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# Strategic tone management in ESG reports and ESG risk

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## **Abstract:**

In this study, we investigate whether strategic tone management in environmental, social, and governance (ESG) reports can serve as an indicator of future ESG risk. Our baseline results reveal a positive association between abnormal positive tone in ESG reports and future ESG risk. The findings suggest that firms employ impression management strategy in their ESG reports to provide misleading information. Analyst coverage and media attention can mitigate this positive association. Heterogeneity analysis reveals that the positive correlation is stronger for firms mandated to disclose ESG reports and those adhering to the Global Reporting Initiative guidelines. Additional tests indicate that abnormal positive tone is positively associated only with future environmental risk, not with future social and governance risk. We observe this positive association exclusively in government-reported ESG risk, not in media-reported ESG risk. Our results offer valuable implications for mitigating the adverse impact of strategic tone management on corporate sustainability practices.

**Keywords:** abnormal positive tone; environmental, social, and governance risk; impression management theory

28 **1. Introduction**

29 The burgeoning interest in sustainable investments has led to a significant surge in the demand  
30 for nonfinancial information regarding corporate social responsibility (CSR) and/or  
31 environmental, social, and governance (ESG) practices (Asante-Appiah & Lambert, 2022;  
32 Gillan, Koch, & Starks, 2021; Tsang, Frost, & Cao, 2023; Wan, Yin, & Wu, 2024). Hence, an  
33 increasing number of firms are opting to disclose such information in their ESG reports.<sup>1</sup>  
34 According to the data collected from the China Stock Market and Accounting Research  
35 (CSMAR) database, the number of ESG reports disclosed by Chinese listed firms has steadily  
36 risen (see Figure 1). By 2021, a total of 1,471 ESG reports were disclosed, accounting for 30.81%  
37 of all listed firms in mainland China.

38 **\*\* Figure 1 \*\***

39 ESG reports contain in-depth and comprehensive information about firms' environmental,  
40 social, and governance issues (Chen, Hung, & Wang, 2018; Du & Yu, 2020; Hamza, Mezgani,  
41 & Jarboui, 2023). Hence, they can also serve as a crucial tool for firms to communicate with  
42 their stakeholders and an essential channel for investors to understand firms' ESG performance  
43 (Li, Yan, Li, & Yan, 2023). However, in China, the absence of mandatory disclosure  
44 requirements for all listed firms and the lack of uniform regulations concerning the contents  
45 and reporting formats provide listed firms with considerable discretion in determining the  
46 language style and format of their ESG reports (Li et al., 2023; Noronha, Tou, Cynthia, & Guan,  
47 2012; Wang, Ma, Dong, & Zhang, 2023). Consequently, there is substantial variation in the  
48 content, format, and linguistic tone of ESG reports.

49 Due to uncertainties and opportunities in the external environment, managers have strong  
50 incentives to communicate private information to investors, distinguishing themselves from  
51 their peers and signaling their future performance through tone management (Li, Wu, Xiao, &  
52 You, 2019). Hence, overwhelming optimistic tone has been widely observed in ESG reports.  
53 The positive tone comprises normal and abnormal positive tone. Normal positive tone reflects  
54 firms' fundamental attributes, while abnormal positive tone arguably captures strategic  
55 distortion by managers (Huang, Teoh, & Zhang, 2014; Rahman, 2023). The strategic use of  
56 tone management in ESG reports can help managers achieve various purposes grounded on  
57 different theories. Grounded on incremental information theory, as an important supplement to  
58 financial and quantitative information, tone management may provide complementary  
59 information and thus reduce information asymmetry. Based on impression management theory,  
60 tone management may function as an impression management technique that deployed by

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<sup>1</sup> In this study, following prior research, we use "ESG reports" to broadly represent sustainability reports, CSR reports, or ESG reports themselves. For conciseness, we interchangeably used the terms "ESG reports" and those for other sustainability reports.

61 managers to mislead stakeholders (Davis, Ge, Matsumoto, & Zhang, 2015; Hamza et al., 2023;  
62 Huang et al., 2014; Merkl-Davies & Brennan, 2007; Xu & Qi, 2022).

63 Existing studies predominantly focus on the financial implications of tone management,  
64 such as its effect on financial performance and financial report quality (Bassyouny, Abdelfattah,  
65 & Tao, 2022; Huang et al., 2014; Rahman, 2023). However, exploration of non-financial  
66 consequences related to tone management in ESG reports has been relatively limited. Hence,  
67 this paper advances the literature by investigating the non-financial impact of tone management,  
68 with a specific focus on the perspective of ESG risk.

69 ESG risk stems from the exposure of firms' misdeeds on environmental, social, and  
70 governance issues (Asante-Appiah & Lambert, 2022), which can adversely affect firms by  
71 influencing stakeholders' perceptions. Consequences of such effects include fines, litigation,  
72 altering customer loyalty, capital cost, and firm value (Champagne, Coggins, & Sodjahn,  
73 2022; Chasiotis, Gounopoulos, Konstantios, & Patsika, 2023; Gallucci, Santulli, & Lagasio,  
74 2022; La Rosa & Bernini, 2022; Zhang & Wong, 2022). Hence, identifying the determinants of ESG risk  
75 and seeking ways to mitigate it are of great importance (Zhang, 2023). However, existing  
76 studies have mainly explored the economic consequences that ESG risk triggers, such as its  
77 effect on firm value and auditor response (Asante-Appiah, 2020; Burke, Hoitash, & Hoitash,  
78 2019; Chasiotis et al., 2023). Limited attention has been paid to the determinants of ESG risk  
79 (Asante-Appiah & Lambert, 2022). Despite the existence of two competing theories on the role  
80 of tone management in ESG reports (Huang et al., 2014; Merkl-Davies & Brennan, 2007), in  
81 this study, we grounded our research on impression management theory and explored the link  
82 between abnormal positive tone in ESG reports and firms' future ESG risk. In this regard, this  
83 paper provides new evidence concerning the determinants of ESG risk.

84 Furthermore, given the limited research on the link between abnormal positive tone and  
85 future ESG risk, whether external governance can moderate this specific connection remains  
86 unclear. When firms engage in impression management, it is possible that the efficacy of  
87 internal governance may be compromised (Al-Sayani & Al-Matari, 2023; Albitar, Abdoush, &  
88 Hussainey, 2022; Pernelet & Brennan, 2023; Treepongkaruna, Kyaw, & Jiraporn, 2022).  
89 Eugster, Kowalewski, and Śpiewanowski (2024) showed that not all internal governance  
90 mechanisms could effectively reduce corporate risk. In instances where internal governance  
91 fails, external governance assumes a crucial and efficacious role (Champagne et al., 2022; Chen  
92 et al., 2018). As essential components of external governance, analyst coverage and media  
93 attention play a disciplinary role in guiding firms' sustainability behavior (An, Chen, Naiker,  
94 & Wang, 2020; Muslu, Mutlu, Radhakrishnan, & Tsang, 2017). To bridge this gap in the  
95 literature, we delved into the governance role that they played in shaping this focal link. Hence,

96 our study also extends current research by considering how external governance acts as a  
97 boundary condition in this relationship.

98 In sum, this study mainly investigates the association between abnormal positive tone in  
99 ESG reports and future ESG risk, and what roles external governance, including analyst  
100 coverage and media attention, can play in this relationship. We utilized A-share listed firms that  
101 published ESG reports in the Chinese stock exchange markets from 2012 to 2020. Our results  
102 show that there is a positive association between abnormal positive tone in ESG reports and  
103 future ESG risk, in line with the prediction of impression management theory. Moreover, both  
104 analyst coverage and media attention can mitigate this positive association, confirming the  
105 moderating role of external governance. Furthermore, the positive correlation is stronger for  
106 firms mandated to disclose ESG reports and those adhering to the Global Reporting Initiative  
107 (GRI) guidelines. Additional tests show that abnormal positive tone is positively associated  
108 only with future environmental risk, not with future social and governance risk. This positive  
109 association is observed exclusively in government-reported ESG risk, not in media-reported  
110 ESG risk.

111 The primary motivations underlying the choice of the Chinese context were twofold. First,  
112 China's lack of a mandatory disclosure framework for ESG reports and the underdevelopment  
113 of legal system and enforcement provide significant leeway for managers to strategically  
114 manage the tone (Allen, Qian, & Qian, 2005). This provides a unique research setting for  
115 investigating the implications of tone management. Second, China confronts substantial ESG  
116 risk arising from environmental, social, and governance challenges (Lian, Ye, Zhang, & Zhang,  
117 2023; Wu, Lin, Chen, Luo, & Xu, 2023), making it imperative to address ESG risk within this  
118 context. Moreover, analyzing the link between tone management in ESG reports and future  
119 ESG risk, within the context of the most widely spoken language in the world, allows us to  
120 provide valuable insights into ESG risk and how to mitigate it (Bian et al., 2021).

121 By addressing these research questions, this study contributes incrementally to existing  
122 literature in several ways. First, Morales-Raya, Martín-Tapia, and Ortiz-de-Mandojana (2018)  
123 contended that the utilization of impression management theory within the realm of  
124 environmental concerns had been relatively restricted. Our study enriches the understanding of  
125 impression management theory by broadening its scope to encompass sustainability issues.  
126 Second, prior studies have primarily explored the impact of tone management in various  
127 corporate narrative disclosures on financial performance and financial report quality  
128 (Bassyouny et al., 2022; Rahman, 2023). This study extends this stream of literature by  
129 examining the non-financial effect of tone management, diverging from the predominantly  
130 financial focus of most previous research. Third, while a limited number of existing studies

131 have delved into the determinants of environmental misconduct, such as founder CEOs'  
132 abilities (Abebe & Acharya, 2022), accounting comparability (Chircop, Tarsalewska, &  
133 Trzeciakiewicz, 2023), and environmental tax reform (Jin, Wang, Cheng, & Zeng, 2024),  
134 investigating the determinants of broader risk in the form of ESG risk has received little  
135 attention. To address this gap, we explored the determinants of ESG risk from a new perspective,  
136 namely, tone management in ESG reports. Finally, the identification of the novel link between  
137 abnormal positive tone in ESG reports and ESG risk further contributes to the literature by  
138 considering how external governance can reshape this link. This also offers deeper insights into  
139 the nature of the focal link.

140

## 141 **2. Literature review and hypothesis development**

### 142 **2.1 The consequences of tone management**

143 As an essential textual attribute of corporate narrative disclosures, researchers have widely  
144 explored the tone or sentiment expressed in corporate disclosures (Loughran & McDonald,  
145 2011; Rahman, 2023). The current literature includes scholars' examinations of tone across  
146 various dimensions of corporate communication, encompassing the analysis of tone within  
147 complete annual reports (Rahman, 2023; Zhang, Ping, & Yang, 2022), specific sections such  
148 as management discussion and analysis (MD&A) (D'Augusta & DeAngelis, 2020; Li et al.,  
149 2019; Liu, 2023; Wang, Wu, & Yan, 2021), earnings conference calls (Davis et al., 2015; Price,  
150 Doran, Peterson, & Bliss, 2012), earnings press releases (Abou-El-Sood & El-Sayed, 2022;  
151 Huang et al., 2014), CSR reports (Albitar et al., 2022; Hamza et al., 2023; Li et al., 2023; Liang  
152 & Wu, 2022; Muslu et al., 2017), and other periodic disclosures, such as interim management  
153 statements (Rahman, 2023), risk management disclosures (Tan & Yeo, 2023), management  
154 reports (Malaquias & Júnior, 2021), and audit committee disclosures (Al-Shaer & Zaman,  
155 2021).

156 Most existing studies focus on the financial consequences of tone management but reach  
157 no consistent conclusions (Bassyouny et al., 2022). Several studies showed that narrative  
158 disclosure tone could provide incremental information and acted as a predictor of firms'  
159 financial performance. For example, Price et al. (2012) documented the predictive power of the  
160 tone in earnings conference calls, in relation to abnormal returns and trading volume. Bian et  
161 al. (2021) revealed that tone in online roadshows was positively associated with first-day returns  
162 and post-IPO operating performance. Xu and Qi (2022) found that abnormal tone in a  
163 management earnings forecast could facilitate insider trading. Similarly, scholars have  
164 suggested positive relationships between tone in MD&A (Li et al., 2019), forward-looking  
165 statements (Li, 2010; Schleicher & Walker, 2010), and earnings press releases (Davis, Piger, &

166 Sedor, 2012) and future earnings. However, this positive linkage was contingent on moderators,  
167 such as firms' prospects, readability of accounting information, and corporate governance  
168 characteristics (Li et al., 2019; Tan, Ying Wang, & Zhou, 2014). In addition, narratives with a  
169 positive tone might have led to short-term stock return gains but adversely affected future  
170 performance (Huang et al., 2014; Liu, 2023).

171 Conversely, other studies revealed that managers strategically distorted the narrative tone  
172 to mislead investors as evident by a negative or insignificant association between tone and  
173 financial performance. Huang et al. (2014) showed that abnormal positive tone in earnings press  
174 releases could predict negative future earnings and cash flows. Caserio, Panaro, and Trucco  
175 (2019) documented the insignificance of the link between MD&A tone and financial  
176 performance in financial firms at high risk for bankruptcy. Malaquias and Júnior (2021)  
177 similarly concluded that a positive tone in management reports did not necessarily reduce stock  
178 return volatility in the following year.

179 Apart from financial performance, a positive tone in narrative disclosures contributes to  
180 enhanced financial reporting quality. Al-Shaer and Zaman (2021) demonstrated that the tone in  
181 audit committee disclosures could reduce earnings management. Similarly, Rahman (2023)  
182 concluded that annual-report tone positively correlated with earnings persistence. Moreover,  
183 positive tone influences firm financial decisions. Chang, Tan, Zhang, and Yuan (2023) showed  
184 that MD&A tone among peer firms could stimulate firm investment. Wang et al. (2021)  
185 documented more positive MD&A tone promoting dynamic adjustments in capital structure.  
186 From the standpoint of other stakeholders, Li et al. (2019) showed MD&A tone assisting  
187 analysts in refining forecast revisions and institutional investors in enhancing their shareholding.  
188 Druz, Petzev, Wagner, and Zeckhauser (2020) showed that as an indicator of future earnings,  
189 conference-call tone prompted analysts to revise their estimates.

190 We find that existing studies often fail to strictly distinguish normal positive tone from  
191 abnormal positive tone in firms' narrative disclosures. Given that normal positive tone and  
192 abnormal positive tone differ significantly, our specific focus is on abnormal positive tone. In  
193 addition, a comprehensive review of the literature shows the scarcity of research into the non-  
194 financial consequences of the tone of disclosure narratives. Hence, this study aims to advance  
195 current research by investigating the non-financial effect of abnormal positive tone in ESG  
196 reports, with a specific focus on the perspective of ESG risk.

## 197 **2.2 The link between abnormal positive tone in ESG reports and ESG risk**

198 From a theoretical perspective, there are two competing theories regarding the role that tone  
199 management plays. Grounded on incremental information theory, managers may use tone  
200 management as a valuable supplement to quantitative information, revealing unique insights to

201 capital markets that are not easily expressed quantitatively (Du & Yu, 2020; Lu, Cahan, & Ma,  
202 2019). Conversely, based on impression management theory, managers may exaggerate a  
203 firm's ESG performance with an overoptimistic tone to cater to stakeholders and potentially  
204 mislead investors (Albitar et al., 2022; Hamza et al., 2023).

205 As essential carriers of non-financial information, ESG reports offer textual and non-  
206 quantitative insights into a firm's performance in environmental, societal, and governance areas  
207 (Dhaliwal, Li, Tsang, & Yang, 2011; El Ghouli, Guedhami, Kwok, & Mishra, 2011). The users  
208 of ESG information are diverse, encompassing various stakeholders. Through the disclosure of  
209 comprehensive and rich ESG information, firms can not only effectively communicate with  
210 stakeholders about their performance but also derive several benefits, including reducing capital  
211 cost (Dhaliwal et al., 2011), lowering analyst forecast errors (Dhaliwal, Radhakrishnan, Tsang,  
212 & Yang, 2012; Muslu et al., 2017), and enhancing firm stock price and market value (Wang,  
213 Dou, & Jia, 2016). However, due to the multidimensional nature of ESG itself, relying solely  
214 on non-financial and textual information may diminish the effectiveness of conveying ESG  
215 information (Hamza & Jarboui, 2021; Li et al., 2023). Therefore, managers may use abnormal  
216 positive tone in their reports to convey hard-to-quantify information and compensate for the  
217 lack of quantifiable information (Du & Yu, 2020). Several previous studies have shown that  
218 abnormal positive tone could provide incremental information and play an informative role in  
219 predicting future performance in various research contexts (Davis et al., 2012; Du & Yu, 2020;  
220 Li et al., 2019; Price et al., 2012; Xu & Qi, 2022). Similarly, Lu et al. (2019) documented the  
221 positive association between CSR performance and the tone in earnings announcements.

222 However, firms are also likely to adopt impression management through tone management  
223 in their ESG reports, especially in the Chinese context. On one hand, due to the lack of a  
224 mandatory disclosure framework for ESG reports in China, no unified regulation has stipulated  
225 how to disclose ESG information (Noronha et al., 2012; Ren, Huang, Liu, & Yan, 2023). Firms  
226 have substantial discretion over the sentiment and reporting formats for those disclosures. As a  
227 result, firms are likely to manage the tone in their ESG reports for strategic purposes (Hamza  
228 & Jarboui, 2021; Li et al., 2023). On the other hand, a relatively small number of firms has  
229 chosen to assure their ESG reports (García - Sánchez, Hussain, Aibar - Guzmán, & Aibar -  
230 Guzmán, 2021). Even though some firms have subjected their ESG reports to audit, auditors  
231 often focus less on the rhetorical devices and tone of the report's textual information (Hamza  
232 & Jarboui, 2021; Li, Zhang, & Ding, 2023). Relatively costless to manipulate but difficult to  
233 verify, this has further encouraged firms to adopt impression management strategy via tone  
234 management in their ESG reports (Liu, 2023; Xu & Qi, 2022).

235 Impression management has traditionally been used at the individual level. Goffman (1959)  
236 argued that individuals could influence the perceptions of others by regulating and controlling  
237 social interaction. However, impression management can also occur at the firm level (Morales-  
238 Raya et al., 2018). Organizational impression management is defined as any deliberate actions  
239 aimed at shaping and manipulating the perceptions of an audience regarding the organization  
240 (Bolino, Kacmar, Turnley, & Gilstrap, 2008; García-Sánchez, Suárez-Fernández, & Martínez-  
241 Ferrero, 2019; Morales-Raya et al., 2018). According to impression management theory,  
242 managers have various communication tactics at their disposal, including reporting bias, self-  
243 serving bias, symbolic management, cheap talk, and accounting rhetoric (Merkl-Davies &  
244 Brennan, 2011). Accordingly, employing the strategy of impression management enables  
245 managers to strategically incorporate abnormal positive tone into their ESG reports, instead of  
246 taking some substantive actions to address negative ESG issues. This strategy aims to legitimize  
247 firms' behavior, enhance their positive image and reputation by concealing negative ESG  
248 information (Li et al., 2023; Zhang, Liang, Feng, Yuan, & Jiang, 2019). While this may obscure  
249 potential ESG risk and influence stakeholders' decisions, opinions, and short-term perceptions,  
250 it can exacerbate ESG risk in the long term. Thus, based on impression management theory,  
251 abnormal positive tone in ESG reports can serve as an indicator of future ESG risk (Hamza &  
252 Jarboui, 2021; Li et al., 2023).

253 Despite few studies directly investigating the non-financial effects of tone management in  
254 ESG reports, several studies have proved that upward tone management in firms' other narrative  
255 disclosures could misinform investors. Hence, tone management in ESG reports is a strategy  
256 for impression management. Hamza and Jarboui (2021) and Hamza et al. (2023) found that  
257 abnormal positive tone in CSR reports negatively affected CSR performance. Liang and Wu  
258 (2022) showed a significantly positive link between an abnormal positive tone in CSR reports  
259 and analysts' earnings forecast bias. Accordingly, we propose the first hypothesis.

260 H1: Abnormal positive tone in ESG reports is positively associated with future ESG risk.

### 261 **2.3 The moderating effect of analyst coverage**

262 Analysts play a significant role as information intermediaries in the capital market (Healy &  
263 Palepu, 2001). They provide investors with valuable information about the market, industry,  
264 and firms, reducing the degree of information asymmetry and shaping investors' expectations  
265 regarding a firm's future performance (Martens & Sextroh, 2021).

266 Analysts are increasingly focusing on firms' ESG practices as ESG information can impact  
267 firms' financial performance (Li et al., 2023; Muslu et al., 2017). Leveraging their professional  
268 expertise and information advantages, analysts can evaluate the disclosure quality of narratives  
269 in ESG reports, unveil the actual ESG performance of a firm, and discern the true motivations

270 behind managers' manipulation of abnormal positive tone (Adhikari, 2016). When analysts  
271 identify managers manipulating their tone in ESG reports as impression management strategy  
272 to mislead investors, they may reduce their valuation of these firms, thereby exerting pressure  
273 on firms' behavior (Huang, Li, & Liao, 2021; Martens & Sextroh, 2021). In response, firms  
274 may proactively engage in substantive ESG activities and enhance their ESG performance to  
275 reduce potential ESG risk. Therefore, increased analyst coverage can mitigate the implications  
276 of tone management for future ESG risk. Studies have also demonstrated the positive role of  
277 analyst coverage (Aouadi & Marsat, 2016; Li et al., 2023; Wu, Xiong, Gao, & Zhang, 2022).  
278 Accordingly, we propose the second hypothesis.

279 H2: Analyst coverage can weaken the positive link between abnormal positive tone in ESG  
280 reports and future ESG risk.

#### 281 **2.4 The moderating effect of media coverage**

282 Media coverage, another crucial component of external governance, also plays a critical role as  
283 an information intermediary in the capital market (An et al., 2020).

284 On one hand, the readers' demand for ESG information creates an expectation of media to  
285 cater to readers' preferences and pay significant attention to firms' ESG performance (Pérez,  
286 García De Los Salmones, & López-Gutiérrez, 2018; Ren et al., 2023). By fulfilling this  
287 informational role, media can mitigate information asymmetry between firms and external  
288 investors and enhance information transparency, regarding firms' ESG performance (An et al.,  
289 2020; Cahan, Chen, Chen, & Nguyen, 2015). On the other hand, media also plays a supervisory  
290 and disciplinary role in regulating firm decisions to maximize benefits for shareholders and  
291 society (An et al., 2020; He, Guo, & Yue, 2024; Xu & Qi, 2022). Du, Chang, Zeng, Du, and  
292 Pei (2016) argued that media could serve as a monitor or "watchdog" to identify firms'  
293 environmental misconduct. Hence, when firms receive more media coverage, they are likely to  
294 refrain from opportunistic actions and engage in responsible ESG activities (Wang & Zhang,  
295 2021). Following the same logic, the increased media pressure that firms face may lead them  
296 to disclose rather than disguise their actual ESG performance and respond to media reports by  
297 taking appropriate actions. This reduces the incentives to mislead investors by engaging in  
298 upward tone management in their ESG reports. A similar study conducted by Xu and Qi (2022)  
299 demonstrated that media coverage could weaken the positive connection between abnormal  
300 tone in management earnings forecasts and insider trading. Thus, we propose our third  
301 hypothesis.

302 H3: Media coverage can weaken the positive link between abnormal positive tone in ESG  
303 reports and future ESG risk.

304

### 305 **3. Research design**

#### 306 **3.1 Sample construction and data sources**

307 The initial sample for this study comprised all Chinese A-share listed firms that disclosed their  
308 ESG reports. We chose to begin our study with 2012, the year that SynTao began disclosing  
309 ESG risk data on a large scale. In addition, SynTao did not release relevant data to individual  
310 users after 2021. Hence, our research periods covered from 2012 and 2020. To refine our sample,  
311 we executed a series of selection procedures; namely, we (1) excluded observations with  
312 financial leverage exceeding one, (2) eliminated observations listed for less than one year, (3)  
313 excluded observations from financial sectors, (4) removed observations classified as special  
314 treatment (ST) or \*ST firms, and (5) excluded observations with missing data on control  
315 variables. Consequently, the final sample retained after these selection processes comprised  
316 4,076 firm-year observations. The details of sample screening procedure and sample  
317 distribution presents in Table 1.

#### 318 **\*\* Table 1 \*\***

319 We procured the necessary data for this study from three databases. ESG risk-related data  
320 came from the SynTao Green Finance database, a prominent data provider in the realm of ESG  
321 in China. The data pertaining to the tone of ESG reports came from the WinGo database,  
322 another renowned data provider specializing in the textual analysis of corporate disclosures.  
323 The data for media coverage came from the China Research Data Service Platform (CNRDS).  
324 The rest of the data (i.e., analyst coverage and control variables) came from the CSMAR  
325 database.

#### 326 **3.2 Variable measurements**

##### 327 **3.2.1 Dependent variables**

328 In recent studies, researchers have employed various methods to capture firms' exposure to  
329 ESG-related risk. These methods include utilizing data from third-party independent rating  
330 agencies (e.g., the RepRisk database) (Asante-Appiah, 2020; Burke et al., 2019; Chasiotis et  
331 al., 2023; Zhang & Wong, 2022), Morningstar's sustainability risk ratings (Ferriani & Natoli,  
332 2020; Teng, Wang, Wang, Chang, & Wu, 2021), and *Wall Street Journal* reports on adverse  
333 ESG events (Champagne et al., 2022). The nature of these approaches center around assessing  
334 the number and severity of incidents related to adverse ESG issues for each firm, ultimately  
335 yielding ESG risk scores. Building upon this rationale, we constructed a new variable (*Risk*) to  
336 quantify ESG risk in this research. Specifically, we measured *Risk* by considering both the  
337 number and severity of negative ESG-related incidents that each firm experienced annually. As  
338 previously noted, we sourced the data pertaining to ESG risk from the SynTao Green Finance  
339 database. This database provides comprehensive information on negative ESG events of listed

340 firms, including event date, event overview, event severity (classified as low, moderate, or high  
 341 risk), the specific risk category (e.g., environmental, social, or governance risk), and the data  
 342 source (media or regulatory authorities' reports). Following Asante-Appiah and Lambert (2022),  
 343 we assigned scores based on the severity of negative ESG events. The final ESG risk scores for  
 344 each firm within a given year were the sum of the severity scores of each negative ESG event.  
 345 To address the right skewness inherent in the data, we took the natural logarithm of the final  
 346 scores of ESG risk plus one as the final proxy for ESG risk (Jin et al., 2024).

### 347 **3.2.2 Independent variables**

348 As mentioned, net positive tone in ESG reports comprises two groups: normal and abnormal  
 349 positive tone (Huang et al., 2014). Before measuring abnormal positive tone in ESG reports,  
 350 determining net positive tone in ESG reports (*Tone*) is essential. The WinGo database  
 351 undertook several fundamental steps for measuring *Tone*. First, the English financial emotional  
 352 words developed by Loughran and McDonald (2011) were translated into Chinese. Second, the  
 353 wordlists were expanded using the synonym thesaurus created by the WinGo database. Third,  
 354 after meticulous manual screening, a final list of emotional words was curated. This facilitated  
 355 the calculation of the frequency of positive and negative words in ESG reports. Following  
 356 Huang et al. (2014) and Zhang et al. (2022), this study measured *Tone* as the frequency  
 357 difference between positive and negative words, scaled by the sum of both categories within an  
 358 ESG report. Higher values indicated a more optimistic disclosure of contents in ESG reports.

359 Since our focus resided in assessing the impact of abnormal positive tone rather than net  
 360 positive tone, we followed the approach of Huang et al. (2014) and employed Model 1 to further  
 361 decompose net positive tone into normal and abnormal positive tone. Generally, the  
 362 determinants of tone encompasses essential aspects such as fundamental information, growth,  
 363 opportunity, and risk (Li, 2010). Considering that tone management in ESG reports may differ  
 364 from that in annual reports, we also incorporated firms' ESG performance and whether firms  
 365 assured their ESG reports as determinants (Liao, Sun, & Xu, 2023). Abnormal positive tone  
 366 (*AbTone*) was quantified as the residual of Model 1. Higher values of *AbTone* signified a greater  
 367 degree of upward tone management in ESG reports (D'Augusta & DeAngelis, 2020; Huang et  
 368 al., 2014).

$$369 \quad \text{Tone}_{it} = c + \beta_1 \text{Size}_{it} + \beta_2 \text{Age}_{it} + \beta_3 \text{BTM}_{it} + \beta_4 \text{ROA}_{it} + \beta_5 \text{ROA\_sd5}_{it} + \beta_6 \text{ROA\_growth}_{it} +$$

$$370 \quad \beta_7 \text{RET}_{it} + \beta_8 \text{RET\_sd}_{it} + \beta_9 \text{Loss}_{it} + \beta_{10} \text{ESG}_{it} + \beta_{11} \text{Assurance}_{it} + \eta_j + \gamma_t + \varepsilon_{it} \quad (\text{Model 1})$$

371 where: *Size* = natural logarithm of total assets at the end of the fiscal year; *Age* = natural  
 372 logarithm of the years since the firm was listed; *BTM* = book-to-market ratio at the end of the  
 373 fiscal year; *ROA* = net profits scaled by total assets; *ROA\_sd5* = standard deviation of ROA  
 374 over the past 5 years; *ROA\_growth* = the growth rate of ROA; *RET* = annual stock returns;

375  $RET\_sd$  = standard deviation of monthly stock returns over the fiscal year.  $Loss$  was a dummy  
376 variable that took the value of 1 if the net profits of a firm were greater than 0, and 0 otherwise;  
377  $ESG$  = the scores of firms' ESG performance provided by the Hexun rating agency.  $Assurance$   
378 was also a dummy variable that took the value of 1 if a firm's ESG report was assured, and 0  
379 otherwise.  $\eta_j$  and  $\gamma_t$  denoted industry and year fixed effects, respectively.

### 380 **3.2.3 Moderators**

#### 381 **3.2.3.1 Analyst coverage**

382 Consistent with the work conducted by Li et al. (2023) and Huang et al. (2021), we constructed  
383 a variable ( $Analyst$ ) using the natural logarithm of one plus the number of analysts and teams  
384 following a firm in a given year, as a proxy for analyst coverage. Each team was considered as  
385 one, regardless of its number of individual members. A higher number of analysts following a  
386 firm generally signifies heightened analyst attention.

#### 387 **3.2.3.2 Media coverage**

388 Considering the rapid spread of news on Internet media and its expanding coverage (Xu & Qi,  
389 2022), we aimed to comprehensively gauge the intensity of media coverage. To achieve this,  
390 we introduced a new variable ( $Media$ ) to capture media coverage.  $Media$  was measured by the  
391 natural logarithm of one plus the number of news articles about a firm appearing in both printed  
392 and Internet media in a given year (An et al., 2020; Li, Ramanathan, & Xu, 2023).

#### 393 **3.2.4 Control variables**

394 To control for factors that could affect ESG risk, we incorporated a series of control variables  
395 into the model. On one hand, previous studies have proven that firm-level fundamental  
396 characteristics such as debt burden and growth maturity can have a significant effect on firms'  
397 environmental initiatives, which can further affect firms' ESG risk (Asante-Appiah, 2020;  
398 Burke et al., 2019). Hence, we first controlled for the fundamental attributes of a firm,  
399 encompassing variables such as financial leverage ( $Lev$ ), age since listing ( $Age$ ), and revenue  
400 growth ( $Revenue$ ). On the other hand, previous studies have also confirmed that both internal  
401 and external governance mechanisms of a firm are likely to exert a significant effect on ESG  
402 disclosure and performance (Albitar et al., 2022; García-Sánchez et al., 2019; Manita, Bruna,  
403 Dang, & Houanti, 2018; Orazalin, 2019). Thus, we also controlled for the internal governance  
404 of a firm, including variables such as the largest shareholder ( $Top1$ ), board size ( $Board$ ), board  
405 independence ( $Independent$ ), shareholder balance ( $Balance$ ), and institutional ownership  
406 ( $Institute$ ). We further controlled for the external governance of a firm, involving variables such  
407 as firm ownership ( $SOE$ ), the presence of assurance for ESG reports ( $Assurance$ ), and the  
408 involvement of Big 4 auditors in the auditing process ( $Big4$ ). Year and industry fixed effects  
409 were both included. Detailed variable definitions appear in Table 2.

410 **\*\* Table 2 \*\***

411 **3.3 Model specification**

412 We built different models to test our proposed hypotheses. To examine the relationship between  
413 abnormal positive tone in ESG reports and future ESG risk, we established Model 2. Given that  
414 ESG reports of year  $t$  were disclosed at the beginning of year  $t+1$ , we used ESG risk in year  
415  $t+1$ .

$$416 \quad Risk_{i,t+1} = \beta_0 + \beta_1 AbTone_{i,t} + \sum_{j=1}^k \beta_j Controls_{i,t} + \eta_j + \gamma_t + \varepsilon_{it} \quad (\text{Model 2})$$

417 To test the moderating effect of external governance, we included the moderator and the  
418 interaction term in the model, which resulted in Model 3. The moderators included analyst  
419 coverage and media coverage.

$$420 \quad Risk_{i,t+1} = \beta_0 + \beta_1 AbTone_{i,t} + \beta_2 Moderator_{i,t} + \beta_3 AbTone_{i,t} * Moderator_{i,t} + \\ 421 \quad \sum_{j=1}^k \beta_j Controls_{i,t} + \eta_j + \gamma_t + \varepsilon_{it} \quad (\text{Model 3})$$

422 Given that panel data were used in this study, we used ordinary least squares (OLS) to  
423 conduct the main regression with robust standard errors. OLS is widely used in similar studies  
424 (Wooldridge, 2010). To further address endogeneity issues, we also employed a series of other  
425 methods including two-stage least squares (2SLS), Heckman two-stage approach, propensity  
426 score matching (PSM), entropy balancing, and placebo tests.

427  
428 **4. Empirical results**

429 **4.1 Descriptive statistics**

430 Table 3 presents the results of descriptive statistics. The minimum and maximum values of  $Risk$   
431 were 0 and 3.611, respectively, indicating variations in the magnitude of ESG risk among firms  
432 in the sample period. Looking at the components of ESG risk, the mean values of  $Risk\_E$ ,  
433  $Risk\_S$ , and  $Risk\_G$  were 0.314, 0.130, and 0.153, respectively, indicating that environmental  
434 risk was the highest, while social risk was the lowest. The mean value of  $Tone$  was 0.763,  
435 suggesting an overall optimistic tone of the contents that ESG reports disclosed. Furthermore,  
436 the mean value of  $AbTone$  was 0.001, which aligned with our expectations.

437 **\*\* Table 3 \*\***

438 **4.2 Pearson correlation analysis**

439 Table 4 displays the results of the Pearson correlation of key variables.  $AbTone$  showed a  
440 positive but insignificant correlation with  $Risk$ . This result indicated the need for further  
441 regression analysis to identify the link between abnormal positive tone in ESG reports and  
442 future ESG risk. Similarly,  $AbTone$  insignificantly correlated with all moderators (i.e.,  $Analyst$   
443 and  $Media$ ), but all moderators exhibited a positive and significant correlation with  $Risk$ .

444 **\*\* Table 4 \*\***

## 445 **4.3 Main analysis**

### 446 **4.3.1 Regression results of H1**

447 Table 5 reports the empirical results of H1 to H3. In column (1), the coefficient on *AbTone* was  
448 significantly positive (0.4031 with  $t=2.509$ ), suggesting an association between a higher  
449 abnormal positive tone in ESG reports and a higher magnitude of ESG risk in the following  
450 year. The results support the idea that firms adopt impression management strategy, and they  
451 can strategically distort the tone in their ESG reports to provide misleading rather than  
452 incremental information on their ESG practices for investors; hence, H1 is supported.

453 In terms of control variables, the results were consistent with those of Treepongkaruna et  
454 al. (2022) and Mallidis, Giannarakis, and Sariannidis (2024). Except for financial leverage,  
455 which could have a positive effect on ESG risk, other fundamental attributes of firms such as  
456 listing age and revenue growth did not show a positive effect on ESG risk. In contrast,  
457 governance characteristics including board size, board independence, shareholder balance, and  
458 institutional ownership could all have a positive effect on ESG risk. Hence, not all internal  
459 governance mechanisms were effective in reducing ESG risk (Eugster et al., 2024).  
460 Additionally, audit quality was found to positively affect ESG risk.

461 **\*\* Table 5 \*\***

### 462 **4.3.2 Regression results of H2**

463 Table 5 reports the empirical results of the moderating effect of analyst coverage. In column  
464 (2), the coefficient on *AbTone* was still significantly positive (2.2557 with  $t=3.536$ ), consistent  
465 with the results shown in column (1). In addition, the coefficient on *Analyst* was also positive  
466 and significant at a 1% level (0.4939 with  $t=12.860$ ), but the coefficient on the interaction term  
467 (*AbTone \* Analyst*) was significantly negative at a 1% level (-1.5047 with  $t = -2.939$ ). The  
468 results together suggest a substitutive effect, between abnormal positive tone in ESG reports  
469 and analyst coverage, on future ESG risk. Compared with firms that received less analyst  
470 coverage, the link between abnormal positive tone in ESG reports and future ESG risk becomes  
471 negative for firms that received more analyst coverage. Figure 2 illustrates the interactive effect  
472 of analyst coverage and abnormal positive tone in ESG reports on future ESG risk. Hence, H2  
473 is supported.

474 **\*\* Figure 2 \*\***

### 475 **4.3.3 Regression results of H3**

476 The results of the moderating effect of media coverage also appear in Table 5. In column (3),  
477 the results were similar. Both the coefficients on *AbTone* and *Media* were positive and  
478 significant (2.2018 with  $t = 2.800$ ; 0.2492 with  $t = 21.739$ ), and the coefficient on *AbTone \* Media*  
479 was significantly negative (-0.3310 with  $t = -2.345$ ). The findings suggest that abnormal

480 positive tone in ESG reports and media coverage act as substitutes for each other in increasing  
481 the magnitude of future ESG risk. Specifically, firms having received more media coverage can  
482 weaken the positive relationship between abnormal positive tone in ESG reports and future  
483 ESG risk. Figure 3 shows the substitutive effect between abnormal positive tone in ESG reports  
484 and media coverage on future ESG risk. Hence, H3 is also supported.

485 **\*\* Figure 3 \*\***

#### 486 **4.4 Robustness tests**

##### 487 **4.4.1 2SLS**

488 To address the potential endogeneity in the relationship between abnormal positive tone in ESG  
489 reports and future ESG risk, we employed a 2SLS approach to mitigate deviations from  
490 endogeneity (Liang & Wu, 2022; Wang et al., 2021). Following Li et al. (2019), Xu and Qi  
491 (2022), and Ertugrul, Lei, Qiu, and Wan (2017), we employed two instruments  
492 (*AbTone\_industry* and *AbTone\_province*). Specifically, *AbTone\_industry* was measured as the  
493 value of *AbTone* minus the annual average value of *AbTone* in the same industry, while  
494 *AbTone\_province* was measured as the value of *AbTone* minus the annual average value of  
495 *AbTone* in the same province. These two variables are significantly associated with tone  
496 management in ESG reports; hence, the requirement of the relevance condition for a valid  
497 instrument is satisfied. However, there is no direct evidence showing that these variables  
498 correlated with firms' future ESG risk; hence, the requirement of the exclusion restriction for a  
499 valid instrument is also met (Ertugrul et al., 2017; Li et al., 2019). The validity of the two  
500 instrumental variables was confirmed, as the Kleibergen-Paap rk LM statistic was significant  
501 at the 1% level, which allowed for the rejection of the null hypothesis of underidentification.  
502 Moreover, the Cragg-Donald Wald F statistic was over 10, confirming the absence of the weak  
503 instrumental variable problem. Table 6 reports the relevant results. The findings in the first-  
504 stage regression indicated that the coefficients on the two instruments were both positive and  
505 significant. In the second-stage regression, the coefficient on *AbTone* remained significantly  
506 positive, providing reassurance that our findings were robust.

507 **\*\* Table 6 \*\***

##### 508 **4.4.2 Heckman two-stage approach**

509 To address endogeneity arising from potential sample selection bias, we followed Muslu et al.  
510 (2017) and Al-Shaer and Zaman (2021) by adopting the Heckman two-stage approach. We  
511 categorized the entire sample into treatment and control groups, based on whether the value of  
512 *AbTone* was above zero (He, Yan, Hao, & Wu, 2022; Liao et al., 2023). A positive residual  
513 indicates a firm employing upward tone manipulation, while a negative residual indicates  
514 otherwise. Consequently, we created a new binary variable (*AbTone\_dummy*) that took a value

515 of one when *AbTone* was greater than zero, and zero otherwise. In the first step, we included  
516 two instruments (*AbTone\_industry* and *AbTone\_province*) and other control variables used in  
517 Model 2, to run the probit model. In the second stage, we included the inverse *Mills* ratio,  
518 obtained in the first step, as an additional control variable, and re-ran Model 2. Relevant results  
519 appear in Table 7. The coefficient on *AbTone* remained positive and significant, revealing the  
520 robustness of our results after controlling for sample selection bias.

521 **\*\* Table 7 \*\***

#### 522 **4.4.3 PSM and entropy balancing**

523 To address the potential endogeneity issue arising from systematic differences in firms'  
524 characteristics or omitted variables, we adopted the PSM method. Similar to the method  
525 mentioned in 4.4.2, we divided the entire sample into treatment and control groups, according  
526 to whether the *AbTone* value was above zero (He et al., 2022; Liao et al., 2023). Firms with  
527 abnormal positive tone values in ESG reports exceeding zero constituted the treatment group,  
528 while others formed the control group. First, we ran a logistic model with *AbTone\_dummy* as  
529 the dependent variable and control variables in Model 2 as covariate variables, to estimate the  
530 propensity scores of adopting upward tone manipulation in ESG reports. We then matched the  
531 treatment group with the control group by applying a 1:1 nearest-neighbor matching procedure,  
532 based on propensity scores. To confirm no systematic differences between the treatment and  
533 control groups, we tested the balance hypothesis of covariate variables. Table 8 reports the  
534 results of the balance test, confirming no systematic differences between the treatment and  
535 control groups. Figure 4 depicts the propensity score distribution between the groups before  
536 and after matching, showing the reduction in group differences after matching. Finally, we  
537 performed the regression again with the matched sample. The results appear in column (1) of  
538 Table 9, and they were consistent with the baseline findings, suggesting that our results were  
539 valid after using the PSM technique.

540 In addition to PSM, we followed Bothello, Ioannou, Porumb, and Zengin -  
541 Karaibrahimoglu (2023) and used entropy balancing as another robustness check. Entropy  
542 balancing involves reweighting observations in the entire sample to balance covariates between  
543 two groups. It allows us to reweight covariates for the control group to eliminate the imbalance  
544 in firm characteristics between the control and treatment groups. Moreover, entropy balancing  
545 does not reduce the observations included in the regression (Hainmueller, 2012). The results  
546 reported in column (2) of Table 9 confirmed our previous findings.

547 **\*\* Table 8 \*\***

548 **\*\* Figure 4 \*\***

549 **\*\* Table 9 \*\***

550

#### 551 **4.4.3 Placebo test**

552 To ensure that our empirical results were not affected by unobservable omitted variables, we  
553 conducted a placebo test. Following the approach of Chang et al. (2023) and Ferrara, Chong,  
554 and Duryea (2012), we created a new variable (*Placebo\_AbTone*) by randomly assigning the  
555 value of *AbTone* to each firm. We then performed the regression again, replacing the  
556 independent variable with *Placebo\_AbTone*. We repeated this process 1,000 times to generate  
557 the distribution of coefficient on *Placebo\_AbTone*. As Figure 5 showed, the estimated  
558 coefficient on *Placebo\_AbTone* was normally distributed around zero. Moreover, the vertical  
559 line in navy color indicated the real effect of abnormal positive tone on future ESG risk, which  
560 was stronger than the effect estimated from the placebo test. Hence, the results of the placebo  
561 test confirmed that the main findings we obtained were robust.

562

**\*\* Figure 5 \*\***

#### 563 **4.4.4 Alternative measurements**

564 To address potential measurement bias, we considered employing alternative proxies to capture  
565 variables. First, in our main regression, we measured net positive tone in ESG reports by the  
566 frequency difference between positive and negative words, scaled by their sum, and abnormal  
567 positive tone in ESG reports was further measured by the residual from conducting regression  
568 Model 1. In robustness tests here, following Huang et al. (2014), we used the frequency  
569 difference between positive and negative words, scaled by the total words within an ESG report,  
570 as another proxy for *Tone*. Accordingly, we obtained a new proxy (*AbTone2*) for abnormal  
571 positive tone by running Model 1 again. The results of using the new proxy appear in column  
572 (1) of Table 10, and they remained unchanged.

573 Second, industry characteristics may significantly affect abnormal positive tone in ESG  
574 reports. For example, firms in the high-tech industry are inclined to disclose more positive  
575 contents, such as new business and new technologies, to differentiate themselves from others  
576 and gain a competitive advantage (Liang & Wu, 2022; Rahman, 2023). Hence, to mitigate the  
577 effect of industry heterogeneity, we calculated the annual mean values of abnormal positive  
578 tone in ESG reports for each two-digit industry. Then, we constructed a new proxy  
579 (*AbTone\_industry*) for abnormal positive tone, which equaled the values of *AbTone* minus the  
580 annual mean values of abnormal positive tone of this industry. The empirical results appear in  
581 column (2) of Table 10. Taking industry effects into consideration, the link between abnormal  
582 positive tone and future ESG risk still held.

583 Third, in the main regression, following the widely used method in the existing studies, we  
584 measured ESG risk by considering the number and the corresponding severity of negative ESG-

585 related issues simultaneously. Here, we created a new variable (*Risk\_dummy*) and measured  
586 ESG risk based on whether a firm encountered a negative ESG-related issue within a given year.  
587 If a firm experienced adverse ESG events more than once, we assigned *Risk\_dummy* a value of  
588 one; otherwise, it received a value of zero. Given the dependent variable becoming a dummy  
589 variable, we used the logits model to re-run the regression, leaving 4,052 observations. The  
590 results appear in column (3) of Table 10 and, once again, confirmed a positive relationship.

591 **\*\* Table 10 \*\***

592 **4.5 Heterogeneity analysis**

593 **4.5.1 The impact of disclosure requirements: Mandatory or voluntary**

594 In December 2008, both the Shenzhen Stock Exchange (SZSE) and the Shanghai Stock  
595 Exchange (SSE) issued official notifications mandating that listed firms, including those within  
596 the Shenzhen 100 Index, firms in the corporate governance sector of the SSE, overseas cross-  
597 listed firms, and firms in the financial sector, disclose their CSR reports. The remaining listed  
598 firms were encouraged to engage in voluntary CSR disclosure (Chen et al., 2018; Xiao & Shen,  
599 2022).<sup>2</sup> Overall, voluntariness primarily characterizes the prevailing practice of ESG  
600 disclosure in China, with mandatory disclosure serving as a complementary element. Due to  
601 varying institutional requirements for ESG disclosure among different firms, noticeable  
602 distinctions can emerge in their motivations and the contents of their disclosures. Especially  
603 firms that disclose their ESG reports mandatorily may have strong incentives to employ  
604 impression management strategy. This contributes to the positive link between abnormal  
605 positive tone and future ESG risk. Therefore, we predict that the connection between abnormal  
606 positive tone in ESG reports and future ESG risk varies, depending on the specific institutional  
607 requirements for ESG report disclosure.

608 We segmented our entire sample into two groups, according to whether firms engaged in  
609 mandatory or voluntary ESG disclosure. We constructed a new binary variable (*Mandatory*). A  
610 value of one indicated that firms were obligated to disclose their ESG reports, while a value of  
611 zero signified voluntary disclosure. Columns (1) and (2) of Table 11 report the relevant results.  
612 For firms mandated to disclose ESG reports, the positive association between abnormal positive  
613 tone and the magnitude of ESG risk remained statistically significant. However, this positive  
614 link became statistically insignificant for firms engaging in voluntary ESG disclosure.  
615 Furthermore, the results of the Chow test revealed that the estimated coefficients differed  
616 significantly between the two subsamples.

---

<sup>2</sup> Note that the notifications initially required a subset of listed firms to mandatorily disclose their CSR reports. However, with the popularity of the ESG concept, firms in this subset have started to disclose their ESG reports instead of CSR reports in practice. Hence, this regulation also applies to firms in this subset, mandating the disclosure of their ESG reports.

617 **\*\* Table 11 \*\***

618 **4.5.2 The impact of the adoption of ESG reporting guidelines**

619 The primary objective of the GRI reporting guidelines is to enhance the quality, rigor, and utility  
620 of sustainability reporting, by establishing a globally recognized reporting framework  
621 (Clarkson, Li, Richardson, & Vasvari, 2008). Firms adhering to these reporting guidelines to  
622 communicate their ESG issues lead to an improvement in the quality and credibility of the  
623 disclosed ESG information. Nonetheless, scholars have also observed that the adoption of GRI  
624 reporting guidelines could serve the purpose of impression management to enhance reputation  
625 and secure legitimacy (García - Sánchez et al., 2021; Vigneau, Humphreys, & Moon, 2014).  
626 In this sense, the incorporation of GRI reporting standards can intensify the positive link  
627 between abnormal positive tone and future ESG risk.

628 We segmented our entire sample according to whether firms adhered to the GRI reporting  
629 guidelines in the preparation of their ESG reports. We introduced a new binary variable (*GRI*).  
630 When firms aligned their ESG reports with GRI reporting guidelines, GRI was assigned a value  
631 of one; otherwise, it was set to zero. The results also appear in Table 11. Columns (3) and (4)  
632 showed that the coefficients of *AbTone* exhibited statistical significance, whether or not firms  
633 chose to comply with GRI reporting guidelines in preparing their ESG reports. However, the  
634 positive association between abnormal positive tone and future ESG risk was noticeably more  
635 pronounced for firms that adhered to GRI reporting guidelines than for firms that did not. The  
636 outcomes of the Chow test further validated the significant disparity between these two  
637 subsamples.

638 **4.6 Additional tests**

639 **4.6.1 The link between abnormal positive tone in ESG reports and different components  
640 of ESG risk**

641 ESG risk comprises environmental, social, and governance risk. Since stakeholders exhibit  
642 varying degrees of interest in different dimensions of ESG risk, firms tend to manipulate the  
643 tone of these disclosures differently (Ferriani & Natoli, 2020). This manipulation can further  
644 influence the association between abnormal positive tone and the various dimensions of ESG  
645 risk. Hence, we were interested in examining the potential heterogeneity in the link between  
646 abnormal positive tone and the different components of ESG risk. Table 12 reports the results,  
647 which showed that abnormal positive tone could serve as an indicator of future environmental  
648 risk but not future social and governance risk.

649 **\*\* Table 12 \*\***

650 **4.6.2 The link between abnormal positive tone in ESG reports and different sources of  
651 ESG risk coverage**

652 SynTao collects ESG risk data from various sources, including media coverage and government  
653 websites. These different data sources involve distinct external stakeholders overseeing firms'  
654 ESG risk. Because media and government oversight may exert different pressure on tone  
655 management in ESG reports, the relationship between abnormal positive tone and future ESG  
656 risk may vary according to the data source. Therefore, we were interested in investigating  
657 potential differences in the link between abnormal positive tone and future ESG risk as media  
658 and government sources reported them. Table 13 presents the results. If the government  
659 reported firms' ESG risk, the focal link was still significantly positive. However, if the media  
660 reported firms' ESG risk, the positive link between abnormal positive tone and future ESG risk  
661 became neutral. The results provided evidence that firms could adopt different strategy within  
662 the magnitude of tone management and further reshape the link between abnormal positive tone  
663 and different sources reporting ESG risk.

664 **\*\* Table 13 \*\***

665

## 666 **5. Discussions**

667 According to impression management theory, firms have strategic incentives to adopt  
668 communication tactics in their ESG reports to build positive image and reputation without  
669 taking any substantive actions (Bansal & Clelland, 2004; Morales-Raya et al., 2018). In line  
670 with the prediction of impression management theory, we reveal that abnormal positive tone in  
671 ESG reports positively relates to future ESG risk. Hence, tone management in ESG reports  
672 provides misleading rather than incremental information. Our results are consistent with those  
673 of some previous studies. Both Hamza et al. (2023) and Liang and Wu (2022) showed that CSR  
674 reports were widely adopted by firms to engage in impression management to further deflect  
675 stakeholders' perceptions. Accordingly, our study does not support the viewpoint of the  
676 informative role of linguistic tone. The potential reasons lie in that, due to the lack of  
677 institutional constraints on ESG disclosures and the widely absent ESG assurance, managers  
678 can strategically use tone management to disguise their poor ESG performance and influence  
679 investors' judgments (Xu & Qi, 2022).

680 On the other hand, tone management in ESG reports to disguise firms' ESG risk can also  
681 be regarded as greenwashing strategy, namely, positive communication without substantive  
682 action. This can occur when firms attempt to deflect stakeholders' perceptions and improve  
683 their corporate image through upward tone management, without implementing substantive  
684 actions (García - Sánchez et al., 2021; Lee & Raschke, 2023). Our results confirm the  
685 existence of greenwashing, which are also consistent with those of some previous research.  
686 Kim, Fairclough, and Dibrell (2016) suggested that nonfamily firms paid increasing attention

687 to environmental issues but adopt fewer proactive environmental actions. Hamza and Jarboui  
688 (2021) documented that the link between tone management and CSR performance was  
689 significantly negative. These results have valuable implications for regulators, having  
690 emphasized the importance of strengthening guidance and supervision of ESG information  
691 disclosure to enhance information content.

692 Our results also demonstrate the positive role that external governance plays in the  
693 association between abnormal positive tone in ESG reports and future ESG risk. Higher  
694 intensity of analyst and media coverage can be a useful supplement to formal disclosure  
695 requirements of ESG reports, compensating for weaknesses in internal governance and formal  
696 legal system (Champagne et al., 2022; Chen et al., 2018). In addition, as important parts of the  
697 intermediary platform between firms and stakeholders, both media and analysts contribute to  
698 creating a high-quality and transparent information environment. In such an environment,  
699 managers would be less likely to manipulate the tone of their ESG reports (An et al., 2020; Li  
700 et al., 2023). Therefore, both media and analyst coverage play a positive moderating role in the  
701 focal link. The results also align with the findings of some previous studies (Aouadi & Marsat,  
702 2016; Li et al., 2023; Wu et al., 2022; Xu & Qi, 2022), emphasizing the crucial role of external  
703 governance in guiding firms' sustainability practices.

704 Furthermore, our additional results indicate that abnormal positive tone in ESG reports is  
705 positively associated only with future environmental risk, not with future social and governance  
706 risk. The reasons may lie in the fact that stakeholders pay more attention to firms'  
707 environmental performance currently (Ferriani & Natoli, 2020). In response, managers may  
708 exert more effort on tone manipulation to disguise their potential environmental risk rather than  
709 their risk in other dimensions. Similarly, abnormal positive tone positively relates only to  
710 media-reported ESG risk, not to government-reported ESG risk. The possible reason is that  
711 media serves as a form of informal governance, while the government represents formal  
712 governance. Due to the greater oversight pressure the government exerted on firms' ESG issues,  
713 unlike media pressure, managers are likely to manipulate tone differently, catering to  
714 government regulatory expectations rather than media expectations. The results collectively  
715 underscore variable communication strategy across different dimensions in firms' ESG reports.

716

## 717 **6. Conclusions and implications**

### 718 **6.1 Conclusions**

719 This study investigates whether abnormal positive tone in ESG reports can predict firms'  
720 subsequent ESG risk. Our baseline results demonstrate a positive association between abnormal  
721 positive tone in ESG reports and firms' future ESG risk. These primary findings remain

722 consistent after a series of robustness tests. Furthermore, as essential components of external  
723 governance, both analyst and media coverage can attenuate the positive link between abnormal  
724 positive tone and future ESG risk. Heterogeneity analysis reveals the more pronounced positive  
725 link between abnormal positive tone and future ESG risk for firms mandated to disclose their  
726 ESG reports and those adhering to the GRI reporting guidelines. Additional analysis suggests  
727 that abnormal positive tone in ESG reports positively correlates only with future environmental  
728 risk; its association with social and governance risk is insignificant. The positive link between  
729 abnormal positive tone and future ESG risk is limited to the risk the government reports.

### 730 **6.2 Theoretical implications**

731 We conclude the theoretical implications of our study in three aspects. First, scholars suggest  
732 that research on the applicability of impression management theory on environmental issues is  
733 rather limited (Bolino et al., 2008; Morales-Raya et al., 2018). In this study, we grounded our  
734 investigation on impression management theory and investigated the link between abnormal  
735 positive tone in ESG reports and future ESG risk. Hence, our study extends the applicability of  
736 impression management theory to tone management in ESG reports. Moreover, we highlight  
737 that impression management in the context of environmental issues can also be regarded as  
738 greenwashing, as the nature of these two strategies is similar. Second, previous studies have  
739 mainly investigated the financial consequences of tone management, including abnormal  
740 returns, trading volume, future earnings, and financial report quality (Davis et al., 2012; Price  
741 et al., 2012; Xu & Qi, 2022). Our study extends existing work by investigating the non-financial  
742 effect of abnormal positive tone in ESG reports from the perspective of ESG risk. Third,  
743 identifying the determinants of ESG risk is the prerequisite to address ESG risk, but previous  
744 studies have largely ignored examining the determinants of ESG risk (Asante-Appiah &  
745 Lambert, 2022). In this study, we also contribute to research by investigating the determinants  
746 of ESG risk from the novel perspective of strategic tone management in ESG reports. Finally,  
747 this study also provides deeper insights into the nature of the link between abnormal positive  
748 tone in ESG reports and ESG risk by considering the moderating role of analyst and media  
749 coverage. This can help advance our understanding of the focal link.

### 750 **6.3 Practical implications**

751 Our results also yield valuable implications for different stakeholders, including firms, investors,  
752 and the government, on how to mitigate firms' ESG risk, particularly given the escalating levels  
753 of ESG investments. For firms, strategic narrative disclosures can provide some misleading  
754 information for stakeholders and further create a favorable reputation in the short term, but it  
755 cannot reduce firms' long-term ESG risk. Hence, firms should take some substantive actions  
756 and fulfill their environmental responsibilities proactively, to eliminate ESG risk at its root,

757 rather than adopting impression management strategy, such as tone manipulation, to mislead  
758 investors. For investors seeking to integrate ESG factors into their investment decisions,  
759 improving their discernment is crucial. They should pay attention not only to financial  
760 information but also to non-financial information, such as tone and other textual features in  
761 narrative disclosures, to avoid strategic disclosures misleading them. With improved  
762 discernment, investors can also exert pressure to deter firms from adopting impression  
763 management strategy to obscure their future ESG risk. For policymakers, the government must  
764 further regulate ESG information disclosure, standardizing ESG report disclosure contents and  
765 standards to further reduce the potential opportunism space for strategically using tone  
766 management for impression management and improving the information content of non-  
767 financial disclosures. In addition, the government should encourage firms to engage in external  
768 assurance of ESG reports to further improve their quality. In this regard, the room for firms to  
769 adopt impression management strategy to obscure their ESG risk becomes limited.

#### 770 **6.4 Limitations and future research**

771 Despite the incremental contributions we have made, this study is also subject to some  
772 limitations. In addition to tone management, scholars have investigated other textual features  
773 of corporate narrative disclosures, such as readability, similarity, and their forward-looking  
774 nature. In this study, we only focus on the link between abnormal positive tone and future ESG  
775 risk, neglecting other textual attributes. With advances in computer technology for natural  
776 language processing, future studies can create a comprehensive indicator to capture the quality  
777 of narrative disclosures by considering all textual attributes, then study their effects on ESG  
778 risk. Future studies can also investigate the interactive effects of these textual attributes on ESG  
779 risk. Additionally, this study focuses on abnormal positive tone in ESG reports as the most  
780 direct communication channel to stakeholders. However, managers can also manage their tone  
781 in annual reports, earnings press releases, conference calls, and other periodic reports. This may  
782 limit the generalizability of our findings. Future studies can also examine and compare whether  
783 upward tone management in these communication channels can predict ESG risk.

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Table 1 The details of sample screening procedure and sample distribution

<b>Panel A. Sample screening procedure</b>			
Procedure		Number of observations	
Initial data for ESG reports		9081	
Merged with data for firms' ESG risk		-2436	
Merged with data for all control variables		-40	
Excluding observations with financial leverage over one		-9	
Excluding observations listed for less than one year		-189	
Excluding observations from financial sectors		-459	
Excluding observations with ST and *ST		0	
Excluding observations with missing data		-260	
Excluding observations because the dependent variable is set in year t + 1		-1612	
Remaining number of observations		4076	
<b>Panel B. Sample across sectors</b>			
Sectors		Number of observations	Percent
A.	Agriculture, forestry, animal husbandry, fishery industries	56	1.37
B.	Mining industry	181	4.44
C.	Manufacturing industry	2301	56.46
D.	Power, thermal, gas and water production and supply industries	240	5.89
E.	Construction industry	141	3.46
F.	Wholesale and retail industries	235	5.77
G.	Transport, warehousing, and postal industries	241	5.91
H.	Accommodation and catering industries	9	0.22
I.	Information transmission, software, and information technology services industries	182	4.47
K.	Real estate industry	278	6.82
L.	Leasing and business services industries	45	1.1
M.	Scientific research and technology services industries	14	0.34
N.	Water conservancy, environmental, and public facilities management industries	39	0.96
P.	Education industry	1	0.02
Q.	Health and social work industries	16	0.39
R.	Culture, sports, and entertainment industries	68	1.67
S.	Other	29	0.71
<b>Panel C. Sample across year</b>			
Year	Number of observations		Percent
2012	380		9.32
2013	414		10.16
2014	448		10.99

2015	470	11.53
2016	517	12.68
2017	562	13.79
2018	661	16.22
2019	624	15.31

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Table 2 Variable definitions

Type of variables	Variable	Definitions
Dependent variable	<i>Risk</i>	= natural logarithm of the final scores of ESG risk plus one
Independent variable	<i>AbTone</i>	= the residual values calculated by Model 1
Moderators	<i>Analyst</i>	= natural logarithm of one plus the number of analysts following a firm in given year
	<i>Media</i>	= natural logarithm of one plus the number of news about a firm appeared on the printed and Internet media in given year
	<i>Lev</i>	= debts / assets
	<i>Age</i>	= natural logarithm of the years since the firms was listed
	<i>Growth</i>	= the growth rate of operating revenue
Control variables	<i>SOE</i>	A dummy variable, SOE =1 if the final controller of a firms is the local or central government, and 0 otherwise
	<i>Top1</i>	= the shareholding proportion held by the largest shareholder
	<i>Board</i>	= the total number of board members
	<i>Independent</i>	= the ratio of independent directors in the board
	<i>Balance</i>	= The shareholding proportion of the second to fifth shareholder / The shareholding proportion of the largest shareholder
	<i>Institute</i>	= the shareholding proportion held by the institutional investors
	<i>Assurance</i>	A dummy variable, Assurance =1 if a firm's ESG report is assured, and 0 otherwise
	<i>Big4</i>	A dummy variable, Big4 =1 if a firm's annual report is audited by big 4 auditing firms, and 0 otherwise

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Table 3 Descriptive statistics

Variable	N	Mean	SD	P50	Min	Max
<i>Risk</i>	4076	0.570	0.837	0	0	3.611
<i>Risk_E</i>	4076	0.314	0.641	0	0	3.401
<i>Risk_S</i>	4076	0.130	0.376	0	0	2.197
<i>Risk_G</i>	4076	0.153	0.374	0	0	1.792
<i>Tone</i>	4076	0.763	0.081	0.774	0.496	0.920
<i>AbTone</i>	4076	0.001	0.076	0.009	-0.304	0.174
<i>Analyst</i> <sup>3</sup>	3406	1.281	0.338	1.359	0.527	1.823
<i>Media</i>	4076	5.774	1.177	5.719	0	9.193
<i>Lev</i>	4076	0.491	0.192	0.500	0.056	0.896
<i>Age</i>	4076	2.538	0.500	2.708	1.099	3.296
<i>Growth</i>	4076	0.129	0.294	0.088	-0.539	2.330
<i>SOE</i>	4076	0.164	0.370	0	0	1
<i>Top1</i>	4076	38.017	15.464	37.910	7.140	80.600
<i>Board</i>	4076	9.071	1.898	9	5	15
<i>Independent</i>	4076	37.699	5.603	36.360	31.250	60.000
<i>Balance</i>	4076	0.597	0.545	0.408	0.014	2.698
<i>Institute</i>	4076	54.805	21.296	57.463	1.048	94.294
<i>Assurance</i>	4076	0.015	0.123	0	0	1
<i>Big4</i>	4076	0.138	0.345	0	0	1

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Table 4 Correlation matrix of key variables

Variable	<i>Risk</i>	<i>AbTone</i>	<i>Analyst</i>	<i>Media</i>
<i>Risk</i>	1			
<i>AbTone</i>	0.006	1		
<i>Analyst</i>	0.248***	0.011	1	
<i>Media</i>	0.413***	0.004	0.338***	1

1103 Note: \*\*\* $p < 0.01$ .

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<sup>3</sup> Due to missing data on analysts, there are 3,406 observations remaining. We do not maintain the same sample size to obtain more observations in regression.

Table 5 The empirical results for H1 to H3

Variable	(1) <i>Risk<sub>t+1</sub></i>	(2) <i>Risk<sub>t+1</sub></i>	(3) <i>Risk<sub>t+1</sub></i>
<i>AbTone</i>	0.4031** (2.509)	2.2557*** (3.536)	2.2018*** (2.800)
<i>Analyst</i>		0.4939*** (12.860)	
<i>AbTone * Analyst</i>		-1.5047*** (-2.939)	
<i>Media</i>			0.2492*** (21.739)
<i>AbTone * Media</i>			-0.3310** (-2.345)
<i>Lev</i>	0.5124*** (7.263)	0.6503*** (7.908)	0.2747*** (4.036)
<i>Age</i>	0.0388 (1.474)	0.1167*** (3.981)	0.0416* (1.688)
<i>Growth</i>	0.0151 (0.383)	-0.0978** (-2.144)	-0.0295 (-0.792)
<i>SOE</i>	0.0029 (0.084)	0.0179 (0.465)	0.0277 (0.859)
<i>Top1</i>	0.0011 (0.875)	0.0034** (2.573)	0.0017 (1.428)
<i>Board</i>	0.0454*** (5.746)	0.0373*** (4.474)	0.0267*** (3.608)
<i>Independent</i>	0.0189*** (7.822)	0.0192*** (7.365)	0.0135*** (5.935)
<i>Balance</i>	0.1302*** (4.303)	0.1774*** (5.168)	0.0944*** (3.382)
<i>Institute</i>	0.0063*** (8.182)	0.0035*** (4.138)	0.0037*** (4.926)
<i>Assurance</i>	0.1491 (1.322)	0.0666 (0.588)	0.1079 (0.939)
<i>Big4</i>	0.4254*** (9.781)	0.3433*** (7.593)	0.2561*** (6.365)
<i>_cons</i>	-1.7680*** (-10.773)	-2.5157*** (-13.710)	-2.6180*** (-16.561)
<i>Industry FE</i>	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes
<i>N</i>	4076	3406	4076
<i>Adj. R<sup>2</sup></i>	0.2141	0.2458	0.3060

Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 6 The empirical results of 2SLS

Variable	(1) <i>AbTone</i>	(2) <i>Risk<sub>t+1</sub></i>
<i>AbTone</i>		0.4892*** (3.134)
<i>AbTone_industry</i>	0.4102*** (51.326)	
<i>AbTone_province</i>	0.6313*** (80.150)	
<i>Lev</i>	-0.0010 (-0.698)	0.5118*** (7.061)
<i>Age</i>	-0.0027*** (-4.958)	0.0390 (1.455)
<i>Growth</i>	-0.0014* (-1.778)	0.0151 (0.374)
<i>SOE</i>	0.0013** (2.001)	0.0017 (0.051)
<i>Top1</i>	-0.0000 (-0.995)	0.0011 (0.841)
<i>Board</i>	-0.0000 (-0.256)	0.0454*** (6.406)
<i>Independent</i>	0.0000 (0.465)	0.0189*** (8.209)
<i>Balance</i>	-0.0009 (-1.392)	0.1304*** (4.284)
<i>Institute</i>	0.0000 (0.309)	0.0063*** (8.028)
<i>Assurance</i>	0.0021 (1.101)	0.1484 (1.549)
<i>Big4</i>	0.0015** (2.071)	0.4273*** (11.625)
<i>_cons</i>	0.0039 (1.089)	-1.7699*** (-9.949)
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>N</i>	4076	4076
<i>Adj. R<sup>2</sup></i>	0.9622	0.2140

1109 Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 7 The empirical results of Heckman

Variable	(1) <i>AbTone_dummy</i>	(2) <i>Risk<sub>t+1</sub></i>
<i>AbTone</i>		1.534*** (3.061)
<i>AbTone_industry</i>	33.214*** (15.765)	
<i>AbTone_province</i>	41.311*** (19.087)	
<i>Lev</i>	-0.091 (-0.323)	0.575*** (5.789)
<i>Age</i>	-0.247** (-2.470)	0.007 (0.204)
<i>Growth</i>	0.146 (0.787)	-0.036 (-0.701)
<i>SOE</i>	-0.109 (-0.851)	0.004 (0.097)
<i>Top1</i>	0.006 (1.317)	0.003* (1.841)
<i>Board</i>	0.026 (1.022)	0.058*** (6.210)
<i>Independent</i>	0.006 (0.847)	0.016*** (5.355)
<i>Balance</i>	0.053 (0.454)	0.151*** (3.764)
<i>Institute</i>	-0.004 (-1.330)	0.006*** (6.184)
<i>Assurance</i>	-0.213 (-0.443)	0.198 (1.534)
<i>Big4</i>	0.326** (2.264)	0.395*** (7.437)
<i>_cons</i>		-1.990*** (-8.252)
<i>/mills lambda</i>		-0.050 (-0.810)
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>N</i>	4076	4076

1112 Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table 8 The empirical results of the PSM balance test

Variable	Unmatched	Mean		%bias	t-test	
	Matched	Treated	Control		t	p>t
Lev	U	0.494	0.487	3.4	1.08	0.282
	M	0.494	0.502	-4.3	-1.41	0.157
Age	U	2.531	2.547	-3.2	-1.01	0.310
	M	2.531	2.528	0.5	0.16	0.872
Growth	U	0.134	0.124	3.3	1.06	0.290
	M	0.133	0.136	-1	-0.34	0.731
SOE	U	0.174	0.151	6.2	1.96	0.050
	M	0.174	0.183	-2.4	-0.78	0.433
Top1	U	37.698	38.397	-4.5	-1.44	0.151
	M	37.678	38.309	-4.1	-1.37	0.170
Board	U	9.033	9.116	-4.3	-1.38	0.168
	M	9.028	9.110	-4.3	-1.44	0.149
Independent	U	37.722	37.671	0.9	0.28	0.776
	M	37.726	38.007	-5	-1.63	0.103
Balance	U	0.596	0.597	-0.1	-0.03	0.973
	M	0.597	0.591	1	0.33	0.739
Institute	U	54.055	55.700	-7.7	-2.46	0.014
	M	54.033	54.871	-3.9	-1.33	0.182
Assurance	U	0.015	0.016	-0.2	-0.07	0.943
	M	0.015	0.005	8.1	3.26	0.001
Big4	U	0.113	0.169	-16.2	-5.2	0.000
	M	0.112	0.111	0.1	0.05	0.962

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Table 9 The empirical results of PSM and entropy balancing

Variable	(1) <i>Risk<sub>t+1</sub></i>	(2) <i>Risk<sub>t+1</sub></i>
<i>AbTone</i>	0.5089*** (2.650)	0.3969** (2.484)
<i>Lev</i>	0.5228*** (6.662)	0.5151*** (7.307)
<i>Age</i>	0.0315 (1.074)	0.0416 (1.591)
<i>Growth</i>	0.0418 (0.985)	0.0144 (0.365)
<i>SOE</i>	0.0245 (0.638)	0.0156 (0.437)
<i>Top1</i>	0.0013 (0.930)	0.0015 (1.213)
<i>Board</i>	0.0497*** (5.662)	0.0393*** (5.003)
<i>Independent</i>	0.0183*** (6.783)	0.0181*** (7.260)
<i>Balance</i>	0.1160*** (3.455)	0.1221*** (4.057)
<i>Institute</i>	0.0061*** (7.159)	0.0057*** (7.432)
<i>Assurance</i>	0.2491* (1.809)	0.1836 (1.608)
<i>Big4</i>	0.4248*** (8.249)	0.4044*** (9.107)
<i>_cons</i>	-1.8424*** (-10.075)	-1.6667*** (-10.125)
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>N</i>	3320	4076
<i>Adj. R<sup>2</sup></i>	0.212	0.202

1117 Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*\*  $p < 0.01$ .

Table 10 The empirical results of alternative measurements

Variable	(1) <i>Risk<sub>t+1</sub></i>	(2) <i>Risk<sub>t+1</sub></i>	(3) <i>Risk_dummy<sub>t+1</sub></i>
<i>AbTone2</i>	0.4056** (2.515)		
<i>AbTone_industry</i>		0.5853*** (3.466)	
<i>AbTone</i>			1.5323*** (3.113)
<i>Lev</i>	0.5125*** (7.265)	0.5097*** (7.230)	1.2472*** (5.487)
<i>Age</i>	0.0388 (1.475)	0.0382 (1.453)	0.1708** (2.095)
<i>Growth</i>	0.0151 (0.383)	0.0152 (0.384)	0.2760** (2.112)
<i>SOE</i>	0.0029 (0.084)	0.0021 (0.059)	0.0491 (0.498)
<i>Top1</i>	0.0011 (0.875)	0.0010 (0.822)	0.0020 (0.488)
<i>Board</i>	0.0453*** (5.746)	0.0453*** (5.752)	0.1193*** (5.343)
<i>Independent</i>	0.0189*** (7.823)	0.0190*** (7.869)	0.0440*** (6.202)
<i>Balance</i>	0.1302*** (4.304)	0.1301*** (4.307)	0.3215*** (3.299)
<i>Institute</i>	0.0063*** (8.182)	0.0063*** (8.184)	0.0176*** (6.867)
<i>Assurance</i>	0.1491 (1.322)	0.1487 (1.323)	0.1460 (0.454)
<i>Big4</i>	0.4253*** (9.780)	0.4299*** (9.896)	1.0081*** (8.950)
<i>_cons</i>	-1.7681*** (-10.774)	-1.7638*** (-10.774)	-6.7684*** (-12.141)
<i>Industry FE</i>	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes
<i>N</i>	4076	4076	4052
<i>Adj. R<sup>2</sup> / Pseudo R<sup>2</sup></i>	0.2141	0.2153	0.1494

1120 Note: *t* statistics in parentheses, \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

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Table 11 The impact of disclosing types of ESG reports

Variable	Mandatory=1	Mandatory=0	GRI=1	GRI=0
	(1) <i>Risk<sub>t+1</sub></i>	(2) <i>Risk<sub>t+1</sub></i>	(3) <i>Risk<sub>t+1</sub></i>	(4) <i>Risk<sub>t+1</sub></i>
<i>AbTone</i>	0.9562*** (4.129)	-0.3022 (-1.403)	1.2511*** (2.840)	0.4647*** (2.779)
<i>Lev</i>	0.6933*** (6.459)	0.3121*** (3.451)	0.9773*** (4.656)	0.3667*** (4.956)
<i>Age</i>	-0.0044 (-0.096)	0.0715** (2.339)	0.0619 (0.828)	0.0565** (2.126)
<i>Growth</i>	0.0723 (1.185)	0.0027 (0.055)	-0.0824 (-0.838)	0.0293 (0.686)
<i>SOE</i>	0.0277 (0.591)	-0.0259 (-0.526)	-0.0737 (-0.819)	0.0167 (0.450)
<i>Top1</i>	0.0019 (0.905)	0.0017 (1.069)	-0.0060* (-1.670)	0.0029** (2.306)
<i>Board</i>	0.0463*** (4.463)	0.0329*** (2.728)	0.0222 (1.176)	0.0429*** (4.997)
<i>Independent</i>	0.0191*** (5.646)	0.0141*** (4.139)	0.0220*** (3.072)	0.0155*** (6.012)
<i>Balance</i>	0.2082*** (3.708)	0.0907** (2.484)	0.1155 (1.236)	0.1360*** (4.322)
<i>Institute</i>	0.0071*** (4.708)	0.0038*** (4.276)	0.0067*** (2.960)	0.0051*** (6.400)
<i>Assurance</i>	0.0318 (0.226)	0.3512* (1.915)	0.0409 (0.303)	-0.0075 (-0.039)
<i>Big4</i>	0.4117*** (7.542)	0.2371*** (3.427)	0.3423*** (3.876)	0.3428*** (6.741)
<i>_cons</i>	-1.8357*** (-7.245)	-1.3890*** (-6.310)	-1.6583*** (-3.308)	-1.6148*** (-9.224)
<i>Industry FE</i>	Yes	Yes	Yes	Yes
<i>Year FE</i>	Yes	Yes	Yes	Yes
<i>N</i>	2180	1896	775	3301
<i>Adj. R<sup>2</sup></i>	0.2368	0.1611	0.2506	0.1645
<i>Chi<sup>2</sup></i>	16.13***		2.91*	

1123 Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

1124 Table 12 The link between abnormal positive tone in ESG reports and the different components of ESG risk

Variable	(1) <i>Risk E<sub>t+1</sub></i>	(2) <i>Risk S<sub>t+1</sub></i>	(3) <i>Risk G<sub>t+1</sub></i>
<i>AbTone</i>	0.276** (2.355)	0.051 (0.632)	0.060 (0.772)
<i>Lev</i>	0.387*** (7.266)	0.069** (2.094)	0.118*** (3.510)
<i>Age</i>	0.026 (1.281)	0.023* (1.770)	-0.008 (-0.593)
<i>Growth</i>	0.001 (0.040)	0.016 (0.965)	0.025 (1.287)
<i>Top1</i>	0.002* (1.948)	0.000 (0.654)	-0.001 (-0.836)
<i>SOE</i>	-0.021 (-0.800)	0.017 (0.978)	-0.003 (-0.190)
<i>Board</i>	0.035*** (5.454)	0.015*** (3.887)	0.003 (0.887)
<i>Independent</i>	0.012*** (6.517)	0.007*** (5.457)	0.003*** (2.647)
<i>Balance</i>	0.059*** (2.741)	0.066*** (4.271)	0.048*** (3.223)
<i>Institute</i>	0.003*** (5.860)	0.002*** (6.281)	0.002*** (4.638)
<i>Assurance</i>	-0.039 (-0.431)	0.090 (1.373)	0.093 (1.437)
<i>Big4</i>	0.259*** (7.599)	0.170*** (6.959)	0.115*** (5.275)
<i>_cons</i>	-1.356*** (-10.634)	-0.618*** (-7.489)	-0.191** (-2.422)
<i>Industry</i>	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes
<i>N</i>	4076	4076	4076
<i>Adj. R<sup>2</sup></i>	0.220	0.111	0.067

1125 Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Table 13 The link between abnormal positive tone in ESG reports and different coverage source of ESG risk

Variable	(1) <i>Risk Media<sub>t+1</sub></i>	(2) <i>Risk Gov<sub>t+1</sub></i>
<i>AbTone</i>	-0.014 (-0.232)	0.398*** (2.873)
<i>Lev</i>	0.077*** (3.326)	0.431*** (7.019)
<i>Age</i>	0.013 (1.448)	0.030 (1.316)
<i>Growth</i>	0.008 (0.755)	0.015 (0.425)
<i>SOE</i>	0.014 (1.179)	-0.017 (-0.553)
<i>Top1</i>	-0.000 (-0.265)	0.001 (1.058)
<i>Board</i>	0.005* (1.649)	0.041*** (5.902)
<i>Independent</i>	0.003*** (3.438)	0.016*** (7.653)
<i>Balance</i>	0.050*** (4.114)	0.095*** (3.649)
<i>Institute</i>	0.001*** (3.132)	0.006*** (8.220)
<i>Assurance</i>	0.073 (1.483)	0.083 (0.869)
<i>Big4</i>	0.089*** (5.020)	0.369*** (9.672)
<i>_cons</i>	-0.243*** (-4.131)	-1.591*** (-11.183)
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>N</i>	4076	4076
<i>Adj. R<sup>2</sup></i>	0.072	0.228

Note: *t* statistics in parentheses, \*  $p < 0.1$ , \*\*\*  $p < 0.01$ .