



Analyst following and greenwashing decision

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ABSTRACT

This study identifies analyst following as a determinant of corporate greenwashing decisions. Our study reveals that analyst following can effectively mitigate the extent of company greenwashing, as analysts can help reduce information asymmetry and play a crucial role in supervision. Moreover, our findings are stronger in samples characterized by high levels of information asymmetry and weak corporate governance environment. Overall, the results are consistent with the view that analysts play an important role in enterprise behavior.

1. Introduction

As environmental awareness increases, investors and consumers will consider the extent of a company's environmental responsibility when making decisions. In order to attract public attention, some enterprises have adopted the deceptive means of "green washing", which has had an adverse impact on the capital market and the consumer market. However, research on the topic of "greenwashing" is still in its early stages (Pizzetti et al., 2021) and many areas remain to be explored.

Greenwashing is a decision made by firms after considering the likelihood of detection versus non-detection. In the context of an emerging economy with high-level information asymmetry, stakeholders may struggle to identify greenwashing (Li et al., 2023). In the meantime, analysts play a crucial role in the market by collecting and processing information released by companies, thereby mitigating information asymmetry and exerting a supervisory effect.

Our research reveals that the implementation of analyst following can effectively mitigate sub-information asymmetry, serving as a vital tool in supervision and resulting in a noteworthy reduction in company greenwashing. Notably, our findings are stronger in samples with high information asymmetry and underdeveloped corporate governance frameworks.

This study contributes to existing literature in several ways. Firstly, it provides evidence of the role of analysts. On the one hand, analysts can alleviate information asymmetry (Chen et al., 2015; 2017). On the other hand, analysts can play a supervisory role to reduce the possibility of corporate violations and earnings management (Cheng and Subramanyam, 2008; Yu, 2008). Based on the prior studies, we further discover that analyst following can further reduce the degree of greenwashing of firms.

Secondly, we contribute to the ongoing discussion on firms' greenwashing. Although previous studies have shown that analyst following can reduce information asymmetry (Cheng and Subramanyam, 2008) and improve enterprise information authenticity (Yu, 2008), others have highlighted the importance of environment in recognizing greenwashing behavior (Neureiter and Matthes, 2023). We combine these previous studies to understand the impact of analyst following on greenwashing by reducing information asymmetry and exerting supervision.

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Thirdly, our findings are related to the ongoing discussion on the information environment. Information plays an import role in innovation (Kong et al., 2022; Liu et al., 2023a), export trading (Liu et al., 2023b), stock price crash risk (Kong et al., 2023) and so on. Moreover, we illustrate that the importance of information environment for firms' decisions.

2. Literature review

2.1. The impacts of analysts

Analysts gather and analyze enterprise data to create reports for public. This process aids in the dissemination of information and reduces the information asymmetry between potential investors and enterprises. Roulstone (2003) find that analysts contribute to public information, which in turn influences market liquidity characteristics. Given the complexity of financial accounting information, the interpretive role of analysts has become increasingly important (Chen et al., 2010). Analyst following can enhance a firm's information environment, thereby increasing its value (Lang et al., 2003). Mansi et al. (2011) also find that analyst activity reduces bond yield spreads, with the economic impact of analysts being most pronounced when uncertainty about firm value is at its peak.

When firms receive attention from analysts and potential investors due to analyst reports, they are subject to increased scrutiny. Investors place a higher value on new information in analyst reports when managers have greater incentives to withhold value-relevant information, suggesting that analysts serve as information intermediaries by uncovering information beyond corporate disclosures and by clarifying and confirming these disclosures (Huang et al., 2018). Analyst following is negatively related to a firm's default risk due to the monitoring and informational roles of financial analysts (Cheng and Subramanyam, 2008). Yu (2008) found that analyst following can significantly reduce a firm's earnings management.

2.2. The determinants of greenwashing

There is extensive literature discussing greenwashing. Seele and Gatti (2017) proposed a revised definition of greenwashing as an external accusation towards an organization for presenting misleading green messages. Zhang (2023) reviewed greenwashing as a practice where companies portray a positive sustainable-performance image while concealing their actual environmental performance.

Research on the determinants of greenwashing is limited. The likelihood of logistics firms engaging in greenwashing depends on both the probability of exposure and the associated penalty for such behavior (Dong et al., 2023). Zhang (2022b) found that increased financial pressure may enhance a firm's greenwashing behavior.

Although there have been studies to explore the absolute factors of corporate greenwashing behavior, there are also discussions about the role of analysts. However, prior studies have ignored to link the two important topics, exploring the impact of analyst tracking on corporate greenwashing.

3. Data and variables

3.1. Data sources

We utilize data from the China Stock Market and Accounting Research (CSMAR) database to substitute the data of analyst following and financial data used for measuring control variables. Referring to Zhang (2022a, 2022b; 2023), ESG disclosures of firms are from the Bloomberg ESG database, and ESG rating scores are extracted from the Wind Database to compute the level of greenwashing. Considering the accessibility of data extracted from Wind Database, our sample period is from 2018 to 2021 which is consistent with the study of Zhang (2023). We include companies listed in Shanghai and Shenzhen while excluding ST companies and those in the financial industries. Additionally, we remove observations with missing key financial variables. All continuous variables are winsorized at the upper and lower 1% levels.

3.2. Variables

3.2.1. Analyst following

To value whether a firm is followed by analysts, we construct a dummy variable *LANA* which equal to one if a firm is followed by analysts last year, otherwise taking the value of zero.

3.2.2. Greenwashing

Building upon the existing literature (Zhang, 2022b), we introduce the variable $GW_{i,t}$ to measure the degree of greenwashing of firms. Specifically, $GW_{i,t}$ quantifies the degree to which a Chinese listed firm i amplifies its sustainability achievements via excessive green communication, rather than implementing substantial efforts to boost environmental performance during the year t . The formulation of the greenwashing variable adheres to Eq. (1):

$$GW_{i,t} = \left[\left(D_{i,t} - \bar{D}_{i,t} \right) / \sigma_D \right] - \left[\left(P_{i,t} - \bar{P}_{i,t} \right) / \sigma_P \right] \quad (1)$$

Table 1
Summary statistics.

Variable	Obs	Mean	Std. dev.	Min	Max
GW	4590	−6.881	0.918	−8.949	−4.470
LANA	4590	0.805	0.396	0.000	1.000
LSIZE	4590	23.851	1.128	21.530	27.183
LROE	4590	0.075	0.160	−0.952	0.433
LLEV	4590	0.476	0.197	0.074	0.918
LBM	4590	0.705	0.283	0.107	1.250
LDUAL	4590	0.234	0.423	0.000	1.000
LSOE	4590	0.468	0.499	0.000	1.000
LAUDIT	4590	0.128	0.334	0.000	1.000

Notes: This table reports the summary statistics of variables in this paper.

Table 2
Analyst following and greenwashing.

VARIABLES	(1) GW	(2) GW
LANA	−0.080*** (−2.65)	−0.064** (−2.12)
LSIZE		−0.103*** (−2.59)
LROE		0.043 (0.76)
LLEV		0.196 (1.36)
LBM		−0.262** (−2.40)
LDUAL		−0.011 (−0.24)
LSOE		0.009 (0.11)
LAUDIT		0.048 (0.38)
Constant	−6.817*** (−280.58)	−4.299*** (−4.42)
Observations	4590	4590
R-squared	0.788	0.789
Firm FE	YES	YES
Year FE	YES	YES

Notes: The t statistics reported in parentheses are based on all standard errors clustered at the firm level. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively.

where, $GW_{i,t}$ represents the degree of greenwashing of firm i in year t . $D_{i,t}$ denotes the ESG disclosure scores, while $P_{i,t}$ represents ESG performance scores of firm i in year t . $\bar{D}_{i,t}$ and $\bar{P}_{i,t}$ are the average ESG disclosure scores and ESG performance scores, respectively. σ_D and σ_P respectively represent the standard deviations of the ESG disclosure scores and ESG performance scores, which are utilized to standardize our greenwashing scores.

3.2.3. Control variables

We introduce a vector of control variables, which include firm size ($LSIZE$), firms' return on equity ($LROE$), leverage ($LLEV$), book-to-market ratio (LBM), duality ($LDUAL$), ownership ($LSOE$), and the audit institution ($LAUDIT$). Firm size is measured using the natural logarithm of a firm's total market value. $LROE$ is defined as the ratio of net income to equity of a firm in a given year. $LLEV$ represents the ratio of total debt to total assets of a firm, while LBM represents the ratio of total assets to market value. $LAUDIT$ is a dummy variable that takes the value of one if the chairman and general manager are the same person, otherwise it takes the value of zero. $LSOE$ equals one for state-owned firms and zero otherwise. $LAUDIT$ is another dummy variable that takes the value of one if the audit opinion is issued by one of the Big Four firms, otherwise it equals to zero.

4. Empirical results

4.1. Description statistics

Table 1 presents the summary statistics for crucial variables, encompassing the count of observations, the average value, the

Table 3
Heterogeneous results by information asymmetry.

VARIABLES	(1) High Profit Volatility GW	(2) Low Profit Volatility GW
LANA	−0.216*** (−3.29)	−0.052 (−1.47)
LSIZE	−0.071 (−0.98)	−0.053 (−0.77)
LROE	0.001 (0.02)	0.157 (0.94)
LLEV	0.073 (0.30)	0.312 (1.33)
LBM	−0.154 (−0.89)	−0.182 (−0.95)
LDUAL	0.060 (0.72)	−0.040 (−0.71)
LSOE	0.108 (0.88)	0.057 (0.52)
LAUDIT	0.063 (0.30)	0.133 (1.01)
Constant	−4.838*** (−2.63)	−5.779*** (−3.50)
Observations	2295	2295
R-squared	0.795	0.846
Firm FE	YES	YES
Year FE	YES	YES

Notes: The t statistics reported in parentheses are based on all standard errors clustered at the firm level. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively.

standard deviation, and the minimum and maximum values. Taking into account the endogeneity issue and hysteresis effect, all independent variables lag one stage behind the dependent variables.

4.2. Baseline results

To identify the impact of analyst following on greenwashing, we adopt the Model (2) as follows:

$$GW_{i,t} = \alpha_{i,t} + \beta_1 ANA_{i,t-1} + \beta_2 Control_{f,t-1} + FixedEffects + \varepsilon_{i,t} \quad (2)$$

where $ANA_{i,t-1}$ is used to measure whether firm i is followed by analysts in year $t-1$, also recorded as $LANA_{i,t}$. $Control_{i,t-1}$ represents a series of control variables. *Fixed Effects* include firm fixed effects used to capture unobservable characteristics of firms, and year fixed effects to control time-variant trends.

The results of the baseline regression for Model (2) are shown in Table 2 below. In Column (1), control variables are excluded, and it is observed that $LANA_{i,t}$ has a significant negative impact on greenwashing, indicating that analyst following can decrease the extent of greenwashing. In Column (2), control variables are included. The coefficient of $LANA_{i,t}$ is -0.064 , suggesting that analyst following leads to a 6.4% reduction in the level of greenwashing.

4.3. Cross-sectional analysis

4.3.1. Cross-sectional differences in information asymmetry

Analyst following plays a crucial role in reducing information asymmetry and enhancing public understanding of a company, thereby serving as a supervisory mechanism. Consequently, we hypothesize that the influence of analyst following on the extent of greenwashing is more pronounced in the subset of companies characterized by higher levels of information asymmetry. To measure information asymmetry, we employ net profit volatility, which represents the standard deviation of net profit over four quarters within a year. Firms with greater information asymmetry tend to exhibit higher levels of net profit volatility. Subsequently, we divide the sample into two groups based on whether their net profit volatility last year exceeded the median value or not. The group with higher net profit volatility is classified as the high group, while the remaining firms are categorized as the low group. We then proceed to apply Model (2) to both subsamples with varying degrees of information asymmetry and present our findings in Table 3.

In Column (1) of Table 3, we observe that $LANA$ is significantly negative, with a coefficient value of -0.216 , compared to the baseline result of -0.064 . Conversely, in Column (2) of Table 3, $LANA$ does not exhibit statistical significance, aligning with our initial assumption. In conclusion, we find that analyst following has a stronger impact on companies within the high group with greater information asymmetry.

Table 4
Heterogeneous results by corporate governance environment.

VARIABLES	(1) High Related Transactions GW	(2) Low Related Transactions GW
LANA	−0.106*** (−2.67)	0.049 (0.89)
lnLMV_A	−0.059 (−0.88)	−0.124* (−1.77)
LROE	0.055 (0.58)	0.116 (0.94)
LLEV	0.115 (0.51)	0.129 (0.41)
LBM	−0.136 (−0.72)	−0.367** (−1.98)
LDUAL	−0.036 (−0.61)	0.040 (0.43)
LSOE	0.044 (0.37)	−0.118 (−0.69)
LAUDIT	−0.019 (−0.10)	0.344** (2.33)
Constant	−5.358*** (−3.20)	−3.803** (−2.23)
Observations	2106	2106
R-squared	0.822	0.800
Firm FE	YES	YES
Year FE	YES	YES

Notes: The t statistics reported in parentheses are based on all standard errors clustered at the firm level. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively.

4.3.2. Cross-sectional differences in corporate governance environment

In the enterprises with poor corporate governance environment, due to the lack of internal supervision, the supervision role brought by the attention of analysts is more important and influential. Therefore, we assume that the influence of analyst following on greenwashing is more likely to be stronger for firms with poor corporate governance environment. To measure the level of corporate governance environment, we calculate the share of related-party revenue in total revenue. Companies with more related-party transactions tend to have worse corporate governance environment. Specifically, we divide the sample into two groups based on the proportion of related-party revenue last year: a high group and a low group. We then perform Model (2) again using these two subsamples with varying the rate of related-party revenue and report results in Table 4.

In Table 4, Column (1), LANA we are always interested in is significantly negative, and the coefficient is −0.106, while the corresponding coefficient in the baseline regression is −0.064. On the contrary, in Column (2) of Table 4, LANA is not significant, which is consistent with our assumption. To sum up, the impact of analyst following on the level of greenwashing of firms is stronger for firms with weak corporate government environment.

5. Conclusion

As analysts can play the role of reducing information asymmetry between firms and the public and supervision the behavior of firms, we find that analysts following leads to a substantial decrease in the extent of company greenwashing. Our findings hold particular significance in samples with high levels of information asymmetry and weak corporate governance environment.

Our findings offer compelling evidence for analysts to assume a supervisory role, validating the significant influence of public concerns on corporate behavior, and enhancing research on the information environment. Additionally, our findings held potential implications for the regulatory sector and investors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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