CEO talk under scrutiny : visibility and rhetorical impression management in sustainability narratives

Manuscript title: CEO Talk under Scrutiny: Visibility and Rhetorical Impression Management in Sustainability Narratives

Abstract

Purpose: We investigate the influence of corporate visibility on rhetorical impression management (IM) in sustainability reporting (SR) CEO letters. By analyzing both general visibility (sensitive industry membership) and issue visibility (sustainability controversies), we aim to provide insights into how managers utilize linguistic style in response to visibility pressures.

Design/methodology/approach: Using a sample of 2,139 SR CEO letters, we examine functional, affective, and cognitive linguistic elements and identify three prominent style profiles: formal-analytical, assertive, and defensive. Multivariate regression is employed to test how general and issue visibility affect these profiles.

Findings: CEOs in less visible industries tend to show a higher propensity for assertive language to project leadership and control. In contrast, companies with higher general visibility tend to use more analytical language, suggesting that formally and logically aligning with public information seems to be a pragmatic way for CEOs in sensitive industries to establish credibility and legitimacy. However, when these CEOs face sustainability controversies, they step in head-on to contextualize the issues in a reactive manner to contain legitimacy threats.

Originality: Our research offers a fine-grained linguistic focus on IM in SR CEO letters, highlighting prominent linguistic style patterns and underlying drivers. We show that the identified language styles are not mutually exclusive but are triggered by distinct legitimacy concerns. We explicitly consider interdependency between the CEO letter and the main report and assess readability as a derivative of primary stylistic choice. The sample allows us to make inferences on how capital market differences affect CEO language postures.

Keywords: sustainability reporting; impression management; legitimacy theory; visibility dynamics; corporate communication; sustainability communication

1. Introduction

Sustainability reporting (SR)[1] is used as a communication tool providing information on companies' sustainability-related activities to address the societal call for sustainable business and to build, enhance or repair organizational legitimacy. As the demand for transparency and accountability regarding corporate sustainability has been increasing among stakeholders, SR has become a standard corporate practice. Many studies, however, have demonstrated false claims, unmet promises or omitted performance outcomes in SR, which cause concerns that organizations "*talk but do not walk the sustainability*". Consequently, the credibility and the quality of sustainability-related disclosures are often debated in the interdisciplinary accounting literature, suggesting that SR is prone to impression management (IM) strategies. While the literature offers extensive empirical evidence of IM in SR, its antecedents are not fully understood. In our study, we contribute to filling this research gap by focusing on linguistic style features of CEO narratives in SR as indicators of rhetorical IM.

Narrative sections in SR contain personalized messages and business tales, addressing key corporate events, achievements and future prospects as presented by the corporate leader (Fuoli, 2018). We explore corporate visibility as a driver and/or constraint of IM practices in CEO letters, in line with Leary and Kowalski (1990). Our investigation distinguishes between general (related to industry membership) and issue visibility (driven by sustainability controversies reflecting unethical and irresponsible business behavior), both of which hold particular relevance in sustainability research (Dawkins and Fraas, 2010). While several authors argue that increased visibility and related scrutiny, make companies less prone to IM (e.g., Marquis *et al.*, 2016), others suggest that companies with higher environmental exposure and institutional pressure - and consequently, greater public visibility - are more inclined to engage in IM practices to legitimize their environmentally unfriendly operations (e.g., Stacchezzini *et al.*, 2016). We address these contradictions in the literature in three ways.

First, drawing upon legitimacy theory, we argue that general and issue visibility relate to different legitimacy-related motives, i.e., maintaining legitimacy versus repairing legitimacy, which promote distinct IM strategies to match legitimacy-related requirements. The level of scrutiny for overt IM is clearly higher for companies operating in sustainability-sensitive industries[2] (hereafter referred to as sensitive industries), where the institutional environment is characterized by stringent regulations and governance structures due to their higher business exposure (Aerts and Cormier, 2009). For companies operating in sensitive industries, using formal and analytical language strategically in concert with institutionalized reporting formats and avoiding explicit self-serving IM are expected to foster perceived accountability and transparency and, thus, maintain legitimacy. Issue visibility driven by sustainability controversies, on the other hand, creates a gap between the desired and current image of companies through media and news and disrupts the legitimacy status-quo (Kuruppu *et al.*, 2019). In such cases, managers are forced to respond to this disruption to repair damaged legitimacy by applying reactive IM strategies (Arvidsson, 2010). As the relationship between general visibility and the use of IM strategies is context-dependent and is likely to be affected

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[1] In the literature, different terms have been used for SR, including corporate social responsibility (CSR) reporting; social/environmental reporting; environmental, social and governance (ESG) reporting; corporate social disclosures, etc. In this paper, we systematically use "sustainability reporting", following the inclusive definition of sustainability in the Brundtland Report (1987).

[2] Following prior literature (Garcia *et al.*, 2017; Passetti *et al.*, 2018), we define sustainability-sensitive industries as those having a major socio-environmental impact and being subject to social taboos, moral debates and political pressures. These industries include materials (chemicals, metals & mining, forestry-paper & wood products), electric utilities, and oil and gas producers.

by the company's business exposure, we also assess the effect of the interaction of industry and controversies on the use of IM.

Second, prior SR studies have predominantly focused on content-based IM, including selective disclosure (e.g., Marquis *et al*., 2016, Roszkowska-Menkes *et al*., 2024) and imagery (e.g., Boiral, 2013), while little attention has been paid to style-related IM, i.e., managers' use of language. The discretionary nature of corporate narratives can be exploited opportunistically by managers by crafting linguistic style to guide readers on how content is to be appreciated along a preferred mindset (Talbot and Boiral, 2018). Style-based IM can take a variety of forms using affective tone, personalization or cognitive devices (e.g., causal language, certainty expressions, etc.). While the limited prior research in this area has primarily examined readability manipulation as an obfuscation strategy (e.g., Li *et al*., 2023; Smeuninx *et al*., 2020; Wang *et al*., 2018), our study offers a more nuanced analysis of linguistic style in SR.

Finally, we focus on the CEO letter as a distinct genre within SR, offering the highest degree of freedom in editorial and linguistic choice and not directly burdened by institutionalized reporting frameworks. Research on the actual talk of sustainability in the CEO letter is currently rather limited (Arvidsson, 2023). We need to acknowledge, however, that the CEO letter is not a comprehensive nor an independent SR vehicle. It is rather a somewhat superimposed piece in the SR repertoire that provides the CEO the opportunity to put a personal stamp on how to position the corporate sustainability challenge, but with the main report as the bottom line. Editorial choice may materialize in summarizing highlights of the main report, introducing the general setting or providing closure of the issues involved. Whatever the chosen editorial perspective, it can be assumed that the level of transparency of the main report will affect the language use in the CEO report. By disregarding the specific status and interdependency of the CEO letter, previous studies might have overlooked the nuanced ways in which CEOs' editorializing complements the main report responding to stakeholders' legitimacy concerns. By controlling for the overall transparency level of SR, we investigate how CEOs engage with the information presented therein.

To this end, we employ a sample of 2,139 CEO letters from 384 companies from the EU, the UK and the US that published a stand-alone SR between 2010 and 2019. We utilize the three summary variables and the cognitive processes variable of the Linguistic Inquiry and Word Count (LIWC) software, which reveal the functional, affective and cognitive linguistic elements encompassed within SR CEO letters. Through factor analysis, we identify rhetorical profiles in SR CEO letters. This approach yields three rhetorical profiles: (1) formal-analytical; (2) assertive; and (3) defensive. Formal-analytical relates to formal, rational and hierarchical language use (Pennebaker *et al*., 2015), while assertive and defensive relate to narrative styles that are less technical and less factual but imply purposeful sense-giving (Arvidsson and Johansson, 2019, Caliskan *et al*., 2021). Using the three profiles, we test our hypotheses using multivariate regression analyses. In doing so, our analysis goes beyond the limited body of research on rhetorical IM in SR, which predominantly relies on qualitative methodologies with a small sample size.

Our findings document that CEOs in more visible industries show a lower propensity to use assertive rhetorical IM refraining from outward-facing and authoritative communication. These companies tend to use more formal-analytical language in CEO letters. It reflects a risk-averse and personally detached CEO stance, aimed at maintaining legitimacy under greater scrutiny and governance pressure by fostering an aura of accountability and objectivity. This would imply that general visibility is not a motivator for explicit IM but rather acts as a constraint. However, when companies in sensitive industries are faced with company-specific sustainability challenges, CEOs step in to actively explain or contextualize the issues in a reactive manner to repair/restore threatened legitimacy. Our results suggest that the CEO's

reactive cognitive framing in response to controversies is mainly prompted by general visibility. Interestingly, we find that identified explicit IM styles are both positively correlated with readability, shedding new light on the use of low readability as a proxy for IM in prior studies. With respect to the interdependency between the CEO letter and the main part of the report, our results indicate that, in general, higher disclosure transparency tends to promote more formal-analytical language and less rhetorical IM by the CEO. This suggests that CEO letters are, indeed, not independent documents separate from the main report and that CEOs appear to consider the company's general disclosure transparency when constructing their narrative. Overall, our results offer valuable insights into the interconnections among visibility, scrutiny and concerns about legitimacy, enriching the scholarly discourse within the field of corporate sustainability.

The remainder of the paper proceeds as follows: The second part provides a brief literature review of SR and IM. In the third part, we introduce visibility notions and develop our hypotheses. The methodology used is presented in part four. The fifth part presents our research findings (including robustness checks). Finally, in part six, we discuss our findings and conclude.

2. Literature review

2.1. SR and related CEO letters from the legitimacy lens

Prior research shows that SR is considered a hybrid disclosure outlet, combining both promotional and informative functions (Fuoli, 2018). Promotional aspects are particularly evident in narrative sections that stress storytelling which is crucial in shaping stakeholder perception (Aerts and Cormier, 2009; Marais, 2012). The SR CEO letter is prominent in this regard. It is generally acknowledged that the CEO letter is one of the most read parts of the annual report (e.g., Barkemeyer *et al.,* 2014; Amernic *et al.*, 2010; Liu and Liu, 2023). While CEOs may not be the primary authors of these letters (Liu and Nguyen, 2020), which are presumably the "*end product that has been filtered through several layers in the company*" (Arvidsson, 2023, p. 34), CEOs exert significant influence on both their content and linguistic style (Post *et al.*, 2022). Bearing their signature, CEOs have a personal interest in at least closely reviewing and approving the final version of the CEO letter before making it public (Amernic *et al.*, 2010)[3]. A CEO letter is, however, not written in isolation. It is not a stand-alone reporting device but rather an integral part of the SR repertoire. As such, it needs to be understood as a highly discretionary component part of the larger SR package. This may mean significant interdependency with the scope and content of the main sustainability reports and a high degree of diversity in editorial choices made across companies.

Overall, legitimacy theory views SR as a means to uphold legitimacy and address external pressures (Cho and Patten, 2007). Organizational legitimacy can be sustained or altered either through corporate actions or by managing perceptions, with the latter probably being the easier and cheaper alternative (Bansal and Kistruck, 2006). In this regard, SR CEO letters can be used as a symbolic legitimacy tool to proactively bolster or amend the company image and reputation or to repair damaged legitimacy (Cho and Patten, 2007). From this perspective, SR CEO letters do not always reflect a company's authentic dedication to sustainability (Talbot and Boiral, 2018), nor are they solely motivated by transparency and

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[3] Prior research convincingly demonstrates that CEO characteristics (e.g., gender, overconfidence, narcissism) influence the language (e.g., tone, readability) used in CEO letters (Liu and Nguyen, 2020; Le Maux and Smaili, 2024). In a similar vein, studies show that CEO changes lead to variations in style, length, and content of the letters, while letters signed by the same CEO tend to exhibit consistency (Eggers and Kaplan, 2009). Indeed, famous business leaders, such as Jack Welch and Warren Buffet, publicly acknowledged their strong involvement in shaping their CEO letters (Amernic *et al.*, 2010).

accountability concerns, but also need to be understood as a response to external scrutiny pressures (Cho *et al*., 2010). Moreover, Marais (2012) points out the predominance of the theme of moral legitimacy when communicating sustainability efforts, with an emphasis on portraying the organization as a good corporate citizen by employing discourse of goodwill and through invoking emotion and affection to persuade the audience. Such a communication approach would necessarily rely on language and rhetoric to convince the audience of a preferred mindset.

2.2. Impression Management

Perception management within the context of legitimacy strategies is close to the concept of IM which refers to the processes by which people manage and control the image they display with the intention of changing the impression of others in order to be perceived and evaluated more favorably (Leary and Kowalski, 1990). Leary and Kowalski (1990) portray an array of IM drivers that either relate to IM motivation or IM construction[4]. We argue that the visibility dimensions that we investigate in this study, are circumstantially related to both components of their model.

In SR narratives, IM can be achieved through thematic control (e.g., biased selection of themes, performance comparisons or visual presentation) and through style control (e.g., the use of complicated language to obfuscate bad news) (Barkemeyer *et al.,* 2014; Merkl-Davies and Brennan, 2007). What we refer to as rhetorical IM are editorial and linguistic choices that are instrumental in building support, convincing investors, and sustaining confidence and credibility; they are primarily style-related.

Traditionally, IM in narrative disclosures has been mainly studied by examining the relationship between linguistic features and organizational performance (Melloni *et al*., 2016). When company activities and outcomes are desirable, managers tend to adopt IM as an assertive strategy in a proactive manner to enhance and emphasize companies' positive outcomes to gain competitive advantage (Barkemeyer *et al.,* 2014; Boiral *et al*., 2020). Assertive IM involves highlighting unique organizational competencies and business skills (Boiral *et al*., 2020; Bolino *et al*., 2008). Managers using this strategy stress the importance, relevance and scope of positive environmental outcomes or actions positing an acclaiming and self-confident stance in the message delivered (Aerts and Cormier, 2009; Aerts and Yan, 2017). In other words, the aim of assertive IM is to make a positive outcome more obvious to the audience and project an impression of organizational success. These strategies are reflected in managers' use of language, where a stronger positive tone, extensive self-referencing, emphatic certainty expressions and achievement- and future-related content references are used (Aerts and Yan, 2017). In the context of SR, scarce evidence suggests that in companies with good sustainability performance, managers tend to use a tone of optimism, clarity and certainty, as well as readable language to signal their achievements (Li *et al*., 2023).

In circumstances that threaten legitimacy, managers tend to employ defensive IM strategies (Bolino *et al*., 2008). In the literature, defensive IM strategies, which encompass distractions, apologies, excuses, justifications or self-handicapping, are used as an umbrella term for reactive mechanisms (Boiral *et al*., 2020). By using such techniques, managers can deny responsibility for negative outcomes, or seek to re-establish a positive identity by removing negative perceptions and purposefully giving sense to the organization's actions (Caliskan *et al*., 2021). They may also prefer to withhold or obfuscate unfavorable

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[4] IM motivation reflects the desire to influence others' perceptions, while IM construction focuses on determining the impressions one aims to create and the strategies to achieve them. IM motivation is associated with goal-relevance of impressions, value of desired goals and discrepancy between desired and current image. The second component, IM construction, relates to self-concept, desired and undesired identity images, role constraints, target's values and current or potential social image (Leary and Kowalski, 1990).

performance-related information (Fabrizio and Kim, 2019). Defensive strategies have also been associated with less readable disclosures (Li *et al.*, 2023; Smeuninx *et al.*, 2020; Wang *et al.*, 2018) to obfuscate poor results or with the remedial use of causal language in order to rationalize negatively perceived outcomes and minimize management responsibility for them (Zhang and Aerts, 2015).

Most IM mechanisms studied in prior SR research (such as thematic choice, arguments offered and attributional analysis) rely on a combination of thematic or propositional content and style features. The rhetorical IM features that we investigate are, however, largely detached from the substance or propositional content of the CEO letter, but are deemed to be important to ground the persuasiveness and credibility of the message. For example, assertive language usually relies on a positive tone, extensive self-referencing, clarity and certainty expressions. For defensive IM, managers tend to use more cautious framing and sense-giving devices, such as engagement markers (e.g., "consider", "note that", "you can see that") that "project an aura of credibility gained by openness" and hedging expressions (e.g., "might", "perhaps", "possible") which help create distance from the message and avoid direct responsibility (Aerts and Yan, 2017, p. 416; Hyland, 1998). Those linguistic style markers are helpful in organizing and evaluating propositional content in such a way that readers are guided and directed to how they should distill meaning from, appraise and respond to the information presented (Crismore *et al.*, 1993). They add a sense-giving layer to propositional content and tend to reveal the messenger's stance with regard to the issues involved. Their effectiveness will ultimately depend on the credibility of the signals involved. Credible signals will have to resonate with the background expectations of the audience. In that regard, rhetorical signals must be perceived as credible, not only within the context of the CEO letter as such, but also within the larger disclosure environment of which the CEO letter is only a part. Public industry knowledge and evidence of company-specific performance and behavior as embedded in the larger information environment may act as a constraint on the construction of credible IM.

3. Hypotheses development

The main research question of this study is how corporate visibility affects rhetorical IM in SR CEO letters. Corporate visibility has multiple dimensions including general visibility, reflecting the degree to which a company is salient or prominent in the public eye due to its size or industry membership (Ruiz-Blanco *et al.*, 2021), and issue visibility, reflecting the salience of company-specific issues or controversies (Dawkins and Fraas, 2010). Visibility tends to escalate institutional pressure and public scrutiny over corporate behavior. As such, it is believed to affect companies' tendency to symbolism and IM (Greenwood *et al.*, 2011). General visibility is associated with stringent scrutiny over corporate activities and disclosures, yet it does not create a legitimacy threat as such. Disruption in the "legitimacy status-quo" can be a result of a major sustainability controversy that increases the issue visibility of a company.

3.1. General visibility and IM

While heightened general visibility associated with sensitive industry membership might increase awareness of the importance of SR and stakeholder engagement, it does not necessarily translate into a direct motivation for IM. Instead, it fosters a complex interplay between institutional pressures, perceived risks and strategic communication choices.

Companies in sensitive industries, such as oil and gas extraction or chemical manufacturing, often have greater business exposure, defined as the degree to which an organization affects its environment and is affected by it (Michelon *et al.*, 2013). This heightened exposure translates into increased scrutiny from a broad range of stakeholders and

creates a strong incentive to maintain legitimacy and the social license to operate through transparent and consensual reporting (Arvidsson, 2014). Institutional literature argues that in a scrutinized environment, accountability and reporting practices tend to become ritualized, largely due to coercive isomorphism stemming from shared agreements and industry regulations (Larrinaga-González, 2007). To maintain legitimacy, managers operating in sensitive industries tend to imitate the decisions and reporting practices of industry leaders within the same institutional reference groups (DiMaggio and Powell, 1983; Van Caneghem and Aerts, 2011). This mimetic isomorphism can lead to increased standardization and use of generally accepted reporting formats, potentially limiting opportunities for more nuanced or individually tailored IM strategies (Aerts and Tarca, 2010).

These arguments suggest that general visibility is not a motivator for IM, but rather acts as a constraint of IM, whereby the current public image of companies in sensitive industries (as embedded in public industry knowledge and documented in transparent SR formats) curbs the construction of IM alternatives (Leary and Kowalski, 1990). Given the low probability of success in creating an alternative impression when the current public image is salient, *people are reluctant to present themselves in ways that are inconsistent with information others have about them* (Leary and Kowalski, 1990, p. 42). This would, *a fortiori*, apply to the CEO letter for which the main sustainability report presets a large part of public company-specific information to which the CEO must relate in the CEO letter. Further, the presence of an evaluative audience, aware of the potential for IM, can create a cautious disclosure attitude in corporate narratives. Recognizing that IM strategies can backfire and be perceived as misleading or "cheap talk" in a highly scrutinized environment (Rogers *et al.*, 2011), managers in sensitive industries might avoid overtly promotional language and prioritize presenting objective, verifiable data to support their claims. This aligns with Aerts *et al.*'s (2013) finding that in highly scrutinized contexts, managers tend to favor technical accounting explanations based on formal and analytical language over more discretionary causal expressions. Thus, while not precluding all forms of IM, the heightened scrutiny in sensitive industries likely shifts the focus toward substantiating claims with verifiable data and aligning with industry best practices, potentially leading to a more cautious and less overtly promotional communication style. This strategic response basically aims at protecting the company's reputation and maintaining legitimacy by minimizing the risk of criticism.

In contrast, companies in non-sensitive industries may operate with less public visibility and face less stringent regulatory pressures, creating a more discretionary reporting environment. Crilly *et al.* (2012, p. 1436) argue that companies in non-sensitive industries hold *"high potential for information asymmetry and can easily build smokescreens around their internal practices"*. This reduced scrutiny may create opportunities for the CEO for purposive editorializing language and tone, using interactional cues of rational, affective and interpersonal appeal that go beyond matter-of-fact reporting and guide the audience to a preferred mindset. Based on the above discussion, we predict the following:

H1a: General visibility driven by sensitive industry membership is positively associated with the use of more formal and analytical language in the CEO letter.
H1b: General visibility driven by sensitive industry membership is negatively associated with the use of more explicit rhetorical IM in the CEO letter.

3.2. *Issue visibility and IM*

Issue visibility is prompted by the salience of company-specific sustainability-related issues or controversies. Corporate controversies, defined as *publicly observable events that are expected to have negative implications on the firm* (Del Giudice and Rigamonti, 2020, p.2), attract media attention and create a gap between a company's desired image and its current, less favorable public perception, ultimately jeopardizing the company's legitimacy and value (DasGupta, 2021; Elsbach and Sutton, 1992).

Drawing on Leary and Kowalski's (1990) two-component model of IM, we argue that sustainability controversies affect both impression motivation and impression construction. Controversies not only increase public perception, making impressions more goal-relevant, but also highlight the discrepancy between a company's desired and current image, both increasing managers' motivation to employ IM strategies. The choice of IM strategy is influenced by the current and potential social image that the company aims to project. Sustainability controversies, as public failures, damage a firm's current image and compel managers to adopt face-saving strategies and legitimization tactics such as apologies, excuses, and self-serving attributions to dissociate themselves from negative events (Boiral, 2016; Hahn and Lülfs, 2014).

Most narrative IM tactics blend propositional content with an appropriate language style. A defensive style tends to include cognitive mechanisms, such as tentative expression, hedges, directive language and insight words, that signal cognitive effort and facilitate coherence and comprehension of the message by the receiver (Hyland, 1998). They tend to invoke plausibility rather than certainty. Such cognitive mechanisms are helpful in signaling the presence of a considerate, capable and honest communicator. As such, they are likely to sustain the CEO's credibility and honesty, making it easier for stakeholders to connect with the challenges and constraints of the company (Aerts and Yan, 2017). Relatedly, sustainability controversies are likely to undermine the credibility of an overly optimistic tone and of self-serving acclaiming and storytelling. Further, as reported by Rogers *et al*. (2011), overly optimistic language (as in assertiveness) can increase litigation risks during corporate controversies.

Conversely, in the absence of controversy, CEOs have more room to proactively claim positive achievements and to portray a positive image of an authoritative, confident and engaging actor in the sustainability domain. As Tata and Prasad (2015) suggest, CEOs in companies with a neutral or favorable public image are likely to use assertive communication to further enhance their reputation, while companies facing negative publicity are more likely to adopt a more protective stance. Thus, we propose the following hypotheses:

H2a: Issue visibility driven by sustainability controversies is positively associated with defensive rhetorical IM in the CEO letter.
H2b: Issue visibility driven by sustainability controversies is negatively associated with assertive rhetorical IM in the CEO letter.

Sustainability controversies pose a legitimacy risk for all companies; however, firms operating in sensitive industries are particularly vulnerable due to heightened public and regulatory scrutiny associated with the inherent risks of their operations. Greater business exposure would exacerbate reputational and financial vulnerabilities when controversies put legitimacy in jeopardy (Aouadi and Marsat, 2018; Del Giudice and Rigamonti, 2020). In sensitive industries, where accidents are especially costly to the environment and society, regulators tend to be less forgiving than in non-sensitive industries (DesJardine *et al*., 2023).

The higher damage potential of controversies in sensitive industries may heighten the perceived severity of image discrepancies and increase the goal relevance of perception management (Leary and Kowalski, 1990). We expect this to act as a strong motivator for CEOs in sensitive industries to take up an active rhetorical stance to engage with the audience in an effort to restore perceived legitimacy in a reactive mode. Only relating to or reinforcing corporate disclosures from the main report through complacent formal language in a descriptive or analytic fashion would not suffice in that regard. To restore confidence, effective rhetorical language is expected to invoke a sense of immediacy in order to rationalize or normalize mediatized controversies. This is consistent with prior research demonstrating the use of legitimization strategies for negative incidents among sensitive industries (Hahn and Lülfs, 2014; Talbot and Boiral; 2018).

Moreover, given the challenges managers in sensitive industries face when trying to highlight favorable outcomes from their sustainability initiatives, we project that general visibility will amplify the CEOs' resistance to using an assertive communication style when addressing controversies. In non-sensitive industries, controversies may be seen as exceptions rather than part of a pattern, allowing companies more leeway to use assertive language or make positive statements in their responses. In contrast, companies in sensitive industries have high base-level exposures (Cho and Patten, 2007) and operate under higher stakeholder situational skepticism (Aqueveque *et al.*, 2018). As such, they are closely scrutinized on how they respond to controversial issues, with particular attention to misleading claims (Marshall *et al.*, 2023). Consequently, companies in sensitive industries are less inclined to manage their public image through the disclosure of positive information related to sustainability issues that are subject to controversy, compared to their counterparts in the less sensitive sectors (Roszkowska-Menkes *et al.*, 2024). Thus, we expect that:

H3a: The positive relationship between issue visibility and defensive rhetorical IM in the CEO letter is positively moderated by general visibility.
H3b: The negative relationship between issue visibility and assertive rhetorical IM in the CEO letter is negatively moderated by general visibility.

4. Methodology

To study rhetorical IM in SR, we employ a three-step methodological approach. First, we conduct an automated text analysis to examine the linguistic style features in SR CEO letters. Second, we conduct a factor analysis to reveal co-occurrence patterns among linguistic markers derived from the previous step to identify rhetorical IM profiles. Finally, we test our hypotheses in empirical models with the rhetorical profiles as dependent variables.

4.1. Sample selection and data collection

We selected listed companies from the EU, the UK and the US that published a stand-alone SR for the fiscal year 2016 according to the Refinitiv (Thomson Reuters' Asset4ESG) database. The sample composition allows diversity in country-level institutional context that has been shown to affect language postures (Aerts and Yan, 2017; Liu and Liu, 2023; Smeuninx et al., 2020). In this regard, we sample companies from the US, UK and Continental Europe respectively to include implicit (Continental Europe) and explicit (US and UK to a lesser degree) CSR institutional environments (Matten and Moon, 2008). Moreover, the sample composition also captures capital market differences that may affect the goal relevance and the value of desired outcomes of IM (Leary and Kowalski, 1990). Structural differences in share ownership and shareholder activism as well as CEO pecuniary differentials that exist among

Anglo-Saxon and continental European countries may affect CEO motivation to engage in IM. For example, institutional differences in CEO power and CEO compensation may affect the value of desired IM outcomes, suggesting a higher propensity in portraying CEO leadership identity and managerial competence to preserve power and lucrative compensation arrangements in an Anglo-Saxon market environment.

We extended the time frame for the selected companies from 2010 to 2019 and manually collected the reports in PDF from their websites, corporate register (corporateregister.com), and Global Reporting Initiative (GRI) database (globalreporting.org). We excluded companies that operate in the healthcare, financials, real estate, government activities, and academic and educational services sectors; companies that do not publish their reports in English; companies that use integrated reporting; SR that do not include CEO letters; SR that are protected and cannot be processed; and CEO letters counting fewer than 350 words[5] in length. We manually processed CEO letters in SR in accordance with prior research and excluded CEO letters that do not contain sustainability-related information. This selection process yielded a sample of 2,139 CEO letters from 384 companies that we later used in factor analysis to create rhetoric variables. We combined the sample of CEO letters with data we needed for explanatory and control variables derived from Refinitiv and Bloomberg and excluded observations with missing data. The final sample used in the multivariate analyses consists of 1,805 CEO letters from 345 companies headquartered in 18 countries[6].

4.2. Linguistic analysis

To examine the linguistic style used in CEO letters, we use LIWC-22, which is based on strong empirical evidence that language can provide rich insights into people's psychological states, including emotions, thinking styles, and social concerns (Boyd *et al.*, 2022). This software has been extensively tested in numerous social psychology studies and has also been used in the corporate reporting context (e.g., Aerts and Yan, 2017; Merkl-Davies and Brennan, 2007). We use LIWC-22 to reveal the functional, affective and cognitive components of the CEO letters. We employ the three summary psychosocial variables of LIWC: (1) *analytical thinking;* (2) *clout*; and (3) *emotional tone.* In addition to these, we use the *cognitive processes* variable. The three summary variables are composite measures derived from previously published findings from Pennebaker Language Lab and converted to percentiles based on standardized scores from large comparison samples (Boyd *et al.*, 2022). Each of the variables is transformed into a scale from 1 to 100, and they are mainly based on function words. Function words have been found to be reliable markers of psychological states, revealing how people think (Pennebaker *et al.*, 2014). For example, high use of single-person or second/third-person pronouns has been associated with self- or other-focus, respectively; auxiliary verbs with the use of passive language; articles with formal and structured style of writing; and conjunctions with cognitive complexity (Aerts and Yan, 2017; Pennebaker *et al.*, 2007). The *analytical thinking* variable captures *the degree to which people use words that suggest formal, logical and hierarchical thinking patterns* (Pennebaker *et al.*, 2015). The lexical categories of a higher *analytical thinking* score include articles, prepositions which reflect a more technical language; while a lower score includes pronouns, auxiliary verbs, conjunctions and adverbs which reflect a more informal and personal language (Pennebaker *et al.*, 2015). *The clout* variable refers to the relative social status, confidence, or leadership that people display through their language (Boyd *et al.*, 2022). A higher *clout* score is measured by 1st person plural (*we*) and second-person pronouns (*you*), which reflects confident, credible and collectively-oriented language; while a lower clout score is measured by tentative words (e.g.,

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[5] Prior text analysis software baseline its measures based on a minimum of 350 words (https://docs.receptiviti.com/). Hence, we impose a minimum word limit for our investigation based on 350 words.
[6] In Appendices, we present more detailed selection criteria (Table-AI) and the final sample summary statistics (Table-AII) with respect to distribution by year, country, region, and industry.

maybe, *perhaps*) reflecting tentativeness, humble and anxious language (Kacewicz *et al*., 2014; Pennebaker *et al*., 2015). Finally, the *emotional tone* variable puts positive tone and negative tone dimensions into a single variable (Cohn *et al*., 2004). The higher the score, the more positive the tone is. Tone as a measure of text sentiment has been widely used as a proxy of disclosure balance in SR. Table I summarizes the indicators of analytical thinking, clout, and emotional tone, their directions and example words.

--- [Insert Table I about here] ---

Cognitive processes is another composite variable that includes markers of cognitive complexity such as insight, causation, discrepancy, tentative, certitude and differentiation words. Cognitive processes words signal thought, causality and insight, and are used in situations, *when people wish to transmit facts, reconstruct events and provide explanations for them* (Brownlow *et al*., 2020, pp. 11-12). Sense-giving in accounting narratives largely depends on these linguistic devices (Aerts and Yan, 2017; Merkl-Davies and Brennan, 2007). The composite variable is expressed as a percentage of the total words used in any given language sample. Table II presents components of the cognitive processes variable with their most frequently used exemplars.

--- [Insert Table II about here] ---

4.3. Factor analysis
We use the LIWC-derived variables as inputs to factor analysis to identify salient linguistic structures in the CEO letters. We employ principal component factor analysis with varimax orthogonal rotation. The identified constructs serve further as our test variables. Table III shows the resulting variables and their respective factor loadings.

--- [Insert Table III about here] ---

The analysis led to the identification of two uncorrelated factors with eigenvalues greater than 1.0, which cumulatively explain 72% of the overall variance. They group the stylistic and content characteristics that tend to co-occur in SR CEO letters, revealing the main explicit IM profiles in our sample. We use a cut-off of 0.20 for interpretation purposes and label the factors as follows: assertive (Factor 1) and defensive (Factor 2).
Both factors have negative loadings on analytic thinking. This provides strong support that analytic indicates a more formal and analytical style with minimal audience engagement, while identified factors represent highly narrative, less technical and less factual writing styles. Factor 1 is based on positive emotional tone and clout, highlighting social connections and accomplishments with the use of optimistic narratives, which we refer to as *assertive*. Factor 2 is balanced communication (e.g., neutral loading of emotional tone) with high use of cognitive processes markers that cautiously provide explanation and meaning to organizational outcomes, which we refer to as *defensive*. Within Factor 2, the loadings suggest that this style provides complex meanings, justifications and explanations for organizational events while avoiding strong emotional bias. To ensure accurate factor labeling and strengthen the

robustness of our conclusions, we additionally account for the correlations between the factor variables and linguistic style and content variables[7]. We present our correlation analysis in Table IV.

--- [Insert Table IV about here] ---

Notably, we find that readability[8] positively correlates with assertive and defensive styles but negatively correlates with the formal-analytical style. These results suggest that contrary to the obfuscation-through-low-readability hypothesis proposed in prior studies, more explicit rhetorical IM tends to rely on simpler, understandable language. Further, in acknowledging the diverse interpretations and classifications within the field of IM, it is important to note that the terms "assertive" and "defensive" encompass a broad spectrum of subcategories in the literature, including enhancements, entitlements, excuses and justifications (Tedeschi and Melburg, 1984). In our investigation, as indicated by correlations observed, the assertive category is notably associated with what might be considered enhancements, portraying an overly optimistic perspective, while the defensive category aligns more with justifications or the act of sensemaking and rationalizing the communicated content.

4.4. Empirical models

To test our hypotheses, we apply the following regression model:

Rhetorical style = f(INDsen, ESGcontro, INDsen X ESGcontr, controls)

The dependent variable allows for three different rhetorical styles. The first is represented by the analytical thinking variable, which loads highly negatively on the assertive and defensive factors in the factor analysis and stands for formal-analytical language use. This somewhat detached and impersonal rhetorical approach stresses logical and rational information structuring and low CEO interference to guide the audience to a preferred mindset. The other two dependent variables are derived from our factor analysis: an assertive style (Factor 1); and a defensive rhetorical approach (Factor 2). The latter two variables correspond to writing styles that are predominantly narrative and include storytelling and explicit IM elements (emotional, personal and cognitive language).

The first variable of interest (INDsen), being a dummy variable that indicates a company's membership in sensitive industries, captures general visibility (H1 and H3). In defining the variable, we follow prior literature (Garcia *et al*., 2017; Passetti *et al*., 2018) and consider materials (including chemicals, metals & mining, forestry-paper & wood products), oil & gas and utilities as sensitive industries (dummy variable is coded one for those industries)[9]. The second variable of interest (ESGcontro) is the ESG controversies score as a proxy for issue visibility (H2 and H3). The score is calculated by Refinitiv based on 23 ESG controversy topics and is captured from global media (third-party sourced information) that materially impact the corporations. The score allows comparison across industries and resolves the market cap bias, which large companies suffer from, as they attract more media attention than smaller companies through adjusting and normalizing scores based on company size and

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[7] Style variables are derived from LIWC-22; whereas content variables are based on the CSR dictionary developed by Pencle and Malaescu (2016), which encompasses dimensions related to employee, human rights, environment, and social and community.

[8] FOG Readability Index is calculated as: *-1 x 0.4 x (average words per sentence + percentage of complex words)*. In our study, higher FOG index values indicate more readable CEO letters.

[9] We acknowledge that all companies in all industrial sectors can conduct activities with potential implications for the environment and society. Our selection of sustainability-sensitive industries includes the industries with the major socio-environmental impact, following prior literature.

industry (Shakil, 2021). The controversies score is expressed as a percentage rank, where a higher score implies fewer controversies. For a more straightforward interpretation, we reverse-coded the controversies score (i.e., presence of controversies is equal to 1; and no controversies is equal to 0). To test the industry moderation effect (H3) we include the interaction term between INDsen and ESGcontro.

Our models also include a number of control variables. To account for the interplay between sections of the report (CEO letter versus main report), we add the following two general disclosure transparency variables. First, we use a GRI dummy variable indicating whether the company follows the GRI standards/guidelines in its disclosure process. While the implementation of GRI may suggest greater transparency (Graafland and Smid, 2019), empirical evidence indicates that given the voluntary character of the framework, it is often used in a symbolic manner (Boiral, 2013; Michelon *et al.*, 2015). Hence, we introduce Bloomberg's ESG disclosure score (DIStransparency) as a second transparency-related control variable, widely used in prior literature as a proxy for corporate transparency and accountability in sustainability (García-Sánchez *et al.*, 2022). Bloomberg's analysts track companies' disclosure on more than 800 environmental, social and governance metrics, both qualitative and quantitative. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. The score is comparable across sectors and regions.

Further, as prior literature indicates, companies can simultaneously be involved in sustainability controversies while demonstrating strong social and environmental performance in other areas (Price and Sun, 2017), which may lead to differing effects on corporate disclosure behavior (Dawkins and Fraas, 2010). Hence, we control for the mean of Refinitiv's environmental and social scores as the proxy for overall environmental and social performance (EnvSoc) (Ioannou and Serafeim, 2012). Additionally, to control for organizational characteristics mechanisms that may influence IM behavior we employ corporate governance variables including an assurance dummy variable (Assur) indicating whether a company's report was subject to external verification, CSR/sustainability committee (CSRcom), percentage of female directors on board (BRDwmn), board size (BRDsize), percentage of independent board directors (BRDind) and CEO duality (CEOdual). As firm-level financial controls, we use ROA as a proxy of a company's profitability, and the natural logarithm of total assets as an indicator of the company's size (Size). Consistent with established literature on the country-level institutional determinants of IM (Aerts and Yan, 2017; Liu and Liu, 2023; Smeuninx *et al.*, 2020), we also incorporate regional dummy variables (UK and US) to control for company location. Finally, we control for the time trend including year dummies in the model. Table V summarizes our variables.

--- [Insert Table V about here] ---

The hypotheses are tested using random effects models that allowed us to estimate the effects of our time-invariant variable of interest (INDsen). The choice of the model was supported by the results of the Mundlak tests (Mundlak, 1978). For assertive and defensive as explained variables tests showed: Chi-squared(12) = 18.01, Prob > Chi-squared = .113; Chi-squared(13) = 20.91, Prob > Chi-squared = .052, respectively. These results indicate that there is no correlation between time-invariant unobservables and regressors, hence we reject the null hypotheses and conclude that the random effects models apply.

5. Results

5.1. Descriptive statistics

Table VI provides descriptive statistics to present the overall characteristics of the companies included in the sample. 38% of our observations come from sensitive industries. The mean value for the ESG controversy score is 0.22. While the majority (76%) of the firms adhere to GRI standards, only about half of them were subject to independent assurance and the mean value of disclosure transparency (DIStransparency) among these firms is 47.01. With regard to corporate governance practices, the majority of the sample companies have CSR/sustainability committees at the board level, as well as CEO and Chairman of the Board separation. The sample companies reveal variation in terms of board size (with a mean of 11 members), independence (with 75% of independent directors on average) and board gender diversity (with 23% female board members on average). Performance statistics reveal a mean of 66.43 for EnvSoc and of 5.51 for ROA. The sample companies are quite similar though with respect to size, with a mean and standard deviation of company size of 23.44 and 1.44, respectively[10].

--- [Insert Table VI about here] ---

Table VII presents a correlation matrix. We note that membership in sensitive industries (INDsen) is negatively correlated with two identified rhetorical IM profiles (assertive and defensive), while positively correlated with the formal-analytical style (Analytic), which provides initial support for our hypotheses (H1a and H1b). Correlation analysis also indicates that our issue visibility variable (ESGcontro) is positively correlated with defensive IM and negatively with formal-analytical style. These results provide support for our expectation regarding the prominence of defensive IM (H2a), but not for our hypothesis on the relationship between issue visibility and assertive IM (H2b). Moreover, sensitive industry membership is positively correlated with the use of GRI and overall disclosure transparency, suggesting that companies in sensitive industries value accountability and transparency to sustain legitimacy. The correlations among our independent variables do not indicate multicollinearity.

--- [Insert Table VII about here] ---

5.2. Multivariate analysis

The results based on the empirical models are reported in Table VIII. In the first three models, we tested the direct relationship (i.e., main effect) between our dependent and test variables (excluding the interaction term between INDsen and ESGcontro). Model (1) shows that, in line with our expectations (H1a), companies operating in sensitive industries disclose more formal and analytical SR CEO letters (i.e., significantly positive coefficient for INDsen - b = -.019, p < 0.10). Model (2) documents a significantly negative relationship between INDsen and the assertive style (b = -.029, p < 0.05). The results could indicate that the effect of general visibility pertains only to assertive IM and provide partial support for our hypothesis (H1b). We further

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[10] The sample exhibits a bias towards larger firms, resulting in limited variation in terms of firm size. This observation further supports the argument that firm size should not be used as a proxy for general visibility.

note a significantly positive relationship between ESG controversies (ESGcontro) and defensive style in SR CEO letters (Model (3)), providing support for H2a. H2b is, however, not supported, as we observe no significant relationship between ESG controversies score and assertive IM (Model (2)).

--- [Insert Table VIII about here] ---

In Models (4) up to (6), we added the interaction term between INDsen and ESGcontro to test the hypotheses regarding the moderating effect (H3a and H3b). The results indicate a significantly positive interaction effect for the defensive style (Model (6)), that supports our H3a. The lack of a statistically significant coefficient on ESGcontro in Model 6 suggests that it is companies from sensitive industries that are more prone to resort to defensive IM when controversies arise. Figure 1 depicts that the positive relationship between ESGcontro and defensiveness is observed only in sensitive industries, while it remains insignificant (indicated by a flat line) in non-sensitive industries. We find no statistically significant interaction effect in Model (5) (H3b was not supported).

--- [Insert Figure 1 about here] ---

Regarding our transparency-related control variables, our results show a positive effect of the DIStransparency on the use of formal-analytical style (b = .0013, $p < 0.01$) and a negative effect on the assertive style (b = -.0012, $p < 0.05$). In addition, our findings indicate a negative relationship between formal-analytical style and GRI (b = -.0192, $p < 0.5$) and a positive association between assertive style and the use of these reporting standards (b = .0211, $p < 0.5$). With respect to the corporate governance controls, assertive style seems to be constrained in the presence of larger boards (b = -.0058, $p < 0.01$) and CSR committee (b = -.0192, $p < 0.1$). Firms with larger representation of women on board tend to use less formal-analytical (b = -.0007, $p < 0.05$) and more defensive language (0.0010, $p<0.01$). Finally, both region dummies (UK and US) move in the same direction in comparison with the EU institutional setting for formal-analytical and assertive styles, that is both UK and US negatively affect the use of formal-analytical style (b = -.0707; b = -.0625, $p < 0.01$); while positively affect the use of assertive style (b = .0522; b = .1272, $p < 0.01$). Regarding the defensive style, however, we observe a significant effect from the UK companies (b = .0496, $p < 0.01$), whereas no significant effect is noted from the US companies; yet both of the effects are in the same direction. According to Matten and Moon's (2008) perspective, these discrepancies could be associated with unique institutional arrangements at the regional level. Matten and Moon's (2008) implicit-explicit CSR framework suggests that both US- and UK-oriented CSR tends to be more explicit in comparison to the European-style CSR, which provides more room for corporate initiative and therefore both assertive and defensive IM. The prominence of active private investors with a short-term outlook and shareholder value oriented institutional investors in the Anglo-Saxon countries would increase awareness for and salience of public image and tend to encourage IM.

As our results show, companies operating in sensitive industries tend to use a more formal-analytical style in the SR CEO letters. Such language is rather formal, logical, and hierarchically structured in terms of how information is presented and tends to avoid the need to focus on people and actions. This suggests that the greater scrutiny and governance pressures

in those industries, compel management to present their sustainability efforts in a more structured, somewhat detached and low-risk manner. Similarly, there is a significant negative relationship between operating in sensitive industries and assertive storytelling style. Whereas CEOs in non-sensitive industries tend to invest in authoritative, confident and outward-facing language that reflects leadership, certainty and being in control through assertive storytelling, such tendencies are significantly lower in sensitive industries. This indicates a more cautious approach in sensitive industries, probably to avoid backlash or skepticism from stakeholders. However, the significantly positive interaction effect for the defensive style indicates that companies operating in sensitive industries are more likely to adopt a defensive stance when facing high levels of ESG controversies. So, when the company is directly faced with mediatized sustainability controversies, the CEO tends to take the stage to explain, make sense or contextualize the issues involved in a more reactive fashion, probably to protect the company's legitimacy and mitigate potential negative perceptions. Our results also suggest that as general disclosure transparency increases, CEOs are less inclined to take on an assertive posture of leadership and control. Instead, they increasingly rely on formal, low-risk information sharing (i.e., analytic). Opposite results are found for GRI-based reports, which might suggest a largely symbolic function of this voluntary disclosure framework.

To evaluate the robustness of our findings against potential bias due to the skewed distribution of ESGcontro[11], we re-estimate our primary models for the subsample of observations with reported ESG controversies (ESGcontro>0). The results (Table IX) show that the direct effect of sensitive industry membership (INDsen) and ESG controversies (ESGcontro) yield the same sign, yet the statistical significance decreases (and even disappears) for some of the previously observed effects (so in Models (1) and (3)). When the interaction term is included (Models (4) and (6)), coefficients do attain statistical significance (which is in line with the main analyses). We associate the decrease in significance levels with the smaller sample size used for the robustness check. Nevertheless, the results of the robustness check qualitatively support our primary findings.

--- [Insert Table IX about here] --

6. **Discussion and conclusion**

CEO narratives are a powerful tool to shape public perception of a company's sustainability track record and of its alignment with societal norms and values. A SR CEO letter holds considerable leeway in highlighting key messages and themes, while the body of the report offers substantiation with more detailed information, data, and context, often in concert with institutionalized reporting formats. Prior research documents that CEO letters tend to be used for legitimacy purposes, portraying the company in a favorable light and giving the impression of acting in accordance with social expectations. Although promotional by nature, the CEO letter also needs to incorporate language that suggests transparency, accountability, and a commitment to sustainability to maintain alignment with societal expectations. This study

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[11] For the majority of our sample, i.e., 1,049 observations, no controversies have been reported.

investigates how balancing these needs is affected by corporate visibility driven by sensitive industry membership and mediatized controversies.

Our paper shows that higher general visibility from sensitive industry membership with its stronger scrutiny pressures leads to a more formal and analytical language style. Avoiding explicit rhetorical IM that is typically permeated with emotional, personal and story-telling language, reflects a restrained and risk-averse communication approach that may serve as a safeguard against potential backlash from stakeholders. This caution is evident in companies operating in sensitive industries, where the risk of being seen as merely window-dressing environmental efforts is higher. While these results are consistent with findings of previous studies (e.g., Marquis *et al*., 2016, Ruiz-Blanco *et al*., 2021), we only observe an impact of general visibility on the use of assertive IM, and not on defensive IM. This indicates that both forms of rhetorical IM follow different internal logic and connect with different drivers.

Our results suggest that managers allow themselves to be assertive only when they are not afraid of being accused of "greenwashing". Companies with a lower environmental footprint face less scrutiny and activist pressure (Marquis *et al*., 2016) and seem less constrained by public knowledge to profile themselves and take up an assertive stance in portraying leadership and authority in the sustainability domain as a way to establish legitimacy (Tan *et al*., 2014). Such outward-facing and authoritative communication allows CEOs to demonstrate confidence and control. While assertiveness is typically proactive, defensiveness is reactive and would not be consistent with an aura of confident agency and leadership. As demonstrated, defensive IM is only triggered when corporate legitimacy is overtly challenged. O'Donovan (2002) argues that the legitimation techniques chosen depend on whether the company is trying to maintain the current level of legitimacy or repair damaged legitimacy. Controversies disrupt a company's legitimacy status, rapidly attract media attention through news and social media, and increase the discrepancy between the desired and current image of the company (DasGupta, 2021; Elsbach and Sutton, 1992). This break in the legitimacy status-quo motivates CEOs to use defensive IM strategies to mitigate reputational and regulatory risks. Our findings show that in the face of a legitimacy threat, CEOs resort to sense-giving mechanisms in a more conversational style, probably in an effort to contextualize and normalize. The highly discretionary nature of the CEO letter makes it more suited to react to controversies than the main report would allow. Defensive rhetorical IM is primarily in play for companies in highly visible, sensitive industries. These companies are exceptionally vulnerable to reputational damage from mediatized sustainability controversies. Any negative event is likely to be amplified by media attention and public outrage. CEOs of these companies are under immense pressure to address the controversies head-on in their letters. They cannot simply ignore them or offer formal or vague statements but need to step in reactively to address and clarify the issues involved. As Tata and Prasad (2015) predict, the relationship between a legitimacy gap and the organization's motivation to close it through sustainability communication will be stronger under high levels of media attention and public scrutiny, which is supported by our findings.

Contrary to our expectations, there is no empirical evidence to substantiate a negative relationship between sustainability controversies and assertive IM. It suggests that assertive and defensive language (and formal and analytical language for that matter) are not mutually exclusive as they respond to different triggers. CEO letters may contain both assertive and defensive components with assertiveness being more pervasive and long-term than reactive language. In the same vein, CEO letters have both an analytic and a narrative component, but they are likely to differ on a continuum along which information-structural language versus story-driving language is used, depending on context (of which general visibility and issue visibility shows to be an important ingredient).

Our study adds to the literature in several respects. Our methodological approach offers a more fine-grained focus on linguistic features in SR CEO letters and extends the existing body of research, which predominantly depends on qualitative methods involving small sample sizes and/or does not differentiate between reporting genres within SR. First, our analysis allows us to disentangle different forms of rhetorical IM management, their mutual interactions and their underlying drivers, highlighting how they are triggered by distinct legitimacy concerns. Ultimately, the study enriches our understanding of how CEOs navigate the complex terrain of sustainability communication to manage public perception and balance highly context-dependent legitimacy needs.

Second, in contrast to prior literature that identifies low readability as an IM strategy (e.g., Li *et al*., 2023; Smeuninx *et al*., 2020; Wang *et al*., 2018), we corroborate that both assertive and defensive IM styles tend to be more readable than a formal-analytical style. Higher readability will facilitate the accessibility of the key messages and, thus, their persuasive potential. This is consistent with the rhetorical intent of the assertive and defensive style patterns: they can only be persuasive and effective in changing impressions to the extent that they are accessible and understandable by the main audience of the CEO letter. In contrast, formal and analytical language, though probably more precise and objective, tends to be more complex and technical, which burdens readability as measured by the traditional readability formulae. Our findings suggest that readability is rather the outcome of more refined linguistic style choices than a direct IM tool.

Furthermore, our analysis also reveals an interesting interdependency between the CEO letter and the main report. The empirical models show that changes in the CEO narratives with respect to language style occur in concert with the transparency of the disclosure environment. Formal-analytical language, prevalent in CEO letters of companies operating in sensitive industries, is highly impersonal and descriptive and creates a sense of objectivity and helps to establish a professional tone. It is in line with the language of accountability and transparency that permeates the main report. This suggests close alignment of the CEO letter with the main reporting outlet which, in itself, already tends to be of higher quality for sensitive industries. The relatively high information threshold of the main report may act as a constraint on promotional postures. Formally and logically aligning with what is already there in the main report seems to be the pragmatic way for CEOs in sensitive industries to maintain credibility and legitimacy. Moreover, interestingly, with respect to GRI, we observe a shift from an assertive style towards more formal and analytical language in SR that does not follow GRI guidelines. While CEOs tend to communicate in an authoritative and optimistic manner in reports prepared according to GRI, their language becomes more cautious when the report is not standard-based. This observation aligns with studies suggesting that the GRI framework may not necessarily guarantee high transparency of disclosures. Instead, it is often employed as a symbolic practice (Michelon *et al.,* 2015; Roszkowska-Menkes *et al.*, 2024) and, as our findings show, can be complemented by an assertive IM in the CEO letter.

Finally, although not explicitly hypothesized, our findings corroborate strong region-based effects on style features of the CEO letter. CEOs from the US and UK companies typically face a more active and demanding investor environment and may have stronger power-related and pecuniary incentives to engage in active IM. In addition, the more explicit CSR environment in which these companies operate (Moon and Matten, 2008), allows more room for corporate initiative to link sustainability issues with company-level identity and reputation (Blindheim, 2015). In our data, this translates into a significant positive effect on rhetorical IM and a negative effect on formal-analytical style. This could suggest that the CEO letter in these countries is typically motivated to cater to a shareholder perspective on the company's sustainability track record.

With respect to practical implications, our empirical exploration of the rhetorical IM in SR along with the identification of instances of the use of formal-analytical style and IM provides valuable insights for policymakers. This investigation enhances understanding of how CEO rhetorics is related to transparency in sustainability-related information and accountability within SR. In addition, our research is expected to help investors and analysts assess companies and the credibility of their corporate communication, which can eventually shape socially responsible investor behaviors and contribute to developing a more effective governance and regulation system in the realm of SR. This is particularly important in light of the increasing financial relevance of sustainability-related risks and opportunities. Our results may also be of interest to investors and financial analysts, as assertive rhetorical IM in financial CEO letters has been shown to be negatively related to the dispersion of financial analysts' earnings forecasts and positively to earnings forecast accuracy (Yan *et al.*, 2019).

A major limitation of our study is the availability of SR of companies. The reliance on databases is insufficient, necessitating a considerable amount of time in the manual data collection process. This constraint led to a reduction in the number of disclosures included in the analysis. As a result, our sample size did not permit, for instance, a more detailed examination of the impact of the institutional environment, including nuanced distinctions between the varieties of capitalism present in Continental Europe (Pinto *et al.*, 2019). Additionally, with the increasing use of integrated reporting ("IR") framework, both sustainability and financial information are combined. Yet, our sample is based on "SR only" to allow for a clear focus on IM strategies in sustainability-related information. Moreover, with our analysis identifying interdependencies between the CEO letter and the main body of the sustainability report, further empirical research is needed to gain a deeper understanding of how increased transparency may discipline CEO IM, particularly in light of the increasing efforts and convergence among standard-setting institutions, including the IFRS Foundation, EFRAG, and GSSB, to develop integrated and globally aligned SR standards. Lastly, the language used in CEO letters to convey personalized messages can largely be influenced by the author's characteristics, including gender and personality traits (Liu and Nguyen, 2020; Le Maux and Smaili, 2024). While this topic remains beyond the scope of our study, we encourage future research to examine how the interplay between organizational visibility and CEO characteristics affects IM in SR.

Notwithstanding these limitations, future studies should explore and shed light on the factors and policies affecting accountability in SR and the influence of corporate governance factors that may restrict managers' use of SR as a symbolic legitimacy tool. We emphasize that continued efforts are needed to make SR more accountable and transparent. In final words, we would like to refer to Patten (2019): "*Legitimacy-based research can help move CSR disclosure at least closer to being a tool of accountability, as opposed to a tool for legitimation*".

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Rhetorical impression management in sustainability reporting CEO letters:
The effect of general and issue visibility

Tables & Figures

Table I: LIWC summary variables

Summary variable	Direction of effect	Indicator	Examples of words
Analytic thinking	+	Article, preposition	a, an, the, of, in, for
	-	Pronouns, auxiliary verbs, adverbs, conjunctions, negations	I, it, be, have, just, about, but
Clout	+	First plural and second person pronouns, positive tone words	we, you, they, good, well, new
	-	First singular pronouns, tentative	I, if, or, maybe, perhaps
Emotional tone	+	Positive tone words	good, well, new, happy, love
	-	Negative tone words	bad, wrong, much, hate

Table II: Components of the LIWC's cognitive processes variable

Cognitive processes		
Component variable	Function	Example words
Insight	Engagement marker	know, how, think, feel
Causation	Causal reasoning	how, because, make, why
Discrepancy	Directive language	would, can, want, could
Tentative	Linguistic hedging	if, or, maybe, perhaps
Certitude	Boosters	really, actually, of course, real
Differentiation	Exclusion words	but, not, if, or

Table III: Factor analysis on linguistic markers (N=2,139)

Variable	Factor 1	Factor 2
Factor loading (orthogonal varimax)		
Analytic thinking	-0.438	-0.718
Emotional tone	0.833	-0.053
Clout	0.846	0.142
Cognitive processes	-0.098	0.893

Table IV – Correlation matrix of factor variables, linguistic style and content variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
(1) Analytic	1.000																								
(2) Assertive	-0.438*	1.000																							
(3) Defensive	-0.718*	0.000	1.000																						
(4) Articles	0.517*	-0.504*	-0.177*	1.000																					
(5) Prepositions	0.423*	-0.052	-0.142*	0.354*	1.000																				
(6) Personal pronouns	-0.657*	0.695*	0.309*	-0.539*	-0.190*	1.000																			
(7) Numbers	0.219*	-0.211*	-0.275*	-0.153*	-0.200*	-0.255*	1.000																		
(8) Allure	-0.443*	0.351*	0.390*	-0.142*	0.036	0.368*	-0.189*	1.000																	
(9) Auxiliary verbs	-0.534*	0.084*	0.609*	0.040	0.034	0.141*	-0.273*	0.464*	1.000																
(10) Conjunctions	-0.374*	0.287*	0.305*	-0.183*	0.071*	0.140*	-0.325*	0.145*	0.084*	1.000															
(11) Adverbs	-0.496*	0.069*	0.554*	0.016	0.055	0.115*	-0.201*	0.362*	0.549*	0.198*	1.000														
(12) Affiliation	-0.535*	0.754*	0.217*	-0.516*	-0.046	0.883*	-0.215*	0.344*	0.063*	0.250*	0.051	1.000													
(13) Achievement	-0.073*	0.458*	-0.073*	-0.160*	0.078*	0.228*	-0.157*	0.132*	-0.044	0.140*	-0.093*	0.334*	1.000												
(14) Positive tone	-0.238*	0.777*	-0.048	-0.279*	0.038	0.369*	-0.199*	0.298*	0.051	0.239*	0.035	0.470*	0.516*	1.000											
(15) Negative tone	0.030	-0.187*	0.029	0.029	0.020	-0.065*	-0.020	-0.055	0.013	0.039	0.039	-0.059*	-0.080*	-0.037	1.000										
(16) Human rights	-0.078*	0.293*	-0.069*	-0.211*	-0.046	0.201*	-0.069*	0.005	-0.217*	0.228*	-0.198*	0.335*	0.183*	0.287*	0.072*	1.000									
(17) Employee	-0.078*	0.325*	-0.055	-0.210*	-0.067*	0.207*	-0.109*	0.011	-0.219*	0.258*	-0.226*	0.323*	0.281*	0.302*	0.023	0.794*	1.000								
(18) Social community	-0.078*	0.309*	-0.019	-0.207*	-0.059*	0.175*	-0.155*	0.042	-0.181*	0.245*	-0.196*	0.330*	0.337*	0.297*	-0.015	0.620*	0.659*	1.000							
(19) Environment	0.063*	0.109*	-0.052	-0.179*	-0.032	-0.017	-0.076*	-0.175*	-0.207*	0.155*	-0.215*	0.080*	0.143*	0.096*	-0.016	0.254*	0.357*	0.526*	1.000						
(20) Negate	-0.331*	-0.088*	0.472*	0.033	-0.041	0.022	-0.117*	0.219*	0.418*	0.108*	0.427*	-0.043	-0.114*	-0.065*	0.111*	-0.140*	-0.169*	-0.114*	-0.108*	1.000					
(21) Verb	-0.591*	0.224*	0.670*	-0.069*	0.072*	0.287*	-0.319*	0.610*	0.867*	0.162*	0.549*	0.232*	0.025	0.183*	-0.007	-0.139*	-0.146*	-0.082*	-0.186*	0.397*	1.000				
(22) Cognitive processes	-0.369*	-0.099*	0.894*	0.040	0.113*	0.076*	-0.286*	0.313*	0.499*	0.226*	0.441*	0.054	-0.031	-0.015	-0.007	-0.092*	-0.062	-0.012	0.000	0.414*	0.576*	1.000			
(23) Need	-0.127*	-0.038*	0.253*	0.028	0.019	-0.025	-0.158*	0.131*	0.243*	0.134*	0.174*	-0.020	-0.028	0.009	0.183*	-0.032	-0.048	0.045	0.018	0.206*	0.296*	0.259*	1.000		
(24) Want	-0.227*	0.150*	0.251*	-0.046	-0.003	0.191*	-0.137*	0.181*	0.171*	0.086*	0.209*	0.134*	0.039	0.127*	-0.054	-0.017	0.032	-0.018	-0.037	0.153	0.251*	0.229*	0.055	1.000	
(25) Readability	-0.398*	0.279*	0.329*	-0.099*	0.003	0.307*	-0.141*	0.466*	0.522*	0.004	0.434*	0.258*	-0.016	0.137*	-0.001	-0.167*	-0.164*	-0.150*	-0.187*	0.283*	0.542*	0.225*	0.140*	0.184*	1.000

*Correlations significant at p<0.01

Table V: Definition of variables

Main variables	Definition	Source
Analytic	LIWC's summary measure of analytical thinking in writing - normalized to 0-1 range.	LIWC
Assertive	Factor 1 derived from a factor analysis (Section 4.3), capturing assertive style in writing – normalized to 0-1 range.	LIWC (factor analysis)
Defensive	Factor 2 derived from a factor analysis (Section 4.3), capturing defensive style in writing – normalized to 0-1 range.	LIWC (factor analysis)
INDsen	Dummy variable that takes value 1 if the company operates in sensitive industry (materials, oil&gas, utilities) and 0 otherwise	Bloomberg
ESGcontro	Refinitiv's ESG controversies score – reverse coded and normalized to 0-1 range.	Refinitiv
Control variables		
GRI	Dummy variable that takes value 1 if the company reports in accordance with GRI guidelines/standards and 0 otherwise.	Bloomberg
DIStransparency	Bloomberg ESG disclosure score ranging from 0.1 to 100 based on data points collected by Bloomberg.	Bloomberg
EnvSoc	Company-year mean of Refinitiv's environmental and social scores. Scores range from 0 to 100.	Refinitiv
Assur	Dummy variable that takes value 1 if the SR was subject of independent assurance and 0 otherwise.	Bloomberg
CSRcom	Dummy variable that takes value 1 if the company has a CSR or sustainability committee at the board level and 0 otherwise	Bloomberg
BRDwmn	The percentage of female directors to the total board membership.	Bloomberg
BRDsize	Number of full-time directors on the company's board.	Bloomberg
BRDind	The percentage of independent directors to the total board membership.	Bloomberg
CEOdual	Dummy variable that takes value 1 if the CEO is also Chairman of the Board and 0 if the two roles are separate.	Bloomberg
ROA	Return on assets.	Bloomberg
Size	Natural logarithm of total assets.	Bloomberg
UK	Dummy variable that takes value 1 if the company is headquartered in the UK and 0 otherwise	Bloomberg
US	Dummy variable that takes value 1 if the company is headquartered in the US and 0 otherwise	Bloomberg

Table VI: Descriptives of variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Analytic	2,139	0.80	0.12	0	1
Assertive	2,139	0.74	0.15	0	1
Defensive	2,139	0.35	0.13	0	1
INDsen	1,805	0.38	0.48	0	1
ESGcontro	1,805	0.22	0.32	0	1

GRI	1,805	0.76	0.43	0	1
DIStransparency	1,805	47.01	11.30	11.52	78.01
EnvSoc	1,805	-18.59	12.73	-58.55	49.84
Assur	1,805	0.52	0.50	0	1
CSRcom	1,805	0.89	0.32	0	1
BRDwmn	1,805	23.04	11.45	0	70
BRDsize	1,805	11.06	2.63	3	21
BRDind	1,805	74.96	19.32	0	100
CEOdual	1,805	0.33	0.47	0	1
ROA	1,805	5.51	7.17	-39.60	97.60
Size	1,805	23.44	1.44	19.65	27.03

Table VII: Correlation matrix of dependent and independent variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) Analytic	1.000															
(2) Assertive	-0.438*	1.000														
(3) Defensive	-0.718*	-0.000	1.000													
(4) INDsen	0.127*	-0.108*	-0.122*	1.000												
(5) ESGcontro	-0.099*	0.027	0.100*	0.015	1.000											
(6) GRI	0.092*	-0.085*	-0.043	0.165*	0.031	1.000										
(7) DIStransparency	0.164*	-0.196*	-0.038	0.300*	0.093*	0.487*	1.000									
(8) EnvSoc	-0.010	-0.077*	0.117*	-0.071*	0.238*	0.321*	0.552*	1.000								
(9) Assur	0.147*	-0.221*	0.015	0.028	0.094*	0.280*	0.555*	0.401*	1.000							
(10) CSRcom	-0.001	-0.060	0.035	0.014	0.098*	0.168*	0.243*	0.327*	0.237*	1.000						
(11) BRDwmn	-0.116*	0.037	0.141*	-0.198*	-0.017	0.011	0.141*	0.189*	0.125*	0.062*	1.000					
(12) BRDsize	0.033	-0.092*	-0.006	0.042	0.229*	0.155*	0.249*	0.280*	0.139*	0.098*	-0.002	1.000				
(13) BRDind	-0.208*	0.324*	0.013	0.061*	0.078*	0.004	-0.006	0.020	-0.126*	0.062*	-0.080*	-0.083*	1.000			
(14) CEOdual	-0.049	0.125*	-0.070*	0.082*	0.112*	0.028	0.010	0.024	-0.121*	0.020	-0.004	0.181*	0.277*	1.000		
(15) ROA	-0.122*	0.129*	0.070*	-0.211*	-0.081*	-0.108*	-0.077*	0.064*	-0.032	0.030	0.183	-0.073*	0.058	0.014	1.000	
(16) Size	-0.035	-0.006	0.039	0.152*	0.488*	0.489*	0.378*	0.436*	0.265*	0.196*	0.007	0.493*	0.227*	0.258*	-0.136*	1.000

Table VIII: Regression models on rhetorical profiles

VARIABLES	(1) Analytic	(2) Assertive	(3) Defensive	(4) Analytic	(5) Assertive	(6) Defensive
INDsen (H1)	0.0194*	-0.0289**	-0.0178	0.0257**	-0.0283**	-0.0277**
	(0.0102)	(0.0124)	(0.0113)	(0.0109)	(0.0130)	(0.0121)
ESGcontro (H2)	-0.0188*	-0.0074	0.0263**	-0.0065	-0.0062	0.0069
	(0.0096)	(0.0103)	(0.0110)	(0.0119)	(0.0129)	(0.0137)
INDsen x ESGcontro (H3)				-0.0320*	-0.0032	0.0506**
				(0.0187)	(0.0203)	(0.0214)
GRI	-0.0192**	0.0211**	0.0073	-0.0197**	0.0210**	0.0081
	(0.0082)	(0.0090)	(0.0094)	(0.0083)	(0.0091)	(0.0094)
DIStransparency	0.0013***	-0.0012**	-0.0008	0.0013***	-0.0012**	-0.0008
	(0.0005)	(0.0005)	0.0005	(0.0005)	(0.0005)	(0.0005)
EnvSoc	-0.0003	0.0004	0.0005	-0.0003	0.0004	0.0005
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Assur	0.0115	-0.0093	-0.0075	0.0121	-0.0092	-0.0085
	(0.0077)	(0.0084)	(0.0088)	(0.0077)	(0.0085)	(0.0088)
CSRcom	0.0052	-0.0192*	0.0023	0.0059	-0.0191*	-0.0011
	(0.0101)	(0.0112)	(0.0116)	(0.0102)	(0.0112)	(0.0116)
BRDwmn	-0.0007**	-0.0000	0.0010***	-0.0007**	-0.0000	0.0010***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
BRDsize	0.0018	-0.0058***	-0.0006	0.0016	-0.0058***	-0.0004
	(0.0015)	(0.0017)	(0.0017)	(0.0015)	(0.0017)	(0.0017)
BRDind	-0.0003	0.0002	0.0002	-0.0003	0.0002	0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)

CEOdual	0.0014	-0.0081	-0.0009	0.0016	-0.0081	-0.0011
	(0.0081)	(0.0090)	(0.0091)	(0.0081)	(0.0090)	(0.0091)
ROA	-0.0003	0.0011**	-0.0002	-0.0003	0.0011**	-0.0002
	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0004)	(0.0005)
Size	-0.0032	0.0035	0.0027	-0.0034	0.0034	0.0029
	(0.0040)	(0.0047)	(0.0045)	(0.0040)	(0.0048)	(0.0045)
UK	-0.0707***	0.0522***	0.0496***	-0.0707***	0.0522***	0.0497***
	(0.0142)	(0.0174)	(0.0157)	(0.0142)	(0.0174)	(0.0157)
US	-0.0625***	0.1272***	0.0019	-0.0634***	0.1272***	0.0032
	(0.0131)	(0.0156)	(0.0146)	(0.0132)	(0.0156)	(0.0146)
Year dummies	Included	Included	Included	Included	Included	Included
Constant	0.9027***	0.6699***	0.2561***	0.9042***	0.6702***	0.2542***
	(0.0821)	(0.0977)	(0.0911)	(0.0821)	(0.0977)	(0.0912)
Within R^2	0.0141	0.0238	0.0127	0.0157	0.0239	0.0163
Between R^2	0.2175	0.2947	0.0911	0.2192	0.2946	0.0927
Overall R^2	0.1475	0.2468	0.0775	0.1474	0.2466	0.0755
Observations	1,805	1,805	1,805	1,805	1,805	1,805
Number of companies	345	345	345	345	345	345

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
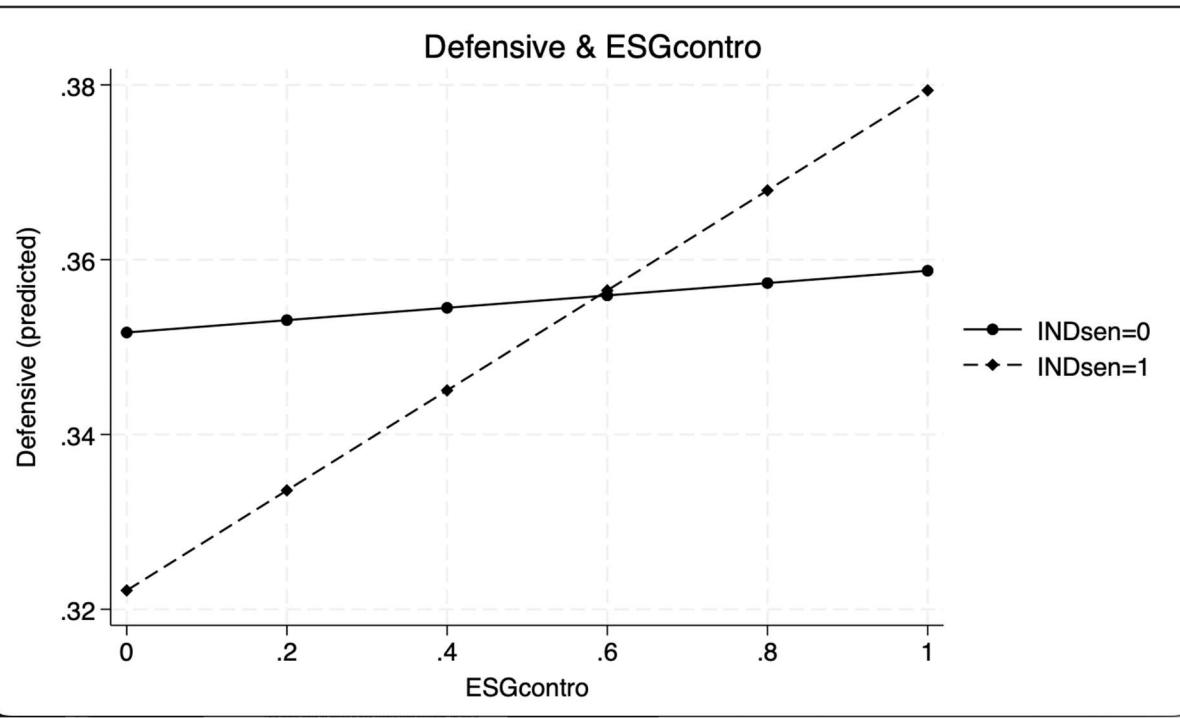
Table IX: Robustness test results

VARIABLES	(1) Analytic	(2) Assertive	(3) Defensive	(4) Analytic	(5) Assertive	(6) Defensive
INDsen	0.0131	-0.0445***	-0.0035	0.0444**	-0.0522**	-0.0390*
	(0.0144)	(0.0157)	(0.0153)	(0.0208)	(0.0216)	(0.0226)
ESGcontro	-0.0239	-0.0124	0.0321*	0.0004	-0.0184	0.0045
	(0.0015)	(0.0149)	(0.0167)	(0.0190)	(0.0189)	(0.0211)
INDsen x ESGcontro				-0.0657**	0.0163	0.0736**
				(0.0315)	(0.0314)	(0.0349)
Control variables	Included	Included	Included	Included	Included	Included
Constant	0.9298***	0.6466***	0.3130**	0.9344***	0.6451***	0.3073**
	(0.1181)	(0.1287)	(0.1250)	(0.1179)	(0.1289)	(0.1239)
Within R^2	0.0259	0.0276	0.0410	0.0315	0.0283	0.0433
Between R^2	0.2044	0.3185	0.1779	0.2067	0.3174	0.1924
Overall R^2	0.1404	0.2562	0.1142	0.1463	0.2575	0.1194
Observations	756	756	756	756	756	756
Number of companies	222	222	222	222	222	222

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Graphing H3a results

Notes: This figure depicts average predicted values generated from Model 6 for *defensive*. The estimates are made at the 5th percentile and 95th percentile of ESGcontro. The solid line depicts estimates for companies with low controversy scores. The dashed line depicts estimates for companies with high controversy scores.

Appendices

Table - AI: Selection criteria

Step 1: Criteria of selection of companies	Excluded	Remaining number of companies
CSR sustainability reporting 2016	-	2,649
Country of headquarters: Europe, US, UK	(1,386)	1,263
Excluding non-EU	(85)	1,178
Excluding healthcare, financials and real-estate sectors	(293)	885
Excluding companies with missing financial or sustainability data on the database	(306)	579
Manual download of SR	(171)	408

Step 2: Criteria for CEO letter selection	Excluded	Remaining number of CEO letters
Expected number of SR CEO letters in 10 years	-	4,080
Excluding integrated reporting formats	(474)	3,607
Excluding SR with no CEO letters	(390)	3,217
Excluding SR with no CEO letters in English	(16)	3,201
Excluding CEO letters with less than 350 words	(704)	2,496
Excluding SR CEO letter not able to process (e.g., secured pdf files)	(76)	2,420
Excluding SR CEO letter with no sustainability information	(281)	2,139
		(from 384 companies)

Step 3: Matching Refinitiv and Bloomberg data		
	-	2,139
Excluding companies that do not match with Bloomberg data	(334)	1,805
		Matching CEO letters
		1,805
		(from 345 companies)

Table – AII: Sample summary statistics

Panel A Sample by country and year

Country	Year										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Austria	1	1	2	3	2	2	2	1	2	2	18
Belgium	2	2	2	1	3	2	3	2	2	2	21
Denmark	2	3	3	4	5	2	5	4	4	5	37
Finland	5	4	6	6	5	5	3	3	3	3	43
France	9	9	9	5	7	7	5	5	5	6	67
Germany	2	3	3	2	2	3	4	12	16	13	60
Greece	3	0	3	3	2	5	3	4	4	3	30
Hungary	1	0	0	0	0	0	0	1	1	1	4
Ireland	0	2	2	2	2	1	2	2	3	2	18

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Italy	4	5	6	5	7	6	6	5	5	6	55
Luxembourg	1	2	3	3	3	2	1	2	2	1	20
Netherlands	5	7	7	6	5	5	3	2	2	2	44
Poland	0	0	1	1	0	1	2	2	1	3	11
Portugal	1	1	2	1	1	1	2	1	2	1	13
Spain	3	4	5	5	4	4	4	5	4	4	42
Sweden	8	10	11	13	12	13	12	12	12	10	113
UK	22	26	22	32	37	34	35	28	35	34	305
US	52	69	70	88	83	91	107	107	114	123	904
Total	121	148	157	180	180	184	199	198	217	221	1,805

Panel B Sample by region and year

Region	Year										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
EU	47	53	65	60	60	59	57	63	68	64	596
UK	22	26	22	32	37	34	35	28	35	34	305
US	52	69	70	88	83	91	107	107	114	123	904
Total	121	148	157	180	180	184	199	198	217	221	1,805

Panel C Sample by industry and year

Industry [a]	Year										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Cons. Disc.	6	9	7	6	8	9	9	12	17	19	81
Cons. Staple	16	22	22	27	23	24	31	23	26	24	238
Indust. Prod.	10	13	15	20	22	20	24	26	30	30	210
Indust. Ser.	15	21	16	20	25	23	23	22	20	19	204
Materials	16	20	29	32	28	29	31	34	37	39	295
Media	7	6	7	6	8	9	9	7	8	9	76
Oil & Gas	13	15	19	19	21	21	20	23	20	21	192
Ren. Energy	0	0	0	0	0	0	0	0	1	1	2
R&Wstaples	8	9	8	9	8	6	9	10	12	9	88
R&Wdisc.	5	6	6	10	8	11	10	8	13	10	87
Software	4	3	3	4	3	3	5	5	5	5	40
Hardware	2	1	2	1	1	3	2	3	1	3	19
Telecom.	7	7	5	8	4	6	4	7	5	7	60
Utilities	12	16	18	18	21	20	22	18	22	25	192
Total	121	148	157	180	180	184	199	198	217	221	1,805

Notes. [a] Based on Bloomberg Industry Classification Standard (BICS) level 2. *Abbrevation.* Cons. Discr., Consumer Discretionary Products; Cons. Stapl., Consumer Staples Products; Indust. Prod., Industrial Products; Indust. Ser., Industrial Services; Ren. Energy, Renewable Energy; R&Wstaples, Retail & Wholesale – Staples; R&Wdisc., Retail & Wholesale – Discretionary; Software, Software & Tech Services; Hardware, Tech Hardware & Semiconductors; Telecom., Telecommunications.