of ESG information disclosure shows that after controlling for endogenous problems, the conclusion of benchmark regression is still valid; that is, ESG information disclosure has a governance effect on corporate earnings management behaviour.

Table.5. Consider endogenous problems

	(1)	(2)	(3)	(4)	(5)
VARIABLES	DA	REM	ESG	DA	REM
IV			0.8068***		
			(140.0229)		
ESG	-0.0018***	-0.0015**		-0.0032***	-0.0029***
	(-2.6631)	(-2.4290)		(-4.4658)	(-4.4391)
CONTROL	YSE	YES	YES	YES	YES
Year FE	YSE	YES	YES	YES	YES
Industry FE	YSE	YES	YES	YES	YES
Observations	11,650	11,650	23,574	23,574	23,574
R-squared	0.0664	0.0655	0.1821	0.0786	0.0792

6. Further analysis

There are differences in the size of listed companies in China. In this paper, the median size of listed companies is divided into a large-scale group and a small-scale group to explore whether significant differences exist in the relationship between ESG information disclosure and earnings management among listed companies of different sizes. Table 6 (1) and (3) are listed as large-scale group regression results, and (2) and (4) are listed as small-scale group regression results. Among them, ESG information disclosure in both large-scale and small-scale groups has a significant inhibitory effect on earnings management. However, ESG information disclosure in the large-scale group has a more substantial inhibitory effect on earnings management, and the coefficient difference between groups is significant. The possible reason is that the larger the company, its internal governance mechanisms and internal control system is more perfect and practical, will also receive more attention and supervision from analysts and regulators so that ESG information disclosure is more transparent, stakeholders can obtain ESG information disclosed by enterprises more quickly and accurately, to restrain the earnings management activities of management effectively.

Table.6. Company size heterogeneity analysis.

	(1)	(2)	(3)	(4)
	large-scale	small-scale	large-scale	small-scale
VARIABLES	DA	DA	REM	REM
ESG	-0.0033***	-0.0014**	-0.0030***	-0.0013**
	(0.0005)	(0.0006)	(0.0005)	(0.0006)
CONTROL	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Observations	12,010	12,010	11,993	11,993
R-squared	0.1017	0.0758	0.0991	0.0753
P-value	0.0314		0.0297	

7. Conclusions and recommendations

This paper innovatively introduces media attention to the research framework of the relationship between enterprise ESG information disclosure and earnings management. With the help of the rating

results issued by the third-party ESG evaluation agency, the data of China's A-share listed companies from 2009 to 2021 are used as samples to test the impact of enterprise ESG performance on enterprise earnings management, and the following conclusions are drawn: enterprise ESG information disclosure has a significant inhibitory effect on enterprise earnings management. Secondly, media attention plays a negative adjustment effect between ESG and earnings management, suggesting that too much media attention will lead to "substitution" of ESG. This weakens the impact of ESG performance on earnings management.

Therefore, this paper puts forward the following policy recommendations:

First and foremost, the government should improve relevant enterprises' ESG information disclosure requirements and formulate corresponding reward and punishment systems. This paper reveals that ESG has the effect of transmitting corporate earnings information. Therefore, it is very necessary to build and improve the ESG information disclosure system, integrate the ESG information disclosure system into the relevant laws, and effectively control the enterprises. At the same time, make full use of the market mechanism, formulate related incentive policies, encourage enterprises to actively and voluntarily disclose ESG-related information, and increase penalties for false ESG information disclosure.

In addition, the government should encourage enterprises to consider their ESG rating performance. The conclusions of this paper reveal the governance effect of ESG on earnings management. Therefore, enterprises should be encouraged to re-evaluate their ESG rating performance and strengthen the governance of earnings management behaviour. At the same time, the enterprise should also integrate the ESG problem into the company's development strategy, abandon the prejudice that ESG behavior will occupy the company's resources and consume a lot of cost, devote itself to improving the company's ESG performance, increase capital investment, and constantly improve the company's environmental protection technology in the process of actively implementing the concept of ESG, so as to achieve "shared value".

Third, companies should pay attention to the role of the media in reducing information asymmetry and give better play to the external regulatory function of the media. Through the media publicity reduces the asymmetry between the company and the outside world, enhancing the company's understanding of the company, so as to establish the credibility and image of the company.

This paper only takes China's Shanghai and Shenzhen A-share listed companies as samples and does not consider whether the conclusion is applicable to listed companies such as U.S. shares and Hong Kong shares. The applicability of the conclusion can be further verified by taking listed companies such as U.S. shares and Hong Kong shares as samples.

References

- [1] Tan Yafei & Zhu Zhaohui. (2022). The effect of ESG rating events on corporate green innovation in China: The mediating role of financial constraints and managers' environmental awareness. *Technology in Society*.
- [2] Xie Hongjun & Lv Xue. (2022). Responsible International Investment: ESG and Chinese OFDI. *Economic Research* (03), 83-99.
- [3] Luo Jinhui & Wu Yilong. (2021). Level of Digital Operation and Real Earnings Management. *Journal of Management Science* (04), 3-18.
- [4] Xu Xiangbing, Qiao Pengcheng & Huang Qin. (2023). Does ESG Accountability Convey More Transparency? . *Review of Industrial Economics*.
- [5] Gao Yanyan & Huang Jianbo. (2023). ESG Rating Performance and Corporate True Surplus Management—Evidence from Chinese A-Share Listed Companies. *Journal of Financial Development Research* (01), 3-12.
- [6] Cheng Bo, Xu Yupeng & Lin Minhua. (2021). The Corporate Governance Effect of Media Supervision: Based on the Perspective of Corporate Tax Avoidance Behavior. *Journal of Audit & Economics* (02), 105-115.

- [7] Kuang Xiong, Chen Xia & Wang Qian. (2019). The impact of different media supervision channels on corporate governance agency costs. *Review of Investment Studies* (10),16-27.
- [8] Gunther Capelle-Blancard & Aurélien Petit. (2019). Every Little Helps? ESG News and Stock Market Reaction. *Journal of Business Ethics* (2).
- [9] Yu Guo & Li Weijian. (2020). Media attention, information disclosure and two types of earnings management behavior choice. *Journal of Zhengzhou University of Aeronautics* (06),32-45.
- [10] Li Zhibin, Shao Yumeng, Li Zongze, Li Minshi. ESG information disclosure, media supervision and corporate financing constraints [J]. *Scientific decision-making*, 2022, No.300 (07): 1-26.
- [11] Chen Kejing & Li Yanxi. (2016). A Study on the Substitution Effect of Media Monitoring and Legal Environment in Restraining Earnings Management. *Journal of Management Science* (04),17-28.
- [12] Lian Junxia. (2021). Research on earnings management of listed companies. *China storage & transport magazine* (05),115-116.
- [13] Guo Lingxiu & Lv Xi. (2023). ESG Performance and Financial Restatement. *Monthly Journal of Finance and Accounting* (08), 77-84.
- [14] Sugata Roychowdhury. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics* (3).
- [15] Yin Xiyang, Yu Xi, Su Qin & Li Dangme. (2023). The impact of internet embedding on farmers' use of chemical pesticides—mateloligical analysis based on PSM model. *Chinese Journal of Agricultural Resources and Regional Planning* (02),68-76.