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CSR Performance, Disclosure Tone, and Cost of Capital: Evidence from European Non-Financial Reporting

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Abstract

This study examines how corporate social responsibility (CSR) performance relates to firms' disclosure tone in CSR reports and their resulting cost of capital. Our empirical analysis reveals that firms with superior CSR performance exhibit systematic patterns in their disclosure tone, characterized by increased usage of positive language and decreased usage of negative language. In contrast, firms with lower CSR performance show no significant strategic communication patterns. Our analysis reveals a complex relationship between CSR performance, disclosure tone, and cost of capital. While CSR performance and optimistic disclosure tone individually have positive associations with cost of capital, their interaction exhibits a significant negative relationship. This finding suggests that the impact of CSR performance on cost of capital is contingent on the optimistic tone employed in CSR disclosures. Firms with strong CSR performance can enhance the favorable impact on their financing costs by adopting a more optimistic disclosure tone, potentially offsetting the standalone positive association between CSR performance and cost of capital. Further analysis reveals that these effects are more pronounced in the pre-NFRD period, indicating that the transition from voluntary to mandatory reporting altered the economic consequences of CSR disclosure strategies.

Keywords: CSR Performance, Disclosure Tone, Cost of Capital, Strategic Communication, Non-financial Reporting

JEL Codes: M14, M48, Q5, G3

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1 Introduction

The communication of sustainability performance has become increasingly critical in corporate reporting, as stakeholders demand transparent and verifiable information about firms' environmental, social, and governance (ESG) initiatives (Christensen et al., 2021; Feber et al., 2020). Despite growing pressure for detailed sustainability disclosures, firms face significant challenges in conveying their ESG performance, leading to varied linguistic approaches in their communications—approaches that may either illuminate or potentially obscure their actual sustainability achievements (Bansal and Clelland, 2004; Kim and Lyon, 2015; Marquis et al., 2016).

Two competing theoretical frameworks help explain firms' approaches to sustainability reporting. The first draws on impression management theory (Goffman, 1959), suggesting firms utilize CSR reports to strategically construct stakeholder perceptions, potentially obscuring unfavorable performance (Bansal and Clelland, 2004; Cho et al., 2012). Conversely, signaling theory (Spence, 1973) posits that firms employ these reports to communicate genuine commitment and superior performance in sustainability initiatives (Conte et al., 2023; Dhaliwal et al., 2011; Friske et al., 2023). These theoretical perspectives, grounded in legitimacy theory's emphasis on aligning organizational practices with societal expectations (Dowling and Pfeffer, 1975), create a fundamental tension in understanding firms' motivations for CSR disclosure.

Previous research has increasingly examined the linguistic dimensions of corporate disclosures, particularly focusing on disclosure tone as a strategic communication mechanism that influences market perceptions and corporate image (Du and Yu, 2021; Loughran and McDonald, 2020; Miller, 2010). Despite growing academic interest in how disclosure tone can enhance transparency or enable obfuscation, a critical gap persists in understanding its strategic deployment in CSR disclosures relative to actual sustainability performance and economic

consequences, particularly within the context of mandatory reporting frameworks. This study addresses this research gap by examining how CSR performance relates to firms' disclosure tone in CSR reports, drawing on impression management and signaling theory as competing explanatory frameworks (Cho et al., 2010; Melloni et al., 2017; Conte et al., 2023; Friske et al., 2023). Building on this theoretical foundation, we develop two hypotheses to test whether there is an association between firms' CSR performance and their disclosure tone in CSR reports, and whether the interaction of firms' CSR performance and disclosure tone is associated with their cost of capital.

The institutional features of CSR reporting, such as the voluntary nature of disclosure during our sample period, the complexity of CSR performance, and the challenges in verifying CSR claims, create distinct incentives for firms based on their CSR performance. These characteristics, combined with the mixed empirical evidence on the relationship between CSR disclosure and cost of capital (Clarkson et al., 2013; Dhaliwal et al., 2011; Richardson and Welker, 2001), underscore the need for further investigation into the economic consequences of CSR disclosure strategies.

This study employs a comprehensive empirical analysis of CSR reports from firms listed in the EURO STOXX 600 index, leveraging the European Union's ESG transparency mandate as a unique institutional setting that combines regulatory requirements with substantial firm discretion in reporting practices. To examine our research questions, we measure disclosure tone using the Loughran and McDonald dictionary (2011, 2016), while CSR performance is measured through Thomson Reuters' Refinitiv ESG Performance Score from the ASSET4 database. The final sample comprises 2,002 firm-year observations spanning 2009-2022, with financial data, including cost of capital metrics, sourced from Bloomberg. We employ ordinary least squares regression analysis with industry and year fixed effects, clustering standard errors at the firm level, to examine the relationship between disclosure tone, CSR performance, and cost of capital.

Our empirical analysis reveals systematic patterns in the relationship between CSR performance and disclosure tone. The results demonstrate a positive and statistically significant correlation between CSR performance and disclosure tone, indicating that firms with superior CSR performance employ more positive disclosure strategies. Notably, this relationship does not manifest for firms with lower CSR performance. Consistent with Clarkson et al. (2013) and Mahoney et al. (2013), these findings support the signaling hypothesis, suggesting firms primarily utilize CSR reports to signal authentic commitment to sustainability initiatives rather than engaging in impression management strategies.

We further investigate the economic consequences of the interplay between CSR performance and disclosure tone. Our analysis reveals that while the individual effects of CSR performance and disclosure tone on weighted average cost of capital are positive and statistically significant, their interaction demonstrates a negative association with cost of capital. This finding suggests that strategic disclosure tone enhances the favorable impact of strong CSR performance on firms' cost of capital, highlighting the economic significance of disclosure choices in CSR communications within the context of superior sustainability performance.

Extending our analysis to the regulatory environment, we examine how the implementation of the EU's Non-Financial Reporting Directive (NFRD, Directive 2014/95/EU), which mandated increased ESG transparency for EU firms starting in fiscal year 2017, influences firms' CSR reporting strategies. We find no significant direct effect of the NFRD on firms' strategic use of disclosure tone in CSR reports, suggesting that the mandatory reporting requirements did not fundamentally alter firms' communication strategies. However, we document a distinct temporal pattern in the relationship between CSR performance, disclosure tone, and economic outcomes. Specifically, the interaction between CSR performance and disclosure tone exhibits an attenuating effect on cost of capital, but this effect is concentrated exclusively in the pre-NFRD period. This finding indicates that the economic benefits of strategic CSR communication were more pronounced during the voluntary reporting regime, when firms

had greater discretion in their disclosure choices.

Further analysis provides granular insights into both the components of ESG performance and the elements of disclosure tone. Our disaggregated examination of ESG dimensions reveals no statistically significant relationships between environmental and social performance dimensions and disclosure tone, nor in their interactive effects on cost of capital. However, governance performance emerges as a distinct case, demonstrating a significant positive association with cost of capital. To deepen our understanding of firms' communication strategies, we also decompose disclosure tone into its constituent elements, examining the relative usage of positive and negative language in CSR reports. This detailed linguistic analysis reveals that firms with superior CSR performance demonstrate a systematic pattern in their language choices, characterized by both increased usage of positive terminology and decreased deployment of negative terminology.

We conduct several robustness analyses to validate our primary findings. First, we examine the sensitivity of our results to different ESG performance thresholds by partitioning our sample into low, mid, and high ESG performance terciles. This analysis corroborates our primary findings, demonstrating that firms in the top quartile of ESG performance exhibit significant positive associations with optimistic CSR reporting tone, while no evidence of a negative relationship is found between low ESG performance and optimistic disclosure tone. Second, we employ an alternative ESG performance measure from Bloomberg as a substitute for the Refinitiv scores. While this analysis yields directionally consistent results with our main findings, the statistical significance varies somewhat, potentially attributable to the reduced sample size in this supplementary analysis.

This study advances the literature in three primary dimensions. First, we contribute to the theoretical understanding of firms' motivations for issuing standalone CSR reports by examining the tension between impression management theory (Goffman, 1959) and signaling theory (Spence, 1973). While impression management theory suggests firms utilize CSR reports to legitimize their societal commitment despite potentially unfavorable performance (Bloomfield, 2008; Li, 2008), signaling theory proposes that firms employ these reports to communicate genuine CSR engagement to stakeholders. Our empirical evidence documents a systematic relationship between CSR performance and disclosure tone (Du and Yu, 2021), providing insights into firms' strategic communication choices in sustainability reporting (Mahoney et al., 2013; Huang et al., 2022).

Second, we extend the literature on disclosure strategies within mandatory CSR reporting frameworks. Our systematic analysis of disclosure tone reveals significant variations in European firms' CSR reporting practices despite the implementation of Directive 2014/95/EU. The persistence of reporting discretion, stemming from limited regulatory guidance and member state-level enforcement variations, creates a unique empirical setting for examining strategic disclosure choices. This analysis contributes to the growing literature on CSR reporting mandates (Fiechter et al., 2022; Ioannou and Serafeim, 2017) and provides insights for regulatory bodies developing non-financial disclosure frameworks.

Third, we advance the understanding of economic consequences associated with non-financial disclosure by establishing empirical evidence on the relationship between disclosure tone and cost of capital. Our study provides systematic evidence of how firms' strategic communication choices in CSR disclosures influence capital market outcomes, extending prior research on CSR determinants and financial performance (Bonetti et al., 2023a; Dhaliwal et al., 2011). These findings have significant implications for both regulatory policy development and corporate disclosure strategies.

The remainder of this paper proceeds as follows. Section 2 develops our theoretical framework and hypotheses regarding the relationship between CSR performance, disclosure tone, and cost of capital. Section 3 describes our research design and empirical methodology. Section 4 presents our empirical findings and robustness analyses. Section 5 concludes with a discussion of implications for theory and practice.

2 Literature Review and Hypothesis Development

2.1 Strategic CSR Communication and Linguistic Attributes

The strategic importance of narrative disclosure in corporate communication has gained significant scholarly attention, particularly as textual elements constitute an expanding portion of corporate reports (Lo et al., 2017). Research examining linguistic attributes of financial disclosures demonstrates their substantial impact on both firm outcomes and market perceptions (Bonsall et al., 2017; Loughran and McDonald, 2016, 2020; Miller, 2010). These studies reveal how specific linguistic choices—including readability, tone, and complexity—serve as mechanisms through which firms communicate with their stakeholders and potentially influence market responses (Li, 2008; Lo et al., 2017; Merkley, 2014).

While linguistic analysis of financial disclosures primarily focuses on information content and market effects, its application to CSR reports introduces broader theoretical considerations. Legitimacy theory suggests that firms strategically craft their narratives to align with societal expectations, adding complexity to our understanding of linguistic choices in non-financial disclosures (Bansal and Clelland, 2004; Cho and Patten, 2007; Cho et al., 2012; Tata and Prasad, 2015). The tone of disclosure, especially through strategic use of positive and negative language, emerges as a critical element in shaping stakeholder perceptions (Davis and Tama-Sweet, 2012; Li, 2008), with documented market effects across various communication

channels (Ben-Amar et al., 2024; Bochkay et al., 2019; Feldman et al., 2010).

Early theoretical work on discretionary disclosure, known as the 'unraveling result', suggests that firms are incentivized to provide full disclosure in equilibrium, as withholding information leads stakeholders to assume the worst (Grossman and Hart, 1980; Grossman, 1981; Milgrom, 1981). However, this theoretical prediction does not consistently hold in practice. Subsequent research identifies various conditions—such as proprietary costs, uncertain information endowment, and processing costs—under which managers may optimally choose partial or strategic disclosure (Beyer et al., 2010; Stocken and Verrecchia, 2004). Empirical evidence presents mixed results regarding the relationship between linguistic attributes of CSR reports and actual CSR performance. While some studies document positive correlations between environmental performance and disclosure levels (Al-Tuwaijri et al., 2004; Clarkson et al., 2008), others find evidence of potential obfuscation strategies (Cossin et al., 2021) or no clear relationship between CSR commitments and actual performance (Raghunandan and Rajgopal, 2020).

Two competing theoretical frameworks offer distinct explanations for firms' CSR communication strategies. The impression management perspective, grounded in sociological theory (Goffman, 1959), suggests that firms employ disclosure tone strategically to shape stakeholder perceptions and maintain organizational legitimacy (Tedeschi, 1981). This theoretical lens views CSR disclosure tone as a potential tool for mitigating negative performance implications (Elsbach and Sutton, 1992) or managing stakeholder impressions of firm activities (Li, 2008). Empirical support for this perspective emerges from studies documenting selective disclosure practices, where firms strategically emphasize positive information while obscuring negative outcomes (Bao et al., 2019; Kothari et al., 2009; Schrand and Walther, 2000). Further evidence comes from analyses of non-financial disclosures, revealing how firms employ specific disclosure strategies to neutralize or justify potentially controversial business activities (Talbot and Boiral, 2015).

In contrast, signaling theory (Spence, 1973) provides an alternative framework suggesting that firms utilize CSR reports as mechanisms to communicate genuine commitment and superior performance to stakeholders. This perspective views CSR disclosure as a credible signal of firms' sustainability initiatives, particularly given the costs associated with preparing comprehensive CSR reports (Mahoney et al., 2013). Studies supporting this theoretical view demonstrate positive associations between CSR disclosures and various market outcomes, including improved analyst forecast accuracy (Muslu et al., 2019) and enhanced market perceptions, particularly in emerging economies (Su et al., 2016). The signaling perspective suggests that firms with superior CSR performance have incentives to distinguish themselves through transparent and detailed reporting, using disclosure tone to effectively communicate their sustainability achievements (Zerbini, 2017).

These competing theoretical perspectives provide the foundation for examining how firms' CSR performance relates to their disclosure tone and the subsequent economic implications of these choices. The tension between impression management and signaling motivations, combined with the institutional features of CSR reporting, creates a complex environment where firms must balance transparency with strategic communication objectives. This theoretical framework guides our investigation of the relationship between CSR performance, disclosure tone, and economic consequences.

2.2 Hypothesis Development

The theoretical frameworks discussed above—impression management and signaling theory—present competing predictions about how firms deploy disclosure tone in their CSR reports. This theoretical tension is particularly salient in CSR reporting for several reasons. First, the voluntary nature of CSR disclosure during our sample period provides managers with considerable discretion in their reporting choices. Second, CSR performance encompasses

multiple dimensions (environmental, social, and governance), making it inherently more complex than traditional financial performance metrics. Third, stakeholders face significant challenges in independently verifying firms' CSR claims, creating information asymmetries that firms might either exploit or attempt to reduce through their disclosure tone.

These characteristics of CSR reporting create distinct incentives for firms based on their CSR performance. From an impression management perspective, firms with weaker CSR performance might employ strategic disclosure tone to obscure their deficiencies (Cho et al., 2010; Melloni et al., 2017), particularly given the substantial costs associated with improving actual CSR performance (Clarkson et al., 2011). The signaling perspective, however, suggests that firms with superior CSR performance might utilize their disclosure tone as credible signals to differentiate themselves and communicate their genuine achievements to stakeholders (Mahoney et al., 2013; Zerbini, 2017). We argue that this theoretical tension, combined with the unique characteristics of CSR reporting and mixed empirical evidence (Al-Tuwaijri et al., 2004; Cossin et al., 2021; Raghunandan and Rajgopal, 2020), makes the relationship between CSR performance and disclosure tone an empirical question. We therefore predict no systematic relationship between these variables, leading to our first hypothesis:

> *H1: There is no association between firms' CSR performance and their disclosure tone in CSR reports.*

Building on this foundation, we examine the economic consequences of firms' disclosure strategies. Prior literature presents conflicting evidence regarding the relationship between CSR disclosure and cost of capital (Bonetti et al., 2023a; Clarkson et al., 2013; Dhaliwal et al., 2011; Hail, 2002; Matsumura et al., 2017; Plumlee et al., 2015; Richardson and Welker, 2001). These mixed findings reflect the complexity of CSR disclosure environments, where multiple factors moderate the relationship between disclosure and economic outcomes, including

variations in CSR performance levels (Cheng et al., 2014; El Ghoul et al., 2011; Sharfman and Fernando, 2008), differences in disclosure characteristics (Michaels and Grüning, 2017; Ng and Rezaee, 2015), and broader market conditions affecting investor responses to CSR information (Chava, 2014).

We argue that the economic implications of CSR disclosure reflect both firms' underlying CSR performance and their disclosure tone. Effective CSR communication can reduce information asymmetry and estimation risks (Clarkson et al., 1996; Diamond & Verrecchia, 1991), leading to reduced information processing and transaction costs. Moreover, investor preference for CSR investment can increase risk diversification through a greater investor base (El Ghoul et al., 2011). CSR disclosure information about firms' CSR strategies (Bonetti et al., 2023; Clarkson et al., 2011) can further align firms' CSR commitment with investor perceptions, enhancing the favorable impact of strong CSR performance on cost of capital.

However, these benefits likely depend on the alignment between firms' actual performance and their disclosure strategies. Firms with strong CSR performance may utilize positive disclosure tone to signal their genuine achievements and differentiate themselves from poor performers (Mahoney et al., 2013; Zerbini, 2017). This signaling mechanism can reduce information asymmetry and enhance the credibility of CSR disclosures, leading to a more pronounced reduction in the cost of capital for firms with strong CSR performance and positive disclosure tone. In contrast, firms with weak CSR performance may employ positive disclosure tone as an impression management tactic to obscure their deficiencies (Cho et al., 2010; Melloni et al., 2017), potentially leading to a less pronounced or insignificant effect on the cost of capital. This leads to our second hypothesis:

> *H2: The interaction between firms' CSR performance and disclosure tone in CSR reports is associated with the cost of capital.*

3 Research Design and Methodology

3.1 Sample Selection and Institutional Setting

The European market provides a unique institutional setting for examining strategic disclosure choices in sustainability reporting. The EU's non-financial reporting framework combines mandatory disclosure requirements with substantial reporting discretion, enabling investigation of how firms deploy strategic communication within a regulated environment. This setting is particularly advantageous for our research objectives for several reasons. First, the regulatory framework ensures baseline comparability of CSR disclosures across firms. Second, the variation in implementation across member states creates natural experimental conditions for examining disclosure choices. Third, the coexistence of mandatory and voluntary disclosure elements enables investigation of strategic communication decisions.

Our sample construction proceeds through several stages. We begin with manual collection of standalone CSR reports from firms' official websites and specialized databases including Corporate Register and Responsibility Reports. This process yields 3,057 CSR reports from 534 European firms listed in the EURO STOXX 600 index (Table 1, Panel A). After merging with ESG performance data and financial information, our final sample comprises 2,002 firm-year observations representing 346 firms over 2009-2022 (Table 1, Panel B). The sample period begins in 2009, corresponding to increased adoption of standalone CSR reporting following the global financial crisis.

The sample exhibits broad geographical distribution across 17 European countries, with a mean of 118 observations and median of 90 observations per country (Table 1, Panel C). While the United Kingdom (338 observations) and Germany (325 observations) represent the largest portions, smaller economies like Poland (12 observations) and Portugal (14 observations) ensure representation across different institutional environments. This distribution enables examination of disclosure practices across varying regulatory and market contexts while

maintaining sufficient observations for robust statistical analysis.

To ensure methodological consistency in our linguistic analysis, we restrict our sample to English-language CSR reports.[1] While this approach enables standardized content analysis, we acknowledge two potential limitations. First, firms may provide additional CSR information in their national languages not captured in our analysis. Second, translated reports might exhibit different linguistic patterns from originally English-language disclosures. However, our large sample size and robustness tests help mitigate concerns about systematic bias from these sources.

[Table 1 about here.]

3.2 Variable Measurement and Research design

Disclosure Tone Measurement

Our analysis of firms' strategic communication choices employs systematic textual analysis of CSR reports using the Loughran and McDonald (2011) Sentiment Word Lists. This dictionary is particularly suitable for analyzing corporate communications as it was specifically developed for business contexts, with word classifications reflecting their meaning in financial and corporate documents rather than general usage (Loughran and McDonald, 2016). Following established methodology in disclosure research (Du and Yu, 2021; Melloni et al., 2017; Rogers et al., 2011), we construct our disclosure tone measure (*OptimistTone*) as:

$$OptimistTone_{i,t} = \frac{\sum_{i=1}^{N} \text{PosWord}_i}{\sum_{k=1}^{T} \text{Word}_k} - \frac{\sum_{j=1}^{M} \text{NegWord}_j}{\sum_{k=1}^{T} \text{Word}_k} \quad (1)$$

[1]Some firms in our sample may issue CSR reports in both their national language and English. Additionally, translated reports might exhibit linguistic patterns that differ from originally English-language disclosures. While we cannot completely eliminate these potential effects, our large sample size and robustness tests help mitigate concerns about systematic bias.

This measure captures the net positivity of discourse in CSR reports, with higher values indicating more optimistic disclosure tone. The scaling by total words ensures comparability across reports of different lengths, while the difference between positive and negative proportions captures the overall tone rather than mere verbal intensity. Figure 1 provides a summary of this textual analysis approach.

[Figure 1 about here.]

CSR Performance and Economic Outcome Variables

We measure CSR performance using Refinitiv's ASSET4 ESG Performance Score (ESGPerf), a comprehensive metric synthesizing environmental, social, and governance performance indicators. This score provides several advantages for our analysis. First, it incorporates multiple dimensions of sustainability performance through standardized methodology. Second, its construction from publicly reported data ensures consistency with information available to market participants. Third, its 1-100 scale facilitates interpretation of economic significance in our analyses.

Our primary economic outcome variable, cost of capital, is measured using Bloomberg's weighted average cost of capital (WACC). This measure incorporates both equity and debt components, weighted by their respective proportions in firms' capital structures, providing a comprehensive measure of financing costs. The use of WACC rather than components like cost of equity alone enables examination of total financing cost implications of CSR communication strategies.

Empirical Models and Control Variables

Our empirical analysis employs two main model specifications to test our hypotheses regarding the relationships between CSR performance, disclosure tone, and cost of capital. Our first model examines whether firms' CSR performance influences their disclosure tone choices:

$$\begin{aligned} OptimistTone_{i,t} = \beta_0 + \beta_1 ESGPerf_{i,t} + Controls_{i,t} \\ + FE_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

where $OptimistTone_{i,t}$ represents our measure of disclosure tone for firm i in year t, and $ESGPerf_{i,t}$ captures the firm's CSR performance. This specification enables us to examine how varying levels of sustainability performance relate to firms' strategic communication choices in their CSR reports.

Our second model investigates the economic consequences of firms' disclosure choices by examining how the interaction between CSR performance and disclosure tone affects cost of capital:

$$\begin{aligned} CoC_{i,t} = \beta_0 + \beta_1 OptimistTone_{i,t} + \beta_2 ESGPerf_{i,t} \\ + \beta_3 OptimistTone_{i,t} * ESGPerf_{i,t} \\ + Controls_{i,t} + FE_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{3}$$

where the cost of capital ($CoC_{i,t}$) represents the weighted average cost of capital ($WACC$) of firm i in year t . The interaction term ($OptimistTone_{i,t} * ESGPerf_{i,t}$) enables examination of whether the economic implications of disclosure tone vary with firms' underlying CSR performance.

Following established practice in disclosure research (Bonetti et al., 2023a; Du and Yu, 2021; Fiechter et al., 2022), we include a comprehensive set of control variables to account for firm

characteristics that might influence both disclosure choices and economic outcomes. Firm size (*Size*), measured as the natural logarithm of total assets, controls for systematic differences in disclosure practices and financing costs across firms of different sizes (Du and Yu, 2021; Muslu et al., 2019). Larger firms typically face greater public scrutiny and have more developed reporting systems, potentially affecting both their disclosure choices and cost of capital. We control for financial structure and performance through several measures. Leverage (*LEV*) accounts for how capital structure choices might affect both reporting incentives and financing costs (Dhaliwal et al., 2012; Waddock and Graves, 1998). Return-on-Assets (*ROA*) and Loss indicator (*Loss*) capture how profitability affects firms' disclosure strategies and risk perceptions (Dhaliwal et al., 2012; Roberts, 1992; Hope, 2003). Market-to-Book Value (*M/B*) controls for growth opportunities and proprietary costs that might influence disclosure choices (Merkley, 2014). The information environment is controlled through analyst following (*Analysts*), which captures variations in external monitoring and information dissemination (Lys and Soo, 1995). This control is particularly relevant as analyst coverage may affect both firms' disclosure incentives and market participants' information processing.

To account for unobserved heterogeneity across industries and time, all specifications include industry and year fixed effects. Standard errors are clustered at the firm level to address potential serial correlation in firms' disclosure choices and cost of capital (Mittelbach-Hörmanseder et al., 2021; Muslu et al., 2019). Detailed definitions of all variables appear in Appendix A1.

4 Empirical Results

4.1 Descriptive Statistics

We begin our empirical analysis by examining the distributional properties of our key variables. Table 2 presents descriptive statistics for our sample. Our measure of disclosure tone (*OptimistTone*) ranges from -0.0096 to 0.0239, with mean and median values of 0.006 and 0.005, respectively. This distribution indicates that while firms generally employ positive language in their CSR reports, some firms exhibit predominantly negative disclosure tone. Decomposing disclosure tone into its components reveals similar proportions of positive words (mean = 1.8%) and negative words (mean = 1.2%) across reports.

CSR performance in our sample, measured by the ESG Performance Score, exhibits substantial variation. The mean score of 69.37% (ranging from 27.23% to 93.55%) suggests considerable heterogeneity in firms' sustainability performance. Analysis of individual ESG components reveals that social performance (mean = 73%) demonstrates the highest average score, followed by environmental performance (71%) and governance performance (63%). This pattern suggests systematic differences in firms' achievements across ESG dimensions.

Our economic outcome variable, weighted average cost of capital (*WACC*), ranges from 0.01 to 0.17, with a mean of 0.0770 and median of 0.0768. This variation reflects substantial differences in financing costs across our sample firms, potentially attributable to both firm-specific characteristics and broader market conditions.

[Table 2 about here.]

[Table 3 about here.]

Analysis of control variables indicates significant cross-sectional variation in firm charac-

teristics.[2] Firm size, measured as the natural logarithm of total assets (*Size*), ranges from 9.907 to 14.236, encompassing both medium and large corporations in our European sample. Capital structure, reflected in the leverage ratio (*LEV*), varies from 0.178 to 0.987, indicating diverse financing strategies. This wide range suggests our sample includes both conservatively financed firms and those with substantial debt levels. Profitability indicators reveal that most sample firms maintain positive earnings, with return on assets (*ROA*) showing a mean of 0.057. The presence of firms reporting losses is captured by our loss indicator (*Loss*), with only 3% of firm-years showing negative earnings. This distribution suggests our sample primarily comprises financially stable firms while maintaining sufficient variation in performance outcomes. Market valuations, measured by the Market-to-Book ratio (*M/B*), range up to 24.229 with a mean approaching 2, reflecting substantial differences in growth opportunities and market perceptions across sample firms. The information environment, measured by analyst following (*Analysts*), shows considerable variation. Coverage ranges from 3 to 37 analysts per firm, with a mean of 19.96, indicating different levels of external monitoring and information dissemination. This variation in analyst coverage suggests differing degrees of market scrutiny and information availability across our sample firms.

4.2 CSR Performance and Disclosure Tone

Table 4 presents our analysis of the relationship between CSR performance and disclosure tone. Examining the full sample (Column 1), we find no significant association between ESG Performance and firms' disclosure tone in CSR reports.

We extend our analysis by examining this relationship across different CSR performance levels. Specifically, we estimate separate regressions for firms with below-median ESG

[2]Our descriptive statistics align with prior research examining CSR disclosure dimensions. The distributions of firm characteristics and CSR performance metrics are comparable to those reported in Fiechter et al. (2022) and Muslu et al. (2019), particularly for *Size*, *LEV*, *ROA*, *Analysts*, and *ESGPerf*. The characteristics of disclosure tone measures (*OptimistTone*, *PosTone*, *NegTone*) and report *Length* are consistent with findings in Muslu et al. (2019) and Brié et al. (2022).

Performance Scores (Column 2) and above-median scores (Column 3). This analysis reveals distinct patterns in firms' communication strategies based on their sustainability performance. Firms with below-median CSR performance show no systematic relationship between their performance and disclosure tone, suggesting no evidence of strategic communication to obscure performance.

The results for firms with superior CSR performance reveal a different pattern. Among firms with above-median ESG Performance Scores, we find a positive and statistically significant relationship with disclosure tone ($\beta = 0.012$, $p < 0.05$). This evidence suggests that firms achieving stronger sustainability performance employ more positive language in their CSR communications, consistent with signaling theory predictions (Mahoney et al., 2013).

To assess the economic significance of this finding, consider a one standard deviation increase in ESG performance (0.141 based on Table 2) for a firm with above-median CSR performance. This increase in *ESGPerf* is associated with a 0.169 increase in *OptimistTone* (0.012×0.141), representing a 28.2% increase relative to the mean *OptimistTone* of 0.006 (Table 2). This finding suggests that superior CSR performers strategically employ more positive language in their CSR disclosures, with the magnitude of this effect being economically meaningful.

Analysis of firm-specific characteristics yields limited evidence of systematic associations with disclosure tone. Firm size (*Size*), leverage (LEV), and analyst following (*Analysts*) show no significant relationship with *OptimistTone* across all specifications. Profitability (ROA) and loss indicators (*Loss*) similarly demonstrate no consistent associations. Only the market-to-book ratio (M/B) exhibits a marginally significant positive relationship with disclosure tone for low CSR performers ($\beta = 0.0001$, $p < 0.10$) and in the full sample ($\beta = 0.0001$, $p < 0.10$). This finding suggests that growth-oriented firms may be more inclined to use positive language in their CSR disclosures, particularly when their sustainability performance is weaker.

[Table 4 about here.]

4.3 Economic Consequences of CSR Performance and Disclosure Tone

Table 5 presents the results of our regression analyses examining the relationship between CSR performance, disclosure tone, and firms' cost of capital. Our key finding relates to the interplay between CSR performance and disclosure tone. While both *OptimistTone* (β = 1.192, p < 0.05) and *ESGPerf* (β = 0.019, p < 0.05) show positive standalone effects on cost of capital, their interaction (*OptimistTone*×*ESGPerf*) reveals a significant negative coefficient (β = -1.288, p < 0.10). This interaction effect requires careful interpretation.

To understand the economic significance of these results, consider a one standard deviation increase in CSR performance (0.141 based on Table 2). At the mean level of optimistic tone, this increase in *ESGPerf* is associated with a 27 basis point increase in cost of capital (0.019 × 0.141 × 100). However, for firms with disclosure tone one standard deviation above the mean (mean of 0.006 plus standard deviation of 0.007), the same increase in CSR performance leads to a 12 basis point decrease in cost of capital ([-1.288 × 0.013 + 0.019] × 0.141 × 100)[3].

The negative interaction effect indicates that firms can potentially offset the positive relationship between CSR performance and cost of capital through more optimistic disclosure tone. Specifically, the inflection point where the marginal effect of CSR performance becomes negative occurs at an optimistic tone level of 0.015 (0.019/1.288), which is approximately 1.29 standard deviations above the mean tone in our sample[4].

[3]This calculation uses the standard deviations from Table 2, where *ESGPerf* has a standard deviation of 0.141 and *OptimistTone* has a standard deviation of 0.007.

[4]The economic interpretation suggests that firms need to carefully balance their CSR communication strategy, as the benefits of positive CSR performance are contingent on how this information is conveyed to market participants.

Delving into the components of the cost of capital – cost of equity (WACE) and cost of debt (WACD) – the positive association between the tone or ESG performance and cost of capital appears to derive from the latter cost element. This indicates the role of CSR transparency and CSR reporting quality in the examination of future firm profitability. Consistent with this notion, Chava (2014) provides evidence of a consideration of firms' ESG profile in the banks' risk assessment and resulting loan options. Sharfman & Fernando (2008) emphasize the importance of a robust ESG risk management -- in particular the environmental risk management -- to lower the cost of capital.

The findings for the control variables suggest lower costs of capital for larger firms and firms with higher leverage (the coefficients on *Size* and *LEV* are negative and significant at -0.006 and -0.032, respectively). These effects are economically meaningful - a one standard deviation increase in firm size is associated with a 106 basis point decrease in cost of capital (-0.006 $\times$ 1.770 $\times$ 100). We also find that firms with greater analyst following exhibit marginally higher costs of capital (coefficient on *Analysts* = 0.001, p $<$ 0.01).

[Table 5 about here.]

4.4 Additional analysis

Analysis of ESG and Disclosure Tone Components

Table 6 presents analyses decomposing both our ESG performance measure and disclosure tone metrics to provide deeper insights into the drivers of our main findings. First, we examine the environmental (*EnvPerf*), social (*SocPerf*), and governance (*GovPerf*) components separately, given that prior research documents varying effects of ESG dimensions on firm outcomes (Chava, 2014; Dhaliwal et al., 2011).

Columns 1-3 examine the relationship between individual ESG components and optimistic

disclosure tone. We find no significant associations between any of the individual components and firms' disclosure tone choices. The coefficients on *EnvPerf* (0.002), *SocPerf* (-0.001), and *GovPerf* (0.00000) are all statistically insignificant.

Columns 4-6 present the results for cost of capital. Only governance performance shows a significant relationship, with *GovPerf* exhibiting a positive association with cost of capital ($\beta = 0.016$, $p < 0.01$). The interactions between optimistic tone and individual ESG components (*OptimistTone*×*EnvPerf*, *OptimistTone*×*SocPerf*, and *OptimistTone*×*GovPerf*) are all statistically insignificant[5].

[Table 6 about here.]

To further understand the mechanisms driving our results, we decompose our optimistic tone measure into its positive (*PosTone*) and negative (*NegTone*) components. This analysis reveals that high CSR performers employ significantly more positive language ($\beta = 0.014$, $p < 0.05$), while low CSR performers use significantly more negative language ($\beta = 0.005$, $p < 0.05$) (Table 7). These findings align with signaling theory rather than impression management theory, suggesting firms' CSR disclosures generally reflect their underlying performance.

[Table 7 about here.]

When examining the cost of capital implications of tone components, we find that the moderating effect of optimistic tone documented in our main analyses is primarily driven by firms' avoidance of negative language rather than their use of positive language (Table 8). Specifically, while the interaction between positive tone and CSR performance shows no significant association with cost of capital, firms with strong CSR performance that use

[5]In untabulated analyses using industry-clustered standard errors following Fiechter et al. (2022), we find significant positive associations between both social and governance performance and cost of capital, which attenuate when interacted with optimistic tone. This suggests our main findings may be primarily driven by the social and governance dimensions rather than environmental performance.

more negative language face significantly higher financing costs. This finding refines our understanding of the interaction effect documented in section 4.3, suggesting that the benefits of CSR performance are particularly diminished when firms adopt a negative disclosure tone, consistent with the market interpreting negative language as a signal of underlying concerns about CSR activities.

[Table 8 about here.]

Impact of Non-Financial Reporting Regulation

Table 9 presents our analysis of how the EU Non-Financial Reporting Directive (NFRD) affects firms' CSR disclosure tone. The NFRD mandated increased transparency on environmental, social, and governance issues for EU firms starting in fiscal year 2017. While prior research suggests that CSR disclosure regulation motivates firms to act more sustainably (Bonetti et al., 2023b; Christensen et al., 2021), the directive provides significant discretion in disclosure characteristics, particularly regarding narrative language choices.

In column 1, which reports results for our full sample, we find no significant association between CSR performance and optimistic tone (coefficient on *ESGPerf* = -0.001). The coefficient on *Post* is negative but insignificant (-0.002), suggesting no systematic change in disclosure tone following the NFRD's implementation. Most importantly, the interaction term *ESGPerf*×*Post* shows a positive but insignificant coefficient (0.002), indicating that the relationship between CSR performance and disclosure tone remained largely unchanged after the introduction of mandatory reporting.

To explore potential heterogeneity in responses to the NFRD, columns 2 and 3 present separate analyses for firms with low and high CSR performance (below and above median *ESG*, respectively). For low CSR performers, we find a marginally negative relationship between CSR performance and optimistic tone (coefficient = -0.005), while high performers

show a positive but insignificant association (coefficient = 0.009). The interaction terms *ESGPerf×Post* remain insignificant in both subsamples, suggesting the NFRD's limited impact persists across different levels of CSR performance.[6]

[Table 9 about here.]

Table 10 presents our analysis of how the NFRD affects the relationship between CSR performance, disclosure tone, and cost of capital. We examine whether mandatory CSR reporting alters the effectiveness of disclosure tone as a signaling mechanism, given that increased transparency requirements could reduce information asymmetry and thus the need for signaling (Bonetti et al., 2023b; Clarkson et al., 2013).

In column 1, which reports results for our full sample, we find positive and significant coefficients on both *OptimistTone* (β = 2.195, p < 0.01) and *ESGPerf* (β = 0.034, p < 0.01), consistent with our main findings. The coefficient on *Post* is positive and marginally significant (0.019, p < 0.10), suggesting a general increase in cost of capital following the NFRD's implementation.

Most importantly, we find significant negative coefficients on the two-way interactions *OptimistTone×ESGPerf* (β = -2.840, p < 0.01), *OptimistTone×Post* (β = -2.015, p < 0.01), and *ESGPerf×Post* (β = -0.026, p < 0.10). However, the three-way interaction *OptimistTone×ESGPerf×Post* shows a positive and significant coefficient (β = 2.788, p < 0.05), suggesting that the moderating effect of optimistic tone on the CSR performance-cost of capital relationship weakens after the introduction of mandatory reporting.

Columns 2 and 3 present separate analyses for firms with low and high CSR performance. The results reveal stronger effects for high CSR performers, with larger coefficient magnitudes

[6]The limited impact of the NFRD on disclosure tone might be attributable to varying enforcement mechanisms across EU member states, as prior research emphasizes the importance of assurance and enforcement institutions for CSR reporting mandate effectiveness (Ioannou & Serafeim, 2017; Krueger et al., 2024).

across all interaction terms. Particularly notable is the three-way interaction coefficient for high performers ($\beta = 11.130$, $p < 0.05$), which is substantially larger than for low performers ($\beta = 6.440$, $p < 0.05$)[7].

[Table 10 about here.]

Anticipation Effects of the NFRD

Figure 2 presents the evolution of CSR disclosure tone (*OptimistTone*), CSR performance (*ESGPerf*), and cost of capital (*WACC*) around the implementation of the NFRD in 2017. The graph reveals relatively stable trends in disclosure tone and CSR performance over the sample period, while cost of capital exhibits a decreasing trend until 2016. This pattern suggests potential anticipation effects, with firms adjusting their behavior in advance of the NFRD's entry-into-force.

To formally test for anticipation effects, we shift our treatment event to the year prior to the NFRD's implementation (i.e., 2016). Untabulated results reveal no significant relationship between the interaction of CSR performance and the shifted regulation dummy on disclosure tone, suggesting that firms did not systematically alter their language choices in anticipation of the mandate.

However, when examining the interplay between optimistic tone, CSR performance, and the shifted regulation dummy, we find a significant positive effect on cost of capital in 2016 [untabulated]. This finding indicates that the moderating role of optimistic tone on the CSR performance-cost of capital relationship began to diminish in the year leading up to the NFRD's entry-into-force.

[7]These findings suggest that mandatory CSR reporting may have reduced the effectiveness of optimistic disclosure tone as a signaling mechanism, particularly for high CSR performers. This aligns with the notion that increased transparency requirements could diminish the importance of narrative choices in communicating CSR performance to capital markets.

Fiechter et al. (2022) suggest that CSR disclosures may have elicited transparency effects around the NFRD's passage in 2014. To explore this possibility, we further shift our treatment event to 2014. Untabulated analyses reveal no significant changes in either the determinants of disclosure tone or the joint effect of tone and CSR performance on cost of capital around this earlier date.

[Figure 2 about here.]

Collectively, these findings suggest that while firms did not significantly alter their disclosure tone in response to the passage or implementation of the NFRD, the regulation's impending introduction began to attenuate the signaling value of optimistic tone in the year immediately preceding its entry-into-force. This anticipation effect is consistent with mandatory reporting requirements diminishing the importance of narrative choices in conveying CSR performance to capital markets.

4.5 Robustness tests

ESG Performance Levels

To ensure the robustness of our findings, we conduct additional analyses using alternative ESG performance classifications. In our main test of H1, we split our sample at the median ESG performance score to examine differences in CSR reporting narratives between high and low performers. However, this approach does not consider firms with extremely high or low ESG performance.

Following Du & Yu (2021), we further divide our sample into low (bottom 25%), medium (middle 50%), and high (top 25%) ESG performers. Figure 3 visualizes the relationship between these ESG performance groups and the optimistic tone in their CSR reports. The two upper graphs (left: p<=25; right: p>25 & p<=75) show a moderately stable, slightly

negative association between ESG performance and optimistic tone for firms in the bottom 25% and middle 50% of the ESG performance distribution. In contrast, the lower graph (p>75) exhibits a strong positive relationship between ESG performance and optimistic tone for firms in the top 25% of the distribution.

These visual patterns suggest that the association between ESG performance and optimistic tone in CSR reports varies across the distribution of ESG performance. While firms with low to moderate ESG performance show little variation in their reporting tone, high-performing firms exhibit a more pronounced positive relationship between their ESG performance and the optimism of their CSR disclosures.

Empirical tests using this refined classification yield results consistent with our main analysis. We find a positive and significant (at the 5% level) association between the top 25% of ESG performers and optimistic CSR reporting tone, supporting H1 [untabulated]. These findings reinforce our conclusion that firms with superior ESG performance tend to adopt more optimistic language in their CSR reports.

[Figure 3 about here.]

Alternative ESG Performance Metric

Prior research has highlighted discrepancies in ESG score computation across rating agencies, leading to divergent ESG ratings (Berg et al., 2022; Christensen et al., 2022; Serafeim & Yoon, 2023). To assess the sensitivity of our results to the choice of ESG metric, we replace our primary measure (Refinitiv ESG score) with the Bloomberg ESG performance score.

Table 11 presents the results of re-estimating our test of H1 using the Bloomberg ESG measure. We find no significant relationship between Bloomberg's ESG performance score and the level of optimistic tone for either high or low ESG performers. These insignificant

results provide no evidence of impression management or signaling strategies in firms' CSR disclosures. However, the smaller sample size resulting from the merge with the Bloomberg ESG database may contribute to the slight deviation from our main findings.

[Table 11 about here.]

Table 12 reports the results of re-estimating our test of H2 using the Bloomberg ESG score. Consistent with our main analysis, we find that while ESG performance and optimistic tone individually have no significant effect on the cost of capital, their interaction (*Optimist-Tone*×*ESGBlmberg*) shows a negative and significant association (β = -37.422, p $<$ 0.01). This finding reinforces our conclusion that the cost of capital benefits of strong ESG performance are contingent on firms' linguistic choices in their CSR reports.

[Table 12 about here.]

5 Conclusion

This study investigates the role of narrative tone in standalone CSR reports, examining whether firms use optimistic language to signal their genuine commitment to sustainability or to manage stakeholders' perceptions of their ESG performance. Our findings support the signaling perspective, indicating that firms with superior CSR performance use standalone reports to communicate their authentic commitment to sustainability, rather than engaging in impression management.

We also explore the economic consequences of these narrative strategies, focusing on their impact on firms' cost of capital. Our results reveal that strong ESG performance, when coupled with an optimistic tone, significantly reduces the cost of capital, highlighting the importance of effective communication in realizing the financial benefits of sustainability initiatives.

Furthermore, we investigate the impact of the EU Directive 2014/95/EU on CSR reporting practices, finding that the interaction between CSR performance and optimistic tone has a more pronounced effect on the cost of capital in the pre-directive period. This suggests that the financial implications of strategic CSR reporting are more salient in a voluntary reporting environment.

Our study contributes to the literature on narrative non-financial disclosure by providing new insights into the linguistic strategies employed by European firms and their economic consequences. Our findings have important implications for regulators and practitioners, emphasizing the need for increased transparency and comparability in non-financial disclosures.

In conclusion, our study highlights the importance of narrative tone in CSR reporting as a tool for signaling and impression management, with significant implications for firms' cost of capital. Our findings underscore the need for continued research on the strategic dimensions

of non-financial disclosure and their economic consequences, as well as the role of regulatory interventions in shaping CSR reporting practices.

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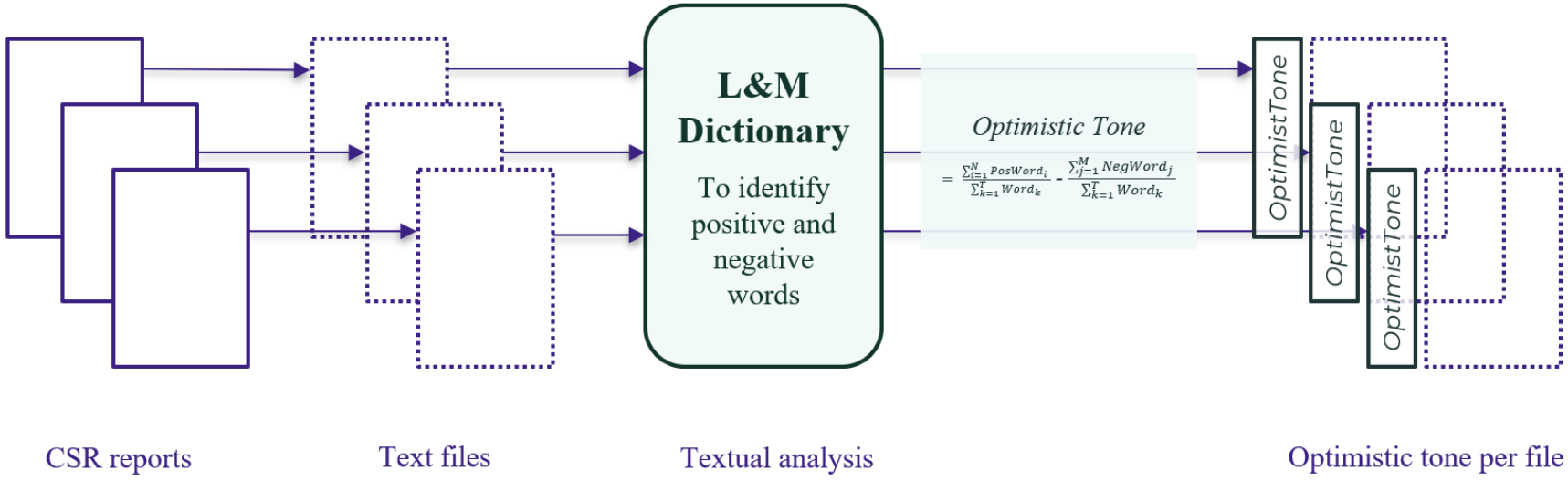
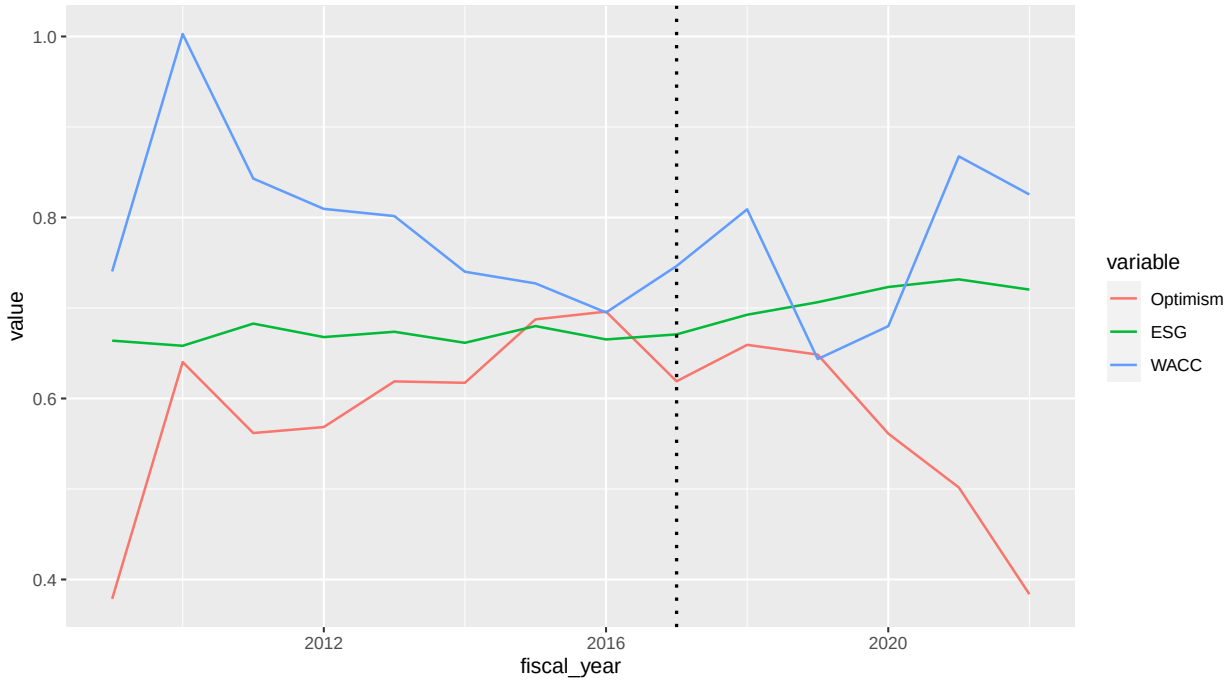
Figures

Figure 1: Textual analysis approach



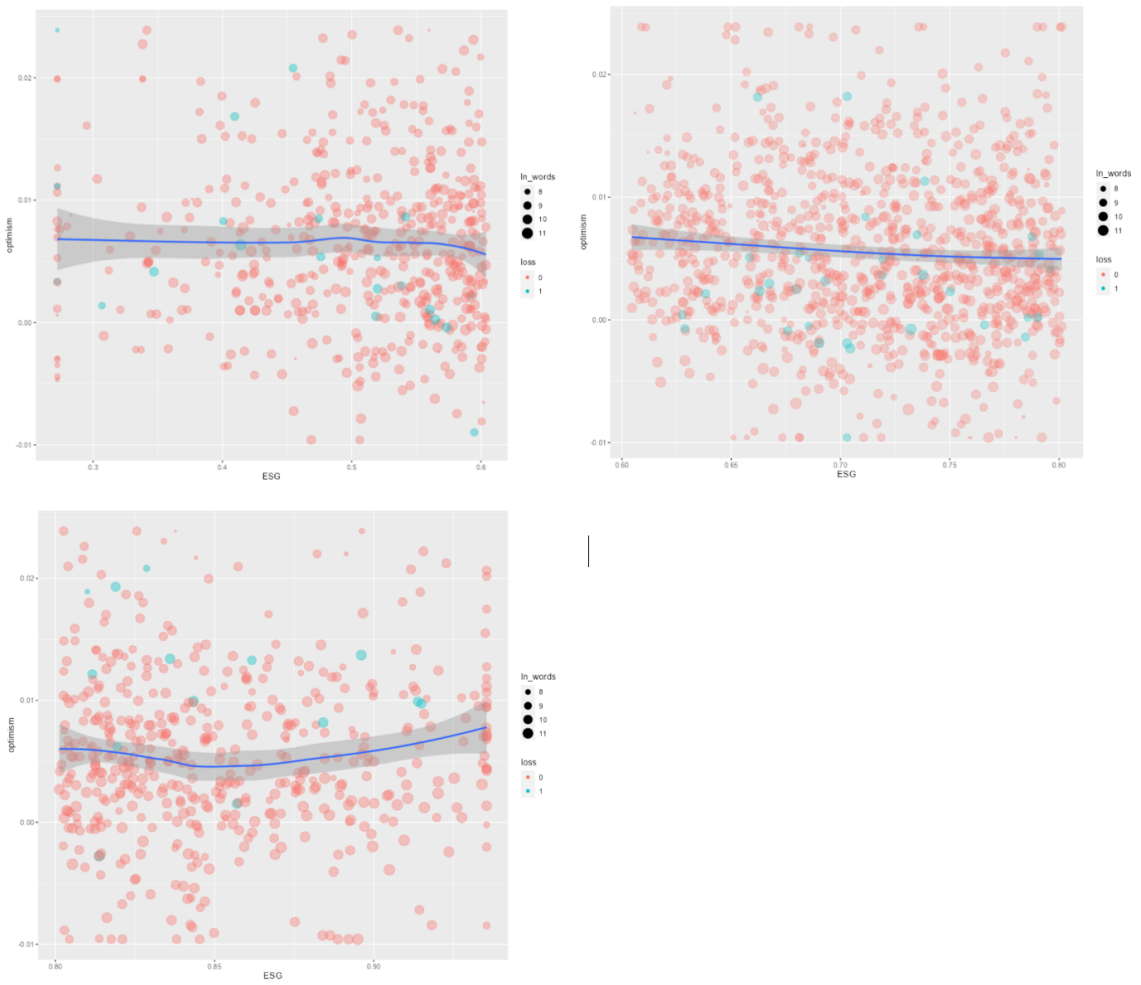
Note: Figure 1 presents the methodological framework for computing the *OptimistTone* proxy, which quantifies the narrative sentiment in Corporate Social Responsibility (CSR) reports. The analytical process transforms our sample of sustainability reports into machine-readable text files to facilitate computational analysis. Using the Loughran and McDonald (2011) Sentiment Word Lists, a validated lexical resource for financial text analysis, we conduct systematic sentiment analysis of the textual content. This sentiment quantification methodology calculates the relative sentiment by determining the differential between positive and negative word frequencies within each CSR report. To control for document length variation, we normalize this differential by the total word count of each CSR report for the corresponding fiscal year, following established approaches in the literature (Melloni et al., 2017; Rogers et al., 2011).

Figure 2: Optimistic tone, ESG performance, & cost of capital over time



Note: Figure 2 displays three time series from 2009 to 2022: CSR reporting tone (OptimistTone/100, red line), ESG performance (Refinitiv ESG performance score, green line), and cost of capital (WACC/100, blue line). A vertical dashed line marks the 2017 implementation of the Non-Financial Reporting Directive (NFRD), dividing the sample into pre- and post-regulation periods. The visualization was generated using the 'ggplot' package (version 3.4.4) in R (Wickham, 2016).

Figure 3: The relationship of optimistic tone and ESG performance per ESG performance range (low, medium, high)



Note: Figure 3 illustrates the relationship between ESG performance and CSR reporting tone across three ESG performance terciles. Following Du and Yu's (2021) categorization, the data is segmented into low (p≤25), medium (25<p≤75), and high (p>75) ESG performance groups. Each panel presents scatter plots with fitted regression lines and confidence intervals. The visualization was generated using the ExPanDaR package (Gassen, 2018).

Tables

Table 1: Selection and distribution of our sample

Panel A: Sample composition

	Firm-year-level	**Firm-level**
Initial sample	3,269	534
- requiring financial and ESG data	(642)	(145)
	2,415	389
- excluding missing values	(413)	(43)
Final sample	**2,002**	**346**

Panel B: Sample distribution by year (firm-year-level)

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Freq.	36	79	91	99	101	119	129	150	182	195	202	212	199	208

Panel C: Sample distribution by countries (firm-year-level)

Country	Freq.
Austria	50
Belgium	37
Denmark	117
Finland	90
France	199
Germany	325
Ireland	23
Italy	175
Luxembourg	18
Netherlands	77
Norway	44
Poland	12
Portugal	14
Spain	122
Sweden	160
Switzerland	201
United Kingdom	338
Total	**2,002**

Note: Table 1 presents the sample composition across different dimensions. Panel A delineates the sample selection process, displaying the number of observations at each screening stage both at the firm-year level (column (1)) and firm level (column (2)). From an initial sample of 3,057 observations, the integration with Refinitiv's financial and ESG data reduced the sample to 2,415 observations due to firm coverage limitations. Further data requirements from Refinitiv and Bloomberg resulted in the exclusion of 413 additional observations. Panel B presents the temporal distribution of the final sample across the period 2009-2022 at the firm-year level, while Panel C outlines the geographical distribution by country. All variable definitions are provided in Appendix A1. The table was generated using the 'kable' package (version 1.3.4) in R (Zhu, 2024; MIT License).

Table 2: Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max
OptimistTone	2,002	0.006	0.007	−0.010	0.001	0.005	0.010	0.024
PosTone	2,002	0.018	0.005	0.007	0.014	0.017	0.021	0.032
NegTone	2,002	0.012	0.004	0.005	0.009	0.012	0.014	0.022
ESGPerf	2,002	0.694	0.141	0.272	0.604	0.715	0.801	0.935
EnvPerf	2,002	0.706	0.192	0.114	0.602	0.746	0.855	0.973
SocPerf	2,002	0.730	0.159	0.240	0.634	0.754	0.855	0.970
GovPerf	2,002	0.632	0.209	0.118	0.491	0.668	0.800	0.955
WACC	2,002	0.077	0.030	0.010	0.059	0.077	0.094	0.171
WACE	2,002	0.108	0.033	0.047	0.086	0.103	0.126	0.229
WACD	2,002	0.012	0.016	−0.005	0.001	0.008	0.018	0.088
Size	2,002	9.907	1.750	6.684	8.662	9.558	10.968	14.236
LEV	2,002	0.654	0.194	0.178	0.522	0.651	0.793	0.987
ROA	2,002	0.057	0.052	−0.036	0.019	0.048	0.079	0.254
M/B	2,002	3.345	3.889	0.214	1.140	2.089	3.827	24.229
Loss	2,002	0.034	0.181	0	0	0	0	1
Analysts	2,002	19.960	7.554	3	15	20	25	37

Note: Table 2 presents descriptive statistics for the main variables employed in our empirical analyses at the firm-year level. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 3: Correlation matrix

	OptimistTone	ESGPerf	EnvPerf	SocPerf	GovPerf	WACC	Size	LEV	ROA	M/B	Loss	Analysts
OptimistTone	1.000∗											
ESGPerf	-0.064∗	1.000∗										
EnvPerf	-0.042	0.739∗	1.000∗									
SocPerf	-0.050∗	0.814∗	0.522∗	1.000∗								
GovPerf	-0.067∗	0.713∗	0.293∗	0.332∗	1.000∗							
WACC	0.099∗	-0.074∗	-0.210∗	-0.053∗	-0.003	1.000∗						
Size	-0.126∗	0.456∗	0.550∗	0.321∗	0.325∗	-0.398∗	1.000∗					
LEV	-0.086∗	0.244∗	0.349∗	0.173∗	0.146∗	-0.404∗	0.635∗	1.000∗				
ROA	0.086∗	-0.166∗	-0.278∗	-0.034	-0.172∗	0.370∗	-0.568∗	-0.510∗	1.000∗			
M/B	0.100∗	-0.100∗	-0.200∗	0.006	-0.117∗	0.177∗	-0.416∗	-0.109∗	0.537∗	1.000∗		
Loss	-0.006	-0.042	-0.039	-0.064∗	0.004	-0.014	0.021	0.065∗	-0.270∗	-0.045∗	1.000∗	
Analysts	0.013	0.401∗	0.380∗	0.353∗	0.229∗	-0.003	0.442∗	0.231∗	-0.105∗	-0.077∗	-0.023	1.000∗

Note: Table 3 presents the Pearson correlation matrix for the main dependent, independent, and control variables. The lower triangle displays pairwise correlation coefficients, with asterisks (*) indicating statistical significance at the 0.05 level. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 4: Analysis of the relationship between CSR performance and CSR reporting tone for high and low ESG performing firms

	Dependent variable:		
	OptimistTone		
	Full sample	ESG<p50	ESG>p50
	(1)	(2)	(3)
ESGPerf	0.001	−0.002	0.012**
	(0.003)	(0.004)	(0.005)
Size	−0.00004	0.001	−0.001
	(0.0004)	(0.0004)	(0.001)
LEV	−0.003	−0.003	−0.006
	(0.002)	(0.003)	(0.004)
ROA	−0.003	−0.002	−0.001
	(0.009)	(0.010)	(0.013)
M/B	0.0001*	0.0001*	0.0001
	(0.0001)	(0.0001)	(0.0001)
Loss	0.0002	−0.001	0.002
	(0.001)	(0.001)	(0.002)
Analysts	0.0001	0.0001	0.00005
	(0.0001)	(0.0001)	(0.0001)
Industry fixed effects	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*
Observations	2,002	1,000	1,002
R^2	0.141	0.151	0.159
Adjusted R^2	0.125	0.120	0.130
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 4 presents ordinary least squares regression estimates examining the relationship between ESG performance and CSR reporting tone. The dependent variable OptimistTone is regressed on ESG performance and control variables for the full sample (column 1) and subsamples split at the median ESG performance (columns 2 and 3). Standard errors are reported in parentheses, with statistical significance denoted at the 10% (), 5% (), and 1% () levels. The analysis includes industry and time fixed effects. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 5: Analysis of the relationship between CSR reporting tone interacted with ESG performance and the cost of capital

	Dependent variable:		
	Cost of Capital WACC	Cost of Equity WACE	Cost of Debt WACD
	(1)	(2)	(3)
OptimistTone	1.192**	0.062	0.198
	(0.522)	(0.607)	(0.236)
ESGPerf	0.019**	0.007	0.011**
	(0.010)	(0.012)	(0.004)
OptimistTonexESGPerf	−1.288*	−0.142	−0.293
	(0.767)	(0.867)	(0.329)
Size	−0.006***	−0.001	−0.0005
	(0.001)	(0.002)	(0.001)
LEV	−0.032***	0.022**	0.003
	(0.007)	(0.009)	(0.004)
ROA	0.029	−0.004	0.004
	(0.025)	(0.028)	(0.009)
M/B	−0.00004	−0.001***	−0.0002
	(0.0003)	(0.0003)	(0.0002)
Loss	0.003	0.028***	0.005**
	(0.004)	(0.006)	(0.002)
Analysts	0.001***	0.0002	−0.00002
	(0.0002)	(0.0002)	(0.0001)
Controls	*Yes*	*Yes*	*Yes*
Industry fixed effects	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*
Observations	2,002	2,002	2,002
R^2	0.401	0.280	0.496
Adjusted R^2	0.390	0.266	0.487
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 5 presents ordinary least squares regression results examining how CSR reporting tone and ESG performance interact to influence firms' cost of capital components. The analysis employs three dependent variables: weighted average cost of capital (WACC), weighted average cost of equity (WACE), and weighted average cost of debt (WACD). Standard errors are reported in parentheses, with statistical significance denoted at the 10% (), 5% (), and 1% () levels. All models include industry and time fixed effects, along with firm-level controls. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 6: Analysis of the effect of the ESG components on the CSR reporting tone

	Dependent variable:					
	OptimistTone			WACC		
	(1)	(2)	(3)	(4)	(5)	(6)
EnvPerf	0.002			−0.002		
	(0.002)			(0.010)		
SocPerf		−0.001			0.014**	
		(0.002)			(0.006)	
GovPerf			0.00000			0.022***
			(0.002)			(0.007)
OptimistTonexEnvPerf				−0.415		
				(0.740)		
OptimistTonexSocPerf					−1.144*	
					(0.620)	
OptimistTonexGovPerf						−0.937**
						(0.421)
Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	2,002	2,002	2,002	2,002	2,002	2,002
R^2	0.143	0.141	0.141	0.314	0.316	0.325
Adjusted R^2	0.127	0.125	0.125	0.306	0.308	0.317
Note:	*p<0.1; **p<0.05; ***p<0.01					

Table 6 presents the disaggregated analysis of ESG components' effects on CSR reporting tone and cost of capital. Columns (1)-(3) report ordinary least squares regression estimates for OptimistTone regressed separately on environmental (EnvPerf), social (SocPerf), and governance (GovPerf) performance measures. Columns (4)-(6) extend this analysis by examining the interaction between reporting tone and each ESG component in explaining the weighted average cost of capital (WACC). All specifications include industry and time fixed effects, with standard errors clustered at the firm level reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 7: Analysis of the effect of the ESG performance on the CSR reporting tone components

	Dependent variable:					
	PosTone			NegTone		
	Full sample	ESG<p50	ESG>p50	Full sample	ESG<p50	ESG>p50
	(1)	(2)	(3)	(4)	(5)	(6)
ESGPerf	0.005**	0.002	0.014***	0.004***	0.005***	0.002
	(0.002)	(0.003)	(0.005)	(0.001)	(0.002)	(0.003)
Size	−0.0002	0.00004	−0.0004	−0.0002	−0.0005**	0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0003)
LEV	−0.001	−0.0001	−0.004	0.003*	0.003**	0.003
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
ROA	−0.001	−0.002	0.005	0.002	−0.0002	0.007
	(0.005)	(0.006)	(0.009)	(0.005)	(0.006)	(0.007)
M/B	0.0001**	0.0001	0.0001	−0.00003	−0.0001	−0.00001
	(0.0001)	(0.0001)	(0.0001)	(0.00004)	(0.0001)	(0.0001)
Loss	0.0001	−0.001	0.002	−0.0001	−0.0004	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Analysts	0.00003	0.00003	0.00003	−0.00003	−0.00004	−0.00002
	(0.00004)	(0.0001)	(0.00005)	(0.00003)	(0.00004)	(0.00004)
Industry fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	2,002	1,000	1,002	2,002	1,000	1,002
R^2	0.137	0.143	0.182	0.169	0.187	0.145
Adjusted R^2	0.121	0.112	0.154	0.153	0.158	0.116
Note:	*p<0.1; **p<0.05; ***p<0.01					

Table 7 examines the differential impact of ESG performance on positive and negative reporting tone components, analyzing both the full sample and subsamples split at the median ESG performance. Columns (1)-(3) present ordinary least squares regression estimates for positive tone (PosTone), while columns (4)-(6) report results for negative tone (NegTone). The analysis includes industry and time fixed effects, with standard errors clustered at the firm level reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 8: Analysis of the effect the CSR reporting tone components on the cost of capital

	Dependent variable:					
	Cost of Capital			Cost of Capital		
	WACC	WACE	WACD	WACC	WACE	WACD
	(1)	(2)	(3)	(4)	(5)	(6)
PosTone	1.050*	0.117	0.044			
	(0.636)	(0.790)	(0.352)			
NegTone				−2.146**	0.260	−0.558
				(1.057)	(1.244)	(0.651)
ESGPerf	0.018	0.009	0.008	−0.028	0.008	−0.003
	(0.019)	(0.024)	(0.009)	(0.017)	(0.021)	(0.011)
PosTonexESGPerf	−0.569	−0.207	0.019			
	(0.950)	(1.132)	(0.505)			
NegTonexESGPerf				3.413**	−0.225	1.013
				(1.475)	(1.746)	(0.977)
Controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	2,002	2,002	2,002	2,002	2,002	2,002
R^2	0.406	0.280	0.496	0.400	0.280	0.498
Adjusted R^2	0.395	0.266	0.487	0.388	0.266	0.488
Note:	*p<0.1; **p<0.05; ***p<0.01					

Table 8 examines how CSR reporting tone components interact with ESG performance to influence firms' cost of capital measures. Columns (1)-(3) analyze the effects of positive tone (PosTone) and its interaction with ESG performance on weighted average cost of capital (WACC), weighted average cost of equity (WACE), and weighted average cost of debt (WACD), respectively. Columns (4)-(6) present parallel analyses using negative tone (NegTone) and its ESG performance interaction. All specifications include industry and time fixed effects, with standard errors clustered at the firm level reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 9: Analysis of the NFRD implications on the CSR reporting tone

	Dependent variable:		
	OptimistTone		
	Full sample	ESG<p50	ESG>p50
	(1)	(2)	(3)
ESGPerf	−0.001	−0.005	0.009
	(0.004)	(0.006)	(0.009)
Post	−0.002	−0.003	−0.005
	(0.002)	(0.004)	(0.008)
ESGPerfxPost	0.002	0.004	0.005
	(0.003)	(0.007)	(0.010)
Size	−0.0001	0.001	−0.001
	(0.0004)	(0.0004)	(0.001)
LEV	−0.004	−0.003	−0.007*
	(0.002)	(0.003)	(0.004)
ROA	−0.004	−0.001	−0.004
	(0.009)	(0.010)	(0.012)
M/B	0.0002**	0.0001*	0.0002
	(0.0001)	(0.0001)	(0.0001)
Loss	−0.0003	−0.001	0.001
	(0.001)	(0.001)	(0.002)
Analysts	0.0001	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)
Industry fixed effects	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*
Observations	2,002	1,000	1,002
R^2	0.125	0.132	0.144
Adjusted R^2	0.113	0.110	0.125
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 9 investigates the regulatory impact of the Non-Financial Reporting Directive (NFRD) on CSR reporting tone through a difference-in-differences framework. The analysis examines the interaction between ESG performance and the post-NFRD period across the full sample (column 1) and subsamples split at the median ESG performance (columns 2-3). The dependent variable OptimistTone captures the relative sentiment in CSR reports, while the interaction term ESGPerfxPost measures the differential effect of ESG performance in the post-regulatory period. All specifications include industry and time fixed effects, with standard errors reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 10: Analysis of the NFRD implications on the cost of capital

	Dependent variable:		
	WACC		
	Full sample	ESGPerf<p50	ESGPerf>p50
	(1)	(2)	(3)
OptimistTone	2.195***	2.788***	8.026***
	(0.601)	(0.845)	(2.767)
ESGPerf	0.034***	0.039***	0.087**
	(0.010)	(0.015)	(0.038)
Post	0.019*	0.035**	0.061
	(0.010)	(0.014)	(0.038)
OptimistTonexESGPerf	−2.840***	−4.161***	−9.847***
	(0.926)	(1.498)	(3.375)
OptimistTonexPost	−2.015**	−3.819***	−9.018**
	(0.932)	(1.441)	(3.823)
ESGPerfxPost	−0.026*	−0.057**	−0.077*
	(0.013)	(0.024)	(0.047)
OptimistTonexESGPerfxPost	2.788**	6.440***	11.130**
	(1.292)	(2.467)	(4.645)
Controls	*Yes*	*Yes*	*Yes*
Industry fixed effects	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*
Observations	2,002	1,000	1,002
R^2	0.336	0.401	0.291
Adjusted R^2	0.326	0.384	0.272
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 10 examines the regulatory impact of the Non-Financial Reporting Directive (NFRD) on cost of capital through a triple-difference framework. The analysis investigates the interactive effects between CSR reporting tone (OptimistTone), ESG performance (ESGPerf), and the post-NFRD period (Post) on firms' weighted average cost of capital (WACC). The full sample analysis (column 1) is complemented by subsample analyses of firms below and above median ESG performance (columns 2-3) to capture heterogeneous regulatory effects across the ESG performance distribution. The triple interaction term OptimistTonexESGPerfxPost measures the differential impact of reporting tone in the post-regulatory period conditional on ESG performance. All specifications include industry and time fixed effects, with standard errors reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 11: Re-estimation of table 4 using the Bloomberg ESG performance score

	Dependent variable:		
		OptimistTone	
	Full sample	ESGBlmberg<p50	ESGBlmberg>p50
	(1)	(2)	(3)
ESGBlmberg	−0.038	0.092	−0.340
	(0.073)	(0.086)	(0.235)
Size	−0.001	−0.001	−0.002*
	(0.001)	(0.001)	(0.001)
LEV	0.004	0.008	−0.006
	(0.005)	(0.006)	(0.010)
ROA	−0.002	−0.002	−0.052*
	(0.012)	(0.018)	(0.026)
M/B	0.00003	0.0001	0.0003
	(0.0001)	(0.0001)	(0.0003)
Loss	−0.002	−0.001	−0.005
	(0.002)	(0.002)	(0.004)
Analysts	0.0002	0.0002	0.0001
	(0.0001)	(0.0002)	(0.0002)
Industry fixed effects	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*
Observations	564	282	141
R^2	0.191	0.262	0.360
Adjusted R^2	0.150	0.183	0.228
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 11 examines the relationship between CSR reporting tone and ESG performance using Bloomberg's ESG scores as an alternative measure to the primary Refinitiv ESG metrics. The analysis presents ordinary least squares regression estimates for the full sample (column 1) and subsamples split at the median Bloomberg ESG performance (columns 2-3). The dependent variable OptimistTone captures the sentiment in CSR reports, while ESGBlmberg represents Bloomberg's composite ESG performance assessment. All specifications include industry and time fixed effects, with standard errors reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Table 12: Re-estimation of table 5 using the Bloomberg ESG performance score

	Dependent variable:		
	WACC		
	Cost of Capital	Cost of Equity	Cost of Debt
	(1)	(2)	(3)
OptimistTone	0.607***	0.376**	0.076
	(0.143)	(0.173)	(0.075)
ESGBlmberg	2.204***	0.952	0.259
	(0.760)	(0.955)	(0.307)
OptimistTonexESGBlmberg	−37.422**	−12.077	−2.787
	(15.064)	(19.811)	(6.984)
Size	−0.005*	−0.0002	0.002*
	(0.003)	(0.003)	(0.001)
LEV	−0.035***	0.011	−0.006
	(0.012)	(0.017)	(0.006)
ROA	−0.017	0.016	0.009
	(0.038)	(0.048)	(0.018)
M/B	0.0005	−0.001	0.0001
	(0.0005)	(0.001)	(0.0002)
Loss	−0.004	0.036**	0.007*
	(0.010)	(0.016)	(0.004)
Analysts	0.001	0.001	−0.0001
	(0.0004)	(0.0004)	(0.0002)
Industry fixed effects	*Yes*	*Yes*	*Yes*
Time fixed effects	*Yes*	*Yes*	*Yes*
Observations	564	564	564
R^2	0.404	0.341	0.587
Adjusted R^2	0.371	0.306	0.565
Note:	*p<0.1; **p<0.05; ***p<0.01		

Table 12 presents ordinary least squares regression estimates examining the relationship between CSR reporting tone and cost of capital components using Bloomberg's ESG performance metrics as an alternative to Refinitiv scores. The analysis employs three dependent variables: weighted average cost of capital (WACC), weighted average cost of equity (WACE), and weighted average cost of debt (WACD). The interaction term OptimistTonexESGBlmberg captures the joint effect of reporting tone and ESG performance on financing costs. All specifications include industry and time fixed effects, with standard errors reported in parentheses. Statistical significance is denoted at the 10% (), 5% (), and 1% () levels. Variable definitions are provided in Appendix A1. The table was generated using the 'stargazer' package (version 5.2.3) in R (Hlavac, 2022; Social Policy Institute).

Appendix

Appendix A1: Variable definitions

Variable name	Description	Source
WACC	Weighted Average Cost of Capital is a financial metric used to calculate a firm's cost of capital in year t in which each category of capital is proportionately weighted. All sources of capital including equity stock, preferred stock, and debt are included.	Bloomberg
WACE	Weighted Average Cost of Equity Capital is calculated by multiplying equity risk premium of the market with the beta of the stock plus an inflation adjusted risk free rate for firm i in year t.	Bloomberg
WACD	Weighted Average Cost of Debt Capital is calculated by adding weighted cost of short term debt and weighted cost of long term debt for firm i in year t.	Bloomberg
OptimistTone	Optimistic tone is a proxy for the optimistic narrative in a CSR report. It is calculated by the sum of all positive words subtracted by the sum of all negative words in a given report whose total is divided by all words in the respective report for firm i in year t (Loughran & McDonals Dictionary; see Figure 1; Eq. 1).	Constructed based on the L&M Dictionary
PosTone	Positive tone is a proxy for the positive narrative in a CSR report. It is derived by the proportion of positive words in a CSR report for firm i and year t (Loughran & McDonals Dictionary; Eq. 1).	Constructed based on the L&M Dictionary
NegTone	Negative tone is a proxy for the negative narrative in a CSR report. It is derived by the proportion of negative words in a CSR report for firm i and year t (Loughran & McDonals Dictionary; eq. 1).	Constructed based on the L&M Dictionary
ESGPerf	The ESG Score is a measure of the ESG performance by Refinitiv (since 2021: LSEG) firm i in year t. The overall ESG score is based on publicly reported data and comprises 870 data points of 10 categories in the pillars environmental, social and governance. Publicly reported information is collected via firms' annual and CSR reports, company and other websites, filings, other news sources. The ESG score is calculated as the relative sum of category weights for these environmental, social and governance pillars and, with that, ranges from 0 - 100 (LSEG; 2024).	Refinitiv ASSET4

Appendix A1: Variable definitions (cont.)

Variable name	Description	Source
EnvPerf	The Environmental Score is an overall company score based on the self-reported information in the environmental pillar for firm i in year t. It contains three categories and ranges from 0 - 100 (LSEG; 2024).	Refinitiv ASSET4
SocPerf	The Social Score is an overall company score based on the self-reported information in the social pillar for firm i in year t. It contains four categories and ranges from 0 - 100 (LSEG; 2024).	Refinitiv ASSET4
GovPerf	The Governance Score is an overall company score based on the self-reported information in the governance pillar for firm i in year t. It contains three categories and ranges from 0 - 100 (LSEG; 2024).	Refinitiv ASSET4
ESGBlmberg	The Bloomberg ESG Score is an overall company score based on the self-reported information in the environmental, social, and corporate governance pillars for firm i in year t.	Bloomberg
Size	*Size* is the natural log of total assets of firm i in year t.	Constructed based on Refinitiv ASSET4
LEV	Leverage is the total liabilities divided by total assets of firm i in year t.	Constructed based on Refinitiv ASSET4
ROA	Return on assets is the ratio of net income scaled by total assets of firm i in year t.	Constructed based on Refinitiv ASSET4
M/B	Market-to-book is the market capitalization divided by the total assets reduced by the total liabilities of firm i in year t.	Constructed based on Refinitiv ASSET4
Loss	Indicator variable that equals 1 for firm i and year t if the firm generated a loss in year t.	Constructed based on Refinitiv ASSET4
Analysts	Number of analysts following of firm i in year t.	Refinitiv ASSET4
WordCount	Word count is the total number of words in a CSR report of firm i in year t.	Constructed based on the L&M Dictionary
Post	Indicator variable that equals 1 for firm i in year t if a firm prepares its CSR reports according to the NFRD after it became mandatory in 2017; 0 otherwise.	Own calculation

Note: Appendix A1 tabulates the variables used throughout this study (column 1), their respective definitions (column 2) and sources used for the data retrieval (column 3).