

Creating sustainability reports that matter: an investigation of factors behind the narratives

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CREATING SUSTAINABILITY REPORTS THAT MATTER: AN INVESTIGATION OF FACTORS BEHIND THE NARRATIVES

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ABSTRACT

Purpose: This paper provides a novel approach to examine sustainability report narratives by considering key features of these narratives including, forward-looking content, risk content, tone, and sustainability-specific content.

Design/methodology/approach: Using a sample of UK firms' sustainability reports from 2014 to 2018, we capture the report content by compiling a collection of words using a computational linguistic technique that attempts to identify specific attributes of sustainability reports.

Findings: Findings show the main factors that determine the content of sustainability reports are: (i) external governance-related factors including the voluntary adoption of sustainability reporting assurance, the choice of assurance provider, stakeholder engagement, and ownership concentration, (ii) internal governance factors including board quality and the existence of a sustainability committee, and (iii) reporting behaviour including the publication of standardised Global Reporting Initiative (GRI) sustainability reports and financial reporting quality.

Practical implications: Corporate managers need to strengthen their internal and external governance mechanisms to enhance the comprehensiveness and credibility of sustainability reports and are encouraged to engage stakeholders in the sustainability reporting process. Policymakers can mandate the assurance of sustainability reports and establish reporting formats and standard words to control the tone of sustainability reports. Finally, researchers, professionals, as well as policymakers need to monitor sustainable development goals and targets to increase awareness, knowledge, and practices that can be operationalised to ensure a global society that can afford sustainable living.

Originality/value: To the best of our knowledge, no study has yet examined sustainability report narratives by considering key features of these reports including, forward-looking content, risk content, tone, and sustainability-specific content.

Keywords: sustainability reports; narratives, corporate governance.

1. INTRODUCTION

The information contained in sustainability reports varies in extent and format due to the lack of an enforced Corporate Social Responsibility (CSR) reporting framework and a high degree of discretion (Muslu et al., 2019). Sustainability reports cover topics that are broader than annual reports or companies' websites (Dhaliwal et al., 2011). They include textual non-quantifiable information regarding firms' policies, practices, and performance in social and environmental responsibilities (Dhaliwal et al 2011). Because there are no compulsory models of sustainability reports, these reports can vary in content and comparability (Reverte, 2009). The lack of regulation has resulted in diverse reporting for voluntary sustainability information (Huang and Watson, 2015; Nazari et al., 2017). The 'comply or explain' foundation of sustainability reporting guidelines allows companies to avoid reporting by explaining the reasons for exclusion (Cardoni et al., 2019; Amel-Zadeh and Serafeim, 2018). As a result, there is a considerable degree of uncertainty about the content, complexity, and reliability of sustainability reports (Nazari et al., 2017), and reporting practices will need to achieve completeness, relevance, and credibility to allow effective communications with stakeholders (Garcia-Torea et al., 2020).

Our paper adds to existing research in several ways. First, the textual properties of sustainability content play an important role in determining the informativeness of sustainability communication given the non-financial nature of sustainability reports (Du et al., 2017; Du and Yu, 2020). Computer-aided textual analysis is an evolving area in Accounting and Finance and generally involves using computer power to analyse large volumes of text to

identify the linguistic features of a document (Loughran and McDonald, 2011; Clarkson et al., 2020; Bassyouny et al., 2020). Prior literature identifies various linguistic characteristics of CSR disclosures including readability and tone (e.g., Nazari et al., 2017; Muslu et al., 2019; Clarkson et al., 2020; Du and Yu, 2020). This paper provides a novel approach and uses computer-aided textual analysis to examine sustainability report narratives by considering key features of these reports including, forward-looking content, risk content, tone, and sustainability-specific content.

Second, previous studies that used the textual analysis techniques have mainly used financial reports and focused on financial disclosures including, risk disclosure (Elgammal et al., 2018; Salem et al., 2019; Elamer et al., 2020), forward-looking disclosure (Liu, 2015; Elgammal et al., 2018), and disclosure tone (Marquez-Illescas et al, 2019). The use of computer-based textual analysis involving sustainability reports is still in its early stages (Clarkson et al., 2020; Hummel et al., 2017). Given the limited attention given to examining sustainability report narratives, we investigate the sustainability-specific context and develop a self-constructed wordlist based on the 17 goals of UN sustainable development goals (SDGs). Our examination adds to research that mainly pertains to the financial disclosures in corporate reports by examining the sustainability-specific content and thus, providing a comprehensive assessment of sustainability narratives.

Third, this study advances the current understanding of sustainability reporting by addressing factors that determine key features of sustainability reports. The CSR textual analysis literature offers little insight into the content of sustainability reports and is largely focused on the consequences of reporting behaviour. For example, Muslu et al. (2017) employ the textual analysis approach to examine the impact of the sustainability information on analyst forecast accuracy, and Clarkson et al. (2020) and Du and Yu (2020) examine the impact of CSR disclosures on CSR performance. This paper aims to understand factors that determine the content of sustainability reports to convey useful and transparent information. The

potential high information asymmetry about sustainable activities highlights the importance of investigating factors determining the sustainability narratives.

Prior literature suggests that recent changes in companies' adoption of sustainability practices from different institutional contexts require further research in terms of both country orientation and sampling period (Martínez-Ferrero et al., 2015; Michelon et al., 2015; Al-Shaer, 2020). We focus on the UK context and use a sample of FTSE100 companies that issued voluntary stand-alone CSR reports for the period of 2014–2018. Findings show that the main factors that determine the content of sustainability reports are: (i) external governance-related factors including the voluntary adoption of sustainability reporting assurance, the choice of assurance provider, stakeholder engagement, and ownership concentration, (ii) internal governance factors including board quality and the existence of sustainability committee, and (iii) reporting behaviour including the publication of standardised GRI sustainability reports and financial reporting quality.¹ Moreover, we develop a disclosure score using the four linguistic features used in the paper viz. forward-looking content, risk content, tone, and sustainability-specific content. We also capture the extent of external governance, internal governance, and reporting behaviour by combining the various associated variables in three factors through a principal component analysis (PCA) (Mallin et al., 2013; Arena et al., 2015). Our results are robust to different model specifications. We employ the Heckman (1979) two-step approach to check for potential endogeneity and our inferences remain unchanged.

¹ We acknowledge that the independent external assurance could be a management decision due to the lack of mandatory sustainability reporting. However, the external assurance process involves providing an independent external practitioner to perform procedures, obtain evidence, and after obtaining reasonable or limited assurance about the information, express an opinion designed to enhance the decision-making process. The independent external assurance requires providing a statement from a third party where accountability standard (AccountAbility AA1000 Assurance Standard (AA1000AS)) is developed, and promoted by the GRI, for external assurance of the implementation of the AccountAbility which guides reporting entities' approach to sustainability. Thus, due to the involvement of external factors that shape the quality of independent external assurance, we consider it as an external governance mechanism.

The remainder of this paper is structured as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 describes the methodology. Section 4 discusses the findings and robustness tests. Section 5 presents the conclusion.

2. LITERATURE AND HYPOTHESES DEVELOPMENT

Computer-aided approaches involve using computing power to analyse a large volume of text to identify interesting patterns (Loughran and McDonald, 2011). The computational linguistic technique helps to capture firms' disclosure behaviour (Berger, 2011). There is a growing body of empirical research in Accounting and Finance using the textual analysis of qualitative information. The disclosure channels used in the literature include annual reports/10-K/10-Q filings (Li, 2008; Ertugrul et al., 2017; Kang et al., 2018), earnings press release (Davis et al., 2012; Davis and Tama-Sweet, 2012), media news (Tetlock, 2007; Tetlock et al., 2008), management discussion and analysis section of the annual report (Lo et al., 2017), and conference calls (Larcker and Zakolyukina, 2012). In general, existing evidence supports the importance of linguistic features in assessing the transparency of corporate disclosure.

Previous studies have used financial reports to empirically examine disclosure patterns including, risk disclosure (Elshandidy and Nero, 2015; Elgammal et al., 2018; Salem et al., 2019; Elamer et al., 2020), forward-looking disclosure (Wang and Hussainey, 2013; Liu, 2015; Elgammal et al., 2018), and disclosure tone (Marquez-Illescas et al, 2019). The use of computer-based textual analysis involving sustainability reports is still in its early stages (Hummel et al., 2017; Clarkson et al., 2020), and existing studies offer little insight into the content of sustainability reports and are largely focused on the consequences of reporting behaviour. Muslu et al. (2017) form a disclosure quality measure based on specific features of CSR reports including tone, readability, and quantitative content, and examine the association between CSR disclosure quality and analyst forecast for all firms with KLD ratings from the period 2000-2011. Clarkson et al. (2020) employ the textual analysis approach to examine

disclosure tone and structure for a sample of US standalone CSR reports from 2002-2016 and whether it helps to predict CSR performance. Similarly, Du and Yu (2020) examine the effects of CSR report readability and tone on CSR performance using a sample of Fortune 500 companies' standalone CSR reports from 2004-2014. Loughran and McDonald (2016) survey textual analysis research and call for careful consideration of using textual properties to measure information content. In this paper, we focus on four disclosure features that provide a comprehensive assessment of sustainability report content namely, forward-looking content, risk content, sustainability-specific content, and tone.

Previous studies were based on different theories in explaining and assessing the nature of reporting. We use agency theory and stakeholder theory to understand the determinants of sustainability narratives. Previous literature uses agency theory to explain firms' disclosure practices (Arora and Dharwadkar, 2011; Michelon et al., 2015; Reverte, 2009) where such disclosure reduces the agency problem and have the purpose of increasing management welfare. Agency theory (Jensen and Meckling, 1976) states that voluntary disclosures help to reduce agency conflicts and information asymmetry problems between managers and shareholders. Based upon this theory, the disclosure of forward-looking and risk information mitigates information asymmetry and decrease agency costs (Hassanein and Hussainey, 2015). Prior research describes stakeholder theory as the most useful theory in explaining sustainability reporting practice. Stakeholder theory suggests that firms seek to gain not only shareholders' satisfaction but also other stakeholder groups such as customers, employees, suppliers, environmental activists, and the community (Wilmshurst and Frost, 2000; Helfaya et al., 2019; Ceesay et al., 2021). Managers need to balance and mitigate conflicts of interest between shareholders and other stakeholders, which results in the need to report on both financial and non-financial information (Helfaya et al., 2019; Gerwanski et al., 2019). Companies publish sustainability reports that are comprehensive and transparent to satisfy stakeholders' demand for information. External and internal-related governance factors

present a possible pressure for senior managers to engage in sustainable strategies and provide comprehensive sustainability reporting. Corporate governance pressure helps to decrease stakeholder's scepticism in sustainability reporting as a reaction to information overload (Haung and Watson 2015). The independent external assurance of sustainability reports increases stakeholders' trust in sustainability reports and improves reporting quality (Cohen and Simnett 2015). Moreover, firms that follow the GRI reporting framework appear to have a higher level of commitment to sustainability which improves the role that stakeholders play on information systems for sustainability (Michelon et al., 2015).

Accordingly, using an extensive literature review, we selected a set of determinants that are assumed to be related to sustainability report narratives. Hypotheses 1 and 2 analyse both external and internal governance determinants, and Hypothesis 3; is specific to corporate reporting behaviour.

2.1. External Governance

Prior literature shows that the voluntary adoption of independent assurance can improve the credibility and reliability of sustainability reports (Simnett et al. 2009; De Beelde and Tuybens, 2015; Birkey et al., 2016; Du and Wu, 2019; Hassan et al., 2020) which will increase corporate accountability (Martínez-Ferrero et al., 2018; Datt et al., 2019). The independent assurance helps to enhance the transparency of information by providing a rigorous independent verification process (Zorio et al., 2013) and increases the completeness and credibility of information (Al-Shaer and Zaman, 2018). The external assurance of sustainability reports reduces stakeholder pressures because it enhances transparency and increases reporting quality (Ballou et al., 2018; Boiral et al., 2019; Martínez-Ferrero et al., 2018). The mere adoption of sustainability assurance may not be sufficient to determine the sustainability reporting process, but rather it is the choice of assurance provider. Sustainability reports' credibility increases when they are assured and when assurance is provided by top tier accountancy

firms due to their expertise in risk assessment, planning, and consideration of materiality in providing assurance (Hodge et al., 2009; Pflugrath et al., 2011; Martinez-Ferrero and Garcia-Sanchez, 2017; Al-Shaer and Zaman 2019; Hummel et al., 2019). This can also alleviate stakeholders' concerns about the transparency of these reports (Simnett et al., 2009). As a result, the voluntary adoption of external assurance and the choice of assurer are more likely to affect the transparency of sustainability report narratives.

Companies that build a constructive collaboration with stakeholders and develop initiatives that engage stakeholders in companies' activities (Rueda-Manzanares et al., 2008) are more likely to be transparent in their sustainability reporting process as means of addressing stakeholders' societal concerns (Arena et al., 2015; Miniaoui et al., 2019). Hahn and Kühnen (2013) argue that there are potential differences in reporting due to differences in stakeholder engagement. Engaging stakeholders in the sustainability reporting process is associated with a firm's motivation to manage reputation risk and keeping stakeholders informed about corporate sustainability issues, performance, and agenda (Ardiana et al., 2019), which helps to promote a higher quality of sustainability reporting (Herremans et al., 2016).

Ownership structure affects shareholders' control where separation of ownership and control may cause a conflict of interest between shareholders and management. The concentrated ownership structure means that controlling shareholders will have greater powers to influence companies' decisions (Liu et al., 2019) including the engagement in sustainability projects (Gallo and Christensen, 2011; Dam and Scholtens, 2013). Existing literature focusing on the ownership structure as a determinant of environmental and social strategies provides mixed findings. Few studies argue that ownership concentration is an important factor that drives companies to voluntarily engage in social responsibility activities (Erhemjants and Huang, 2019), while others argue that ownership concentration may hinder corporate engagement in sustainability because it increases costs and reduces short-term

profits (Darnall and Edwards, 2006; Liu et al., 2019). Major shareholders have strong incentives to monitor managers' behaviour (Eng and Mask, 2003) which can affect companies' strategic choices towards sustainability. Accordingly, ownership concentration can be considered as an important factor that influences sustainability report narratives. Based on the aforementioned discussion, we propose our first hypothesis:

Hypothesis 1: External governance is positively associated with sustainability report narratives.

2.2. Internal Governance

Prior literature argues that corporate governance mechanisms play a crucial role in monitoring the sustainability reporting process (Husted and de Sousa-Filho, 2019; Akben-Selcuk, 2019) which can lead to more transparent disclosures (Mallin et al., 2013). The board of directors also plays a legitimacy role that is complementary to the monitoring role and can help to explain the board's effect on the company's policies related to sustainability (Michelon and Parbonetti, 2012). Effective boards should put pressure on managers to promote sustainability reporting and enhance the credibility and usefulness of sustainability disclosures (del Miras-Rodríguez and Di Pietra, 2018; Al-Shaer et al., 2017).

It is argued that larger boards are more likely to be diverse and include directors with different skills, knowledge, and expertise than smaller boards, hence provide better supervision and oversight (Liao et al., 2018). Larger boards may be more independent and have a broader range of multitude values (Halm and Huse, 1997), and thus will be inclined to publish informative and comprehensive sustainability information due to increased legitimacy pressure and greater interest in sustainability (Arora and Dharwadkar, 2011; Husted and de Sousa-Filho, 2019; Albitar et al., 2020). From an agency perspective, boards with a higher proportion of independent directors increase monitoring and control of managers' actions which will lead to a reduction in information asymmetry (Elshandidy et al.,

2015; Allini et al., 2016). Independent directors can put pressure on management to publish more information, which will affect the reporting transparency (Fisher et al., 2019).

The literature suggests that female directors are more effective in supervising managers' behaviour (Nekhili et al., 2018), and will help to generate new ideas and different opinions in the decision-making process (Husted and de Sousa-Filho, 2019). Having female directors on board helps to improve the reporting discipline and increase stakeholder confidence and corporate engagement (Al-Shaer and Zaman, 2016). This is because women directors are believed to have a higher degree of moral maturity and a lower tolerance for opportunism than their male peers do during the reporting process (Srinidhi et al., 2011; Husted and de Sousa-Filho, 2019). Female directors are more likely to be stakeholder-oriented and concerned about ethical practices and socially responsible behaviour (Isidro and Sobral, 2015; Jain and Jamali, 2016). As a result, board diversity is more likely to improve the quality of sustainability reports. In addition, frequent board meetings enhance discussion and address effective CSR strategies which affect the transparency of information disclosed and improve the effectiveness of board decisions (Lakshmana, 2008; Liao et al., 2015; Liao et al., 2018).

The existence of sustainability committees can be considered as an effective mechanism that affects the quality of sustainability reports (Peters and Romi, 2015; Helfaya and Moussa, 2017; Al-Shaer and Zaman, 2018). The creation of a sustainability committee helps to improve the planning and adoption of sustainable projects (Peters et al., 2019). Sustainability committees can advise the board on various social and environmental activities, engage dialogue with stakeholders, and inform the management about stakeholder expectations (Shaukat et al., 2016) which is likely to affect the content of information disclosed in sustainability reports. Based on the aforementioned discussion, we propose our second hypothesis:

Hypothesis 2: Internal governance is positively associated with sustainability report narratives.

2.3. Reporting Behaviour

Sustainability reporting quality may be affected by a firm's reporting behaviour (Al-Shaer and Zaman, 2016). Firms can commit to a high quality of financial reporting to enhance the credibility of CSR reports (Chen et al., 2016). Sustainable companies are more likely to provide high-quality financial information and maintain financial transparency (Chih et al., 2008). Martínez-Ferrero et al. (2015, p.50) argue that the quality of financial information can be regarded as a defining aspect of the information disclosure in each company. High-quality financial disclosure will increase managerial incentives to voluntarily disclose information on sustainable practices (Francis et al., 2008). As a result, commitment to high-quality financial information is more likely to affect the transparency of sustainability reports.

Firms have a significant degree of discretion in whether and how much sustainability information to disclose (Muslu et al., 2019). Because there are no compulsory models of sustainability reports, these reports can vary in content and comparability (Reverte, 2009). The GRI reporting framework is widely acknowledged as a leader in the international standardisation of sustainability reporting and is used worldwide to improve user's understanding of sustainability-related risks and opportunities (Muslu et al., 2019; Mahoney et al., 2013). Adherence to global standards such as the GRI may increase the comparability of sustainability reports by overcoming variations in format and content (Hahn and Kühnen, 2013). Huang and Watson (2015) argue that the GRI is the most successful attempt to standardised and harmonise voluntary sustainability reporting, and Hess and Dunfee (2007) have gone even further to suggest a mandatory sustainability reporting system based on the GRI guidelines to overcome the issue of strategic disclosures. Firms that follow the GRI reporting framework appear to have a higher level of commitment to sustainability (Martínez-Ferrero et al., 2015). The presence of the GRI framework in sustainability reports reflects

corporate reporting behaviour, which can enhance the comprehensiveness of sustainability report narratives. Based on the aforementioned discussion, we propose our third hypothesis:

Hypothesis 3: A firm's reporting behaviour is positively associated with sustainability report narratives.

3. RESEARCH METHOD

3.1. Sample

We use the computational linguistic technique to examine the sustainability disclosure content for a sample of UK-listed companies for the period 2014-2018.² We focus on sustainability reports/standalone CSR reports since these reports include textual narratives regarding firms' sustainable policies, practices, and performance (Du and Yu, 2020). The use of CSR standalone reports is more likely to mitigate concerns that the linguistic features of CSR information might be affected by the presence of financial information compared to using other channels of reporting (e.g., annual reports, corporate websites) (Clarkson et al., 2020). Moreover, standalone CSR reports, on average, are longer and cover more CSR issues compared to the CSR information disclosed in the firm's annual reports (Dhaliwal et al., 2011). Our study is based on FTSE 100 firms listed on the London Stock Exchange for the period 2014-2018. The initial sample consists of 500 firm-year observations. Due to the unavailability of the sustainability reports, we had 48 companies that published sustainability reports in 2014; 66 companies in 2015; 65 companies in 2016; 57 companies in 2017; and 43 companies in 2018. Thus, the final sample consists of 279 with available sustainability reports. Corporate

² We use a computerised software called Corporate Financial Information Environment (CFIE) -Final Report Structure Extractor (FRSE). CFIE-FRSE tool is a desktop application to detect the structure of the UK Annual Report and extract the reports' contents on a section level. It helps to explore texts using natural language processing (NLP) and corpus linguistics methods (El-Haj et al., 2020). Further details are available at <https://github.com/drelhaj/CFIE-FRSE>.

governance and sustainability-related data are collected from Thomson Reuters Asset4. Financial data are collected from DataStream.

3.2. Dependent Variable

In examining the textual attributes of sustainability reports, we focus on the positive and negative content, forward-looking content, risk content, and sustainability-specific content. Loughran and McDonald (2011) created a finance-based word list to describe the negative, positive, and risk content in financial disclosures. Using positive, negative, forward, and risk word lists add additional power and could provide an additional means of analysing sentiments (Loughran and McDonald, 2016). Consistent with the literature (e.g., Huang et al., 2013; Kang et al., 2018; Muslu et al., 2019), we calculate sustainability report pessimistic tone as the ratio of the number of negative words over the total number of words in the report. Optimism tone is calculated as the ratio of the number of positive words over the total number of words in the report. We also use the net tone calculated as the difference in the positive and negative words scaled by the total number of words.

We also identify future-oriented statements in sustainability reports following the word list created by Hussainey et al. (2003). Their study generated a list of keywords that are used to identify forward-looking statements in the annual report discussion section. Finally, we create our bag of words that are relevant to the sustainability context similar to Larcker and Zakolyukina (2012) who create their financial word list to examine the textual attributes of conference calls. We consider how much companies make reference to the UN's Sustainable Development Goals (SDGs) in sustainability reports and develop a bag of words based on UN's Sustainable Development Goals (SDGs), including words that are related to poverty, inequality, climate change, environmental degradation, peace, and justice. We use a sample of sustainability reports to find the most frequent words about sustainability. The key stage was finalising the wordlist that is linked to SDGs. We identified the wordlist that is directly

linked to the SDGs individually by using LancsBox software, and then we cross-checked word choices and agreed on word choices. We also assessed the reliability and validity of the developed measurement by manually checking the score for a random sample of sustainability reports, and the outcomes remained consistent. We also used Nvivo 12 pro to re-score a random sample of sustainability reports and the scores remained consistent. We, therefore, add to the existing literature by generating a word list specifically tailored to the sustainability report (Sustainability-specific keywords are provided in Appendix 2).

3.3. Explanatory Variables

We examine factors that determine sustainability report narratives. We include both external and internal governance-related factors in line with prior literature on the link between corporate governance and CSR (e.g., Hodge et al., 2009; Pflugrath et al., 2011; Zorio et al., 2013; Al-Shaer and Zaman, 2016; Al-Shaer and Zaman, 2018). Regarding external governance factors, we include a composite measure of the voluntary adoption of sustainability reporting assurance and the choice of assurer, which represents the quality of sustainability report assurance (*SRA_quality*). Following Al-Shaer and Zaman (2016) and Al-Shaer (2020), we assign a score of 0 in the case of no assurance of sustainability reports, 1 if sustainability reports are externally assured by a non-accounting firm, 2 if the report is externally assured by a non-Big Four accounting firm, and 3 if the external assurer is a Big Four firm. Research on stakeholder engagement as a determinant of sustainability reporting content is limited (Manetti, 2011; Habisch et al., 2011; Hahn and Kühnen, 2013). We include *Stakeholder_engage*, a binary variable that takes a value of 1 if the company explains how it engages with stakeholders in the sustainability reporting process, zero otherwise. We also include ownership concentration (*OWNCON*) as a factor that could influence the firm's reporting for sustainability (Gallo and Christensen, 2011) measured by the percentage of shares (5% or more) owned by substantial shareholders.

Internal governance determinates are linked to the strength of the board of directors and sustainability committees. Following Al-Shaer (2020), we include an index that measures the quality of the board (*Board_index*) computed by totalling the proxies of four board characteristics measured using binary variables. These are board size, board independence, board meeting, and board diversity. *SUSCOM* is a binary variable that takes a value of 1 if a board-level sustainability committee exists, 0 otherwise.

Firms that follow the GRI reporting framework appear to have a higher level of commitment to sustainability (Michelon et al., 2015). We include a variable representing the firm's sustainability reporting behaviour following the GRI guidelines. *GRI_standard*, a binary variable takes a value of 1 if the company publishes a standardised GRI sustainability report, and 0 otherwise. Moreover, the firm's commitment to high-quality financial reporting enhances the transparency of sustainability reports (Chen et al., 2016). We include a measure of the firm's commitment to the high-quality of financial disclosure viz. *ACCRUAL* which equals total accruals scaled by cash from operations in the previous year.

3.4. Control Variables

In testing our model, we control for the firm's CSR performance in the previous year, firm size, return on equity, the firm's listing status, and the length of the document. All variables are defined in Appendix 1.

3.5. Empirical Model

We construct the multivariate regression model below to examine factors determining sustainability report narratives. The variables used in this study are defined in Appendix 1. All our regressions include year and industry fixed effects, where industry dummies are created based on the SIC one-digit industry classification.

$$\begin{aligned}
Sus_{Reporting} = & \beta_0 + \beta_1 External_{CG} + \beta_2 Internal_{CG} + \beta_3 Reporting_{Behaviour} \\
& + \beta_4 Length + \beta_5 CSR_{perf} + \beta_6 Leverage + \beta_7 Size + \beta_8 ROE + \beta_9 CROSSLIST \\
& + \beta_{10} Industry\ dummies + \beta_{11} Year\ dummies + \epsilon
\end{aligned}$$

4.1. Descriptive Statistics

Table 1 provides the summary statistics. The mean value of *Forward_content* is 245.91 representing the average frequency of forward-looking words disclosed in sustainability reports, the mean value of *Risk_content* is 1240.54 representing the average frequency of uncertain words disclosed in sustainability reports, and the mean value of *SDG_content* is 144.52 representing the average frequency of SDGs words disclosed in sustainability reports. The average frequency of optimistic words disclosed in sustainability reports is 608.59 while the average frequency of pessimistic words is 413.72 indicating that, on average, the optimistic tone in sustainability reports is higher than the pessimistic tone. This is also shown in the mean of the net tone measure of 1022.316. The mean value of *SRA_Quality* is 1.057. We find that, on average, 73.4% of firms in the sample engage stakeholders in their decision-making process. The mean value of *OWNCON* is 0.172, the mean value of *ACCRUAL* is 0.047, and the mean value of *Board_index* is 2. We find that the majority of our sample firms (97.21%) have sustainability committees operating on board and that 53.4% of our sample firms publish standardised GRI sustainability reports.

[Table 1 about here]

The Pearson correlation coefficients provided in Table 2 do not evidence serious multicollinearity problems. We include one content of the sustainability report narrative, viz. *Forward_content*, and find that external governance factors including *SRA_quality* and *Stakeholder_engage* are positively correlated with *Forward_content* indicating a significant overall positive association. Table 2 also shows that *GRI_standard* and *CSR_perf* are positively

correlated with *Forward_content*. The average VIF score for the regressions is 1.76 (values range between 2.48 and 1.21) confirming that there is no issue of multicollinearity.³

[Table 2 about here]

4.2. Multivariate Analysis

Previous literature highlighted the endogeneity issue arguing that using cross-sectional analysis will cause researchers to treat variables as exogenous in the model where they might have endogenous effects (Brown et al., 2011). In line with the argument that panel data methods allow researchers to capture effects that are not detectable in pure cross-sectional and time-series designs (Gerwanski et al., 2019), we employ generalized least squares (GLS) random effects (RE) estimator with firm-clustered standard errors. The application of random effects is further validated based on the Hausman (1978) test. The insignificant value of the Hausman test confirms this as the correct specification.⁴ Table 3 investigates factors determining the narratives of sustainability reports. Model 3.1 uses *Forward_content* as the dependent variable; Model 3.2 uses *Risk_content* as the dependent variable; Model 3.3 uses *SDG_content* as the dependent variable; Model 3.4 uses *Pessimism* as the dependent variable, Model 3.5 uses *Optimism* as the dependent variable, and Model 3.6 uses Net Tone as the dependent variable.

The results show that the coefficient for *SRA_quality* is positive and significant at the 5% level (Models 3.1 and 3.4) and the 10% level (Models 3.3 and 3.6), suggesting that the voluntary adoption of SRA and the choice of assurer are likely to assess the inclusion of forward-looking statements and information about future targets and risk disclosures in

³ We include one content of sustainability report narratives in Table 2. We conduct similar correlations with other sustainability report contents included in this study (untabulated).

⁴ We employ random effect estimation because entity fixed effects are not applicable due to limited variances in our explanatory variables viz. external and internal governance data (Gerwanski et al., 2019). Time invariant variables can be a cause of apparent insignificance and model specification issues. On the other hand, the random effects model is more likely to allow the estimation of time-invariant variables effects.

sustainability reports, as well as to disclosures specific to the sustainability context. Moreover, the external assurance of sustainability reports is likely to increase the disclosure of negative aspects and enhance the verifiability of information so that managers are held accountable for their disclosures (Muslu et al., 2019). These results are consistent with the literature (Simnett et al., 2009; Pflugrath et al., 2011; Zorio et al., 2013) and suggest that the external assurance of sustainability reports, in particular assurance provided by accounting firms, helps to enhance the transparency and completeness of information by providing rigorous independent verification process. The results also show that the coefficient for *Stakeholder_engage* is positive and significant at the 10% level (Model 3.1) and at the 1% level (Model 3.3) suggesting that engaging stakeholders in sustainable practices and the decision-making process will help to provide transparent reporting to stakeholders. The coefficient for *OWNCON* is positive and significant at the 5% level (Model 3.3) and at the 10% level (Models 3.2 and 3.6) suggesting that block-holders controlling more than 5% of shares have strong incentives to monitor managers' behaviour (Eng and Mask, 2003), and can be considered to enhance sustainability reporting narrative and increase the extent of SDGs disclosures in sustainability reports.

The coefficient of *Board_index* is negative and significant at 5% for (Models 3.1-3.6) suggesting that effective boards can be substitutive to external governance in the sustainability reporting process. Our result is consistent with Al-Shaer and Zaman (2018) that state a negative impact of board composition on sustainability reporting practices and a substitutional effect with external governance factors. The coefficient of *ACCRUAL* is negative and significant at 1% (Model 3.5), at 5% level (Models 3.1 and 3.6), and at 10% (Model 3.2) suggesting that commitment to high-quality financial information is more likely to affect the informativeness of sustainability report narratives. Overall, findings in Table 3 support our hypotheses on the positive association between external governance factors, internal governance factors, and reporting behaviour and sustainability report narratives. Our results also support the theoretical lens of agency and stakeholder theories. Companies that publish

comprehensive and transparent sustainability reports are likely to reduce information asymmetry problem and mitigate conflict of interest between shareholders and other stakeholders. External and internal governance factors push companies to engage in sustainable strategies and increase the emphasis on disclosures through sustainability reports which help to make sustainability reporting more informative to stakeholders.

[Table 3 about here]

4.3. Factor Analysis Results

We capture the extent of external governance, internal governance, and reporting behaviour by combining the various associated variables in three factors through a principal component analysis (PCA) (see for similar approach, Arena et al., 2015; Mallin et al., 2013). The PCA will help to aggregate variables associated with each determinant into a single composite score and hence avoid multicollinearity and reduce measurement error. The first factor, *External_CG*, proxies for external governance-related determinants and includes the voluntary adoption of sustainability assurance and the choice of assurer, stakeholder engagement, and ownership structure. The second factor captures internal governance-related attributes, *Internal_CG*, and includes board composition and the existence of a sustainability committee. The third factor captures the firm's *Reporting Behaviour* and includes proxies for financial reporting quality and the publication of standardised GRI sustainability reports. We also develop a composite measure (*Disc_score*) of the five contents of sustainability report narratives viz. forward-looking, risk, tone, and SDGs content.⁵

In Table 4 we conduct additional analysis using the alternative proxies for sustainability reporting determinants viz. external governance factor (*External_CG*), internal

⁵ In an untabulated analysis, we provide eigenvectors and the Kaiser-Meyer-Olkin measure for sampling adequacy for external governance factor, internal governance factor, and reporting behaviour factor, as well as for disclosure score.

governance factor (*Internal_CG*), and reporting behaviour factor (*Reporting_Behaviour*). Table 4 Models 4.1-4.6 are analogous to Models 3.1-3.6 in terms of their dependent variables, and Model 4.7 uses *Disc_score* as the dependent variable. Results show that the coefficient of *External_CG* is positive and significant at the 5% level (Models 4.1, 4.3, 4.4, 4.6, and 4.7) and 10% level (Models 4.2 and 4.5), and the coefficient of *Internal_CG* is negative and significant at 5% (Model 4.3), and the 10% level (Models 4.2 and 4.7). The coefficient of *Reporting_Behaviour* is positive and significant at 1% (Models 4.1 and 4.5) and the 5% (Models 4.2, 4.6, and 4.7). Results for control variables are qualitatively similar to results reported in Table 3.

Results in Table 4 support our hypotheses, are consistent with findings in Tables 3 and show that the external assurance of sustainability reports hinders the opportunistic incentives of managers to report positively on sustainability practices (Muslu et al., 2019). The monitoring role played by internal governance mechanisms is substitutive to the monitoring role played by external governance in enhancing the informativeness of sustainability reports. Firms can commit to higher quality financial reporting and publish sustainability reports following the GRI framework that is used worldwide as a leader in the international standardisation of sustainability reporting (Mahoney et al., 2013). Corporate reporting behaviour helps to improve user's understanding of sustainability-related risks and opportunities (Muslu et al., 2019), and enhances the comprehensiveness of sustainability narratives.

[Table 4 about here]

4.4. Heckman Two-Step Approach

We account for endogenous self-selection bias using a Heckman-type correction (see, e.g., Heckman, 1979), given that a decision to issue sustainability reports is made based on

managerial considerations (Simnett et al., 2009). For this purpose, we estimate a probit model of the probability of a firm issuing a sustainability report, predicted by financial performance, sustainability performance, firm size, leverage, and industry. Subsequently, we include the inverse Mills ratio (*IMR*) calculated from the probit model in our main regression. Table 5 reports the coefficient estimates from the second-stage regression. Our initial findings are substantively unaffected by the Heckman-type correction, with the signs and significance levels of our variables of interest largely similar to the ones tabulated in Table 4.⁶

[Table 5 about here]

5. CONCLUSION

This paper contributes to the recent CSR literature that uses the textual analysis approach to identify various linguistic characteristics of CSR disclosures including readability and tone (e.g., Nazari et al., 2017; Hummel et al., 2017; Muslu et al., 2019; Clarkson et al., 2020; Du and Yu, 2020). It provides a novel approach and uses computer-aided textual analysis to examine sustainability report narratives by considering key features of these reports including, forward-looking content, risk content, tone, and sustainability-specific content. The report content in this study is captured by compiling a collection of words that attempt to identify specific attributes of sustainability reports (Loughran and McDonald, 2016). Using a sample of UK firms' sustainability reports from 2014-2018, we explore factors that determine the narratives in sustainability reports by considering external governance factors, internal governance factors, and reporting behaviour.

The results show that the voluntary adoption of sustainability report assurance and the choice of assurer are considered as factors determining the forward-looking information

⁶ Untabulated results from the first stage regression show that *CSR_perf*, *Size*, and *Leverage* have positive and significant associations with the choice to issue the sustainability reports.

about future targets, risk information in sustainability reports and more disclosures related to the sustainability context. Further, the external assurance of sustainability reports is likely to increase the disclosure of negative aspects and thus helps to enhance the transparency and completeness of information by providing a rigorous independent verification process. The results also show that engaging stakeholders in sustainable practices provide transparent reporting to stakeholders. Ownership concentration can be considered to enhance sustainability report narratives. It is noteworthy that the monitoring role played by internal governance mechanisms is substitutive to the monitoring role played by external governance in enhancing the transparency of sustainability reports. Finally, corporate commitment to high-quality reporting helps to enhance the informativeness of sustainability report narratives. Our results confirm our hypotheses on the positive association between external and internal governance factors and reporting behaviour with sustainability reporting narrative. Our results also support the theoretical lens used in the paper. First, from the agency theory perspective, sustainability reporting content that is transparent and informative supplements financial information content so that it reduces information asymmetry and helps investors to make informed decisions (Michelon et al., 2015; Reverte, 2009). Second, in a broader sense, stakeholder theory supports information quality that would determine the users of such information (Helfaya et al., 2019). Companies will need to publish sustainability reports that are comprehensive and transparent to meet stakeholders' demand for information. Our results remain unchanged when using alternative proxies for sustainability reporting determinants and when testing for endogeneity using the Heckman two-stage estimation.

The findings of this paper should be of interest to corporate managers, investors, and policymakers given the relevant role that sustainability reporting plays in the decision-making processes of all stakeholders. Corporate managers need to strengthen their internal

and external governance mechanisms to enhance the comprehensiveness and credibility of sustainability reports and are encouraged to engage stakeholders in the sustainability reporting process. Furthermore, for investors with preferences linked to social and environmental patterns, corporate disclosure on SDGs is of particular importance so that the investor can make environmentally sensible investment decisions. Furthermore, investors need to consider factors that determine sustainability report narratives when making their decisions. For regulators, this study shows that corporate boards of high quality and the existence of a sustainability committee affect sustainability reporting narratives positively. Therefore, regulators are expected to tighten supervision of the implementation of regulations related to the board of directors and its associated committee. Policymakers can mandate the assurance of sustainability reports and establish reporting formats and standard words to control the tone of sustainability reports. Finally, researchers, professionals, as well as policymakers need to monitor sustainable development goals and targets to increase awareness, knowledge, and practices that can be operationalized to ensure a global society that can afford sustainable living.

This study is not without limitations. We limit our sample to companies operating in the UK. Future research can explore the results in other institutional contexts such as North America or Asia-Pacific where the governance of sustainability reporting and other factors determining the content of sustainability reports could be different. We also limited our analysis to the stand-alone CSR reports/sustainability reports. Future research can assess sustainability narratives through other channels, such as media and company websites. Finally, it would be interesting to interview managers and other stakeholders to obtain their opinions with regard to sustainability reporting and assurance practices and to understand their opinions regarding the GRI guidelines and their appropriateness. This study combines different research streams to advance our understanding of sustainability disclosures and factors that determine sustainability narratives.

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Table 1: Summary Statistics

Variable	mean	SD	P25	P50	P75
<i>Forward_content</i>	245.9118	250.0112	89.5	183	322
<i>Risk_content</i>	1240.544	1065.061	541.5	930	1583
<i>SDG_content</i>	144.5252	114.4452	57	115	206
<i>Optimism</i>	608.5956	434.5182	294.5	520	785.5
<i>Pessimism</i>	413.7206	440.8425	119	234.5	557
<i>Net Tone</i>	1022.316	840.6015	411	799	1343.5
<i>SRA_quality</i>	1.057348	0.8376965	0	1	2
<i>Stakeholder_engage</i>	0.734767	0.4422505	0	1	1
<i>OWNCON</i>	0.1716598	0.1511227	0.07	0.12	0.2
<i>BOD_index</i>	2	1.061895	2	2	3
<i>SUSCOM</i>	0.9721116	0.1649822	1	1	1
<i>GRI_standard</i>	0.5340502	0.4997356	0	1	1
<i>Length</i>	25319.27	22575.25	10879	18500	32277
<i>ACCRUAL</i>	0.0472178	9.139548	-0.88048	-0.44917	-0.08092
<i>CSR_Perf</i>	132.1325	32.92969	107.485	136.92	160.11
<i>Leverage</i>	0.2634205	0.1641942	0.1774	0.2634	0.352
<i>Size</i>	57500000	139000000	2826600	5917000	32200000
<i>ROE</i>	22.8741	129.6865	3.55	11.99	22.38
<i>CROSSLIST</i>	3.691406	1.311519	3	4	4

Variables are as defined in Appendix 1. Note: Sustainability content variables are scaled by total word count.

Table 2: Correlation Matrix

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Forward_content</i>	1													
<i>SRA_quality</i>	0.1690	1												
<i>Stakeholder_engage</i>	0.1424	0.1189	1											
<i>OWNCON</i>	-0.0033	-0.0051	0.0092	1										
<i>BOD_index</i>	-0.0718	-0.0862	-0.0331	-0.0713	1									
<i>SUSCOM</i>	0.0297	0.0419	-0.098	0.0429	-0.0616	1								
<i>GRI_standard</i>	0.2185	0.2875	0.3828	0.0214	-0.1296	-0.0114	1							
<i>ACCRUAL</i>	-0.0954	0.0922	-0.0939	-0.0529	-0.0804	0.1156	-0.0419	1						
<i>Length</i>	0.5173	0.2522	0.2019	-0.0253	-0.07	0.0508	0.3511	-0.0604	1					
<i>CSR_Perf</i>	0.1418	0.3169	0.3942	-0.0098	-0.1487	0.0426	0.4465	-0.1154	0.2397	1				
<i>Leverage</i>	-0.0238	0.0946	0.2343	0.122	-0.0287	-0.1014	0.1653	-0.0094	0.1371	0.0215	1			
<i>Size</i>	0.0072	0.2495	0.1299	0.0378	-0.0799	0.0718	0.2832	-0.0437	0.1262	0.4161	-0.027	1		
<i>ROE</i>	0.0723	-0.0667	0.0319	-0.0277	-0.0372	0.016	0.0627	-0.0077	-0.1808	-0.0518	0.0825	-0.0333	1	
<i>CROSSLIST</i>	0.1163	0.0871	0.0989	-0.1235	-0.1138	0.1178	0.0757	-0.0357	0.1056	0.1472	0.0769	0.4462	0.0235	1

This table reports the Pearson correlation matrix between the variables used in the analyses, where coefficients in bold indicate significance at the 5% level or better. Variables are as defined in Appendix 1.

Table 3: Empirical Results for Determinants of Sustainability Report Content

<i>Variable</i>	<i>Forward_content</i>	<i>Risk_content</i>	<i>SDG_content</i>	<i>Pessimism</i>	<i>Optimism</i>	<i>Net Tone</i>
	<i>Model 3.1</i>	<i>Model 3.2</i>	<i>Model 3.3</i>	<i>Model 3.4</i>	<i>Model 3.5</i>	<i>Model 3.6</i>
SRA_Quality	0.1934** [1.65]	0.3492* [1.70]	0.1716* [1.29]	0.2623** [1.97]	0.1081 [1.29]	0.3424* [1.76]
Stakeholder_engage	0.3025* [1.65]	0.308 [0.95]	0.4418*** [2.70]	0.2509 [1.29]	0.1562 [1.10]	0.383 [1.25]
OWNCON	0.0037 [1.13]	0.0096* [1.66]	0.0086** [2.16]	0.0057 [1.37]	0.0043 [1.64]	0.0097* [1.70]
BOD_index	-0.1205** [-1.98]	-0.2841** [-2.32]	-0.1951** [-2.60]	-0.1522** [-2.07]	-0.1233** [-2.26]	-0.2608** [-2.25]
SUSCOM	-0.1177 [-0.50]	-0.3589 [-0.79]	-0.1847 [-0.84]	-0.1406 [-0.49]	-0.2907 [-1.34]	-0.4431 [-0.96]
GRI_standard	0.1404 [0.82]	0.2404 [0.89]	0.0912 [0.54]	0.0149 [0.08]	0.1942 [1.47]	0.2329 [0.84]
ACCRUAL	-0.0078** [-2.49]	-0.0093* [-1.74]	-0.0018 [-0.67]	-0.0064 [-1.51]	-0.0073*** [-3.03]	-0.0140** [-2.27]
Length	0.3479*** [3.09]	0.6535*** [2.92]	0.2606** [2.39]	0.3598*** [2.83]	0.3103*** [3.13]	0.6776*** [3.24]
CSRPER	-0.0033 [-1.40]	-0.0088** [-2.38]	0.0021 [0.78]	-0.0087*** [-3.71]	-0.0038** [-2.04]	-0.0117*** [-3.18]
Leverage	-1.3325*** [-2.98]	-2.1936*** [-2.70]	-1.2966*** [-2.28]	-1.3618*** [-2.57]	-0.9826*** [-2.78]	-2.2259*** [-2.82]
Size	-0.1022** [-2.20]	-0.2147** [-2.32]	-0.1014* [-1.70]	-0.1070* [-1.93]	-0.0579 [-1.38]	-0.1575* [-1.80]
ROE	0.0012*** [2.62]	0.0023** [2.54]	0.0006* [1.93]	0.0014*** [2.85]	0.0008** [2.05]	0.0022** [2.55]
CROSSLIST	0.0604 [1.58]	0.2023** [2.33]	0.0729** [1.96]	0.1264** [2.45]	0.0643 [1.52]	0.1819** [2.11]
Industry	Included	Included	Included	Included	Included	Included
Year	Included	Included	Included	Included	Included	Included
Intercept	3.3322*** [2.60]	9.4548*** [3.98]	2.9551** [2.16]	4.2351*** [2.98]	4.3605*** [4.05]	7.4693*** [3.29]
R-squared	0.4321	0.4861	0.4363	0.5089	0.4134	0.4775
N	279	279	279	279	279	279

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. Variables are as defined in Appendix 1.

Table 4: Replicating the Main Findings using the PCA

<i>Variable</i>	<i>Forward_content</i>	<i>Risk_content</i>	<i>SDG_content</i>	<i>Pessimism</i>	<i>Optimism</i>	<i>Net Tone</i>	<i>Disc_score</i>
	<i>Model 4.1</i>	<i>Model 4.2</i>	<i>Model 4.3</i>	<i>Model 4.4</i>	<i>Model 4.5</i>	<i>Model 4.6</i>	<i>Model 4.7</i>
External_CG	0.2190** [2.12]	0.3338* [1.78]	0.2496** [2.10]	0.2474** [2.09]	0.1267* [1.68]	0.3467** [1.96]	0.3715** [1.99]
Internal_CG	-0.088 [-1.60]	-0.1943* [-1.82]	-0.1347** [-2.32]	-0.1114 [-1.56]	-0.0738 [-1.46]	-0.1736 [-1.59]	-0.1801* [-1.67]
Reporting_Behaviour	0.1073*** [2.69]	0.1434** [2.07]	0.0488 [1.33]	0.0735* [1.55]	0.1142*** [3.15]	0.1940** [2.56]	0.1874** [2.51]
Length	0.3502*** [3.07]	0.6844*** [2.96]	0.2512** [2.16]	0.3741*** [2.88]	0.3158*** [3.04]	0.6912*** [3.20]	0.7185*** [3.22]
CSR_Perf	-0.0035 [-1.47]	-0.0095** [-2.54]	0.0023 [0.83]	-0.0095*** [-4.07]	-0.0038** [-2.09]	-0.0124*** [-3.38]	-0.0107*** [-2.79]
Leverage	-1.2862*** [-3.07]	-2.0834*** [-2.64]	-1.1008* [-1.94]	-1.3847** [-2.54]	-0.8695*** [-2.63]	-2.1256*** [-2.74]	-2.2654*** [-2.86]
Size	-0.1072** [-2.35]	-0.2223** [-2.36]	-0.1148* [-1.89]	-0.1128** [-1.99]	-0.0652 [-1.54]	-0.1695* [-1.89]	-0.1999** [-2.19]
ROE	0.0011*** [2.71]	0.0023*** [2.73]	0.0005** [1.97]	0.0014*** [2.95]	0.0008** [2.16]	0.0021*** [2.63]	0.0022*** [2.73]
CROSSLIST	0.0541 [1.43]	0.1865** [2.14]	0.0632* [1.68]	0.1195** [2.34]	0.0559 [1.32]	0.1655* [1.92]	0.1618* [1.92]
Industry	Included	Included	Included	Included	Included	Included	Included
Year	Included	Included	Included	Included	Included	Included	Included
Intercept	3.8881*** [2.81]	9.9705*** [3.83]	3.7411** [2.43]	4.7692*** [3.16]	4.5828*** [3.80]	8.1962*** [3.29]	-2.4558 [-0.95]
R-squared	0.3788	0.4116	0.3671	0.4579	0.3425	0.4136	0.421
N	279	279	279	279	279	279	279

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. Variables are as defined in Appendix 1. *Disc_score* = a composite measure of the five contents of sustainability report narratives using a Principal Component Analysis (PCA); *External_CG* = A composite measure that represents external governance determinants obtained using a Principal Component Analysis (PCA); *Internal_CG* = A composite measure that represents internal governance determinants obtained using a Principal Component Analysis (PCA); *Reporting_Behaviour* = A composite measure that represents reporting behaviour obtained using a Principal Component Analysis (PCA) [where accrual is multiplied by -1].

Table 5: Replicating the Findings in Table 4 using the Heckman Two-Stage Estimation

<i>Variable</i>	<i>Forward_content</i>	<i>Risk_content</i>	<i>SDG_content</i>	<i>Pessimism</i>	<i>Optimism</i>	<i>Net Tone</i>	<i>Disc_score</i>
	<i>Model 5.1</i>	<i>Model 5.2</i>	<i>Model 5.3</i>	<i>Model 5.4</i>	<i>Model 5.5</i>	<i>Model 5.6</i>	<i>Model 5.7</i>
External_CG	0.2157** [2.00]	0.3500* [1.82]	0.2753** [2.17]	0.2563** [2.14]	0.1264* [1.68]	0.3536** [2.00]	0.3793** [2.00]
Internal_CG	-0.1134** [-1.97]	-0.2350** [-2.05]	-0.1308** [-2.07]	-0.1331* [-1.77]	-0.0987* [-1.82]	-0.2190* [-1.89]	-0.2264** [-1.97]
Reporting_Behaviour	0.1292*** [2.72]	0.1871** [2.38]	0.0509 [1.32]	0.1048* [1.96]	0.1321*** [3.17]	0.2435*** [2.79]	0.2357*** [2.71]
Length	0.3620*** [3.16]	0.7155*** [3.06]	0.2338* [1.94]	0.3986*** [3.08]	0.3297*** [3.14]	0.7207*** [3.34]	0.7461*** [3.33]
CSR_Perf	-0.0017 [-0.67]	-0.0053 [-1.40]	0.003 [0.99]	-0.0074*** [-3.14]	-0.002 [-1.06]	-0.0085** [-2.29]	-0.0068* [-1.72]
Leverage	-1.2092*** [-2.74]	-1.8759** [-2.30]	-1.0385* [-1.77]	-1.2644** [-2.29]	-0.7758** [-2.21]	-1.9264** [-2.41]	-2.0748** [-2.53]
Size	-0.1109** [-2.50]	-0.2312*** [-2.59]	-0.1085* [-1.81]	-0.1196** [-2.27]	-0.0690* [-1.69]	-0.1800** [-2.14]	-0.2096** [-2.43]
ROE	-0.0009 [-0.80]	-0.0025 [-1.40]	-0.0003 [-0.40]	-0.0015 [-1.45]	-0.0012 [-1.28]	-0.0026 [-1.40]	-0.0024 [-1.23]
CROSSLIST	0.0379 [1.03]	0.1488* [1.77]	0.0474 [1.32]	0.0983** [2.03]	0.0372 [0.90]	0.1259 [1.53]	0.1232 [1.52]
IMR	0.1830** [2.03]	0.4306*** [3.13]	0.0743 [1.15]	0.2543*** [3.17]	0.1782** [2.48]	0.4178*** [2.89]	0.4150*** [2.75]
Industry	Included	Included	Included	Included	Included	Included	Included
Year	Included	Included	Included	Included	Included	Included	Included
Intercept	0.407 279	0.446 279	0.426 279	0.488 279	0.374 279	0.448 279	0.475 279
R-squared	0.451	0.476	0.403	0.504	0.404	0.475	0.475
N	279	279	279	279	279	279	279

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. Variables are as defined in Appendix 1. *Disc_score*= a composite measure of the five contents of sustainability report narratives using a Principal Component Analysis (PCA); *External_CG* = A composite measure that represents external governance determinants obtained using a Principal Component Analysis (PCA); *Internal_CG* = A composite measure that represents internal governance determinants obtained using a Principal Component Analysis (PCA); *Reporting_Behaviour*= A composite measure that represents reporting behaviour obtained using a Principal Component Analysis (PCA) [where accrual is multiplied by -1].

Appendix 1

Variable Definition	
Forward_ content	Forward looking wordlist based on the list proposed by Hussainey et al. (2003). We use word frequency scaled by total word count.
Risk_ content	Contains uncertain words based on Loughran and McDonald (2011). We use word frequency scaled by total word count.
Pessimism	Negative wordlist based on Loughran and McDonald (2011). We use word frequency scaled by total word count.
Optimism	Positive wordlist based on Loughran and McDonald (2011) [we also include Henry (2008, 2006) positive and negative word list as alternative testing]. We use word frequency scaled by total word count.
Net Tone	Calculated as (optimism -pessimism/total word count.
SDG_ content	Self-constructed wordlist based on the 17 goals of UN sustainable development. Represent the frequency of appearance of SDGs in sustainability reports scaled by word count.
SRA_ Quality	Represents sustainability report assurance quality (the voluntary adoption of SRA and the choice of assurer). We assign a score of 0 in the case of no assurance of sustainability reports, 1 if sustainability reports are externally assured by a non-accounting firm, 2 if the report is externally assured by a non-Big Four accounting firm, and 3 if the external assurer is a Big Four firm
Stakeholder_ engage	if the company explains how it engages with stakeholders takes a value of 1, zero otherwise.
OWNCON	Percentage of shares owned by substantial owners 5% or more (The ownership concentration of a firm).
Board_ index	The corporate board quality index computed by adding the four dummy variables: BODSIZE: Dummy variable if the number of board members is higher than the industry median, 1; otherwise 0; BODIND: Dummy variable if the percentage of independent directors on the board is higher than the industry median, 1; otherwise 0; BODMEET: Dummy variable if the number of board meetings is higher than the industry median, 1; otherwise, 0; BODDIV: Dummy variable if the percentage of female board members is higher than the industry median, 1, otherwise 0.
SUSCOM	If a board-level sustainability committee exists =1, otherwise 0
GRI_ standard	If the company publishes a standardised GRI sustainability reports= 1, and 0 for non-GRI.
Length	Length of the document
ACCRUAL	Proxy of firm's corporate transparency (a measure of firm's commitment to the high quality of financial disclosure. Accruals equals total accruals scaled by cash from operations.
CSR_ Perf	CSR performance composite measure generated from a weighted score of firms' strength and weaknesses of social and environmental indicators from Thomson Reuters' Assets4 (in previous year).
Leverage	ratio of debt to total asset
Size	The natural log of total assets
ROE	Return on equity ratio
CROSSLIST	Total number of countries in which the firm's securities are cross listed

Appendix 2: Self-constructed wordlist based on the 17 goals of UN sustainable development.

SDG's Word List

Human rights
No poverty
Zero hunger
Good health
Wellbeing
Equitable workplace
Gender equality
Clean water
Water management
Waste
Recycle
Affordable energy
Alternative energy
Greenhouse gas emission
Renewable energy
Decent work
Economic growth
Innovation
Green innovation
R&D investment
Capital investment
Infrastructure
Sustainable cities
Sustainable communities
Resilience
Financial resilience
Responsible production
Responsible consumption
Climate action
Climate Change
Natural resources
Supply chain
Procurement practice
Product and services
Logistics
Transportation

Sustainable governance
Board oversight
Diverse board
Management accountability
Employee compensation
Executive compensation
Corporate policies
Management system
Public policy
Stakeholder engagement
Materiality
Materiality assessment
Stakeholder dialogue
Strategic collaboration
Investor engagement
Employee engagement
Training and development
Supplier engagement
Customer satisfaction
Environmental group
Standard disclosures
Social disclosure
Environmental disclosure
Financial disclosure
Scope and content
Verification
Assurance
Third party
Independent
Credible
