UNIVERSIDADE CATÓLICA PORTUGUESA

Sustainable Finance

The ESG textual content of annual reports and greenwashing

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The ESG textual content of annual reports and greenwashing

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Resumo

Esta dissertação investiga a relação entre a divulgação textual ambiental, social e de governação (ESG) e os ratings das empresas, com o objetivo de identificar potenciais padrões indicativos de greenwashing.

Analisámos métricas construídas (CITAR) com base no texto constante do relatório de gestão de uma amostra de empresas cotadas na London Stock Exchange (LSE) entre 2013 e 2023. Estas métricas capturam a frequência da utilização de palavras relacionadas com ESG. Este estudo procura determinar se a divulgação ESG está, de facto, associada a um melhor desempenho ESG.

Utilizando modelos de regressão linear de efeitos fixos e controlos de ano e indústria, avaliamos o impacto de cada pilar ESG individualmente e em conjunto tanto nos ratings específicos de cada pilar como no rating ESG global. Os resultados apresentam associações positivas e estatisticamente significativas entre a intensidade de divulgação ambiental e social e o desempenho ESG, - inferido através da utilização dos ratings ESG disponibilizados pela base de dados Refinitiv – enquanto exibem efeitos insignificantes nos ratings de governação e uma relação negativa no rating ESG global, quando analisada a intensidade de divulgação de governação, sugerindo potencial greenwashing.

As conclusões obtidas fornecem perceções sobre a credibilidade das divulgações ESG e esta dissertação contribui para a literatura ao combinar análise textual com ratings ESG para avaliar a fiabilidade do reporte corporativo ESG, fornecendo informações úteis para utilizadores, reguladores e decisores políticos.

Palavras-chave: ESG, greenwashing, análise textual, ratings ESG, divulgação corporativa

Abstract

This dissertation investigates the relationship between environmental, social and governance (ESG) textual disclosure and firms' ESG ratings, aiming to identify potential patterns indicative of greenwashing.

We analyse constructed metrics (CITAR) based on the text contained in the management report sample of firms traded on the London Stock Exchange (LSE) between 2013 and 2023. These metrics capture the frequency of the use of ESG-related worlds. The study seeks to determine whether ESG disclosure is in fact associated with higher ESG performance.

Using fixed-effects linear regression models with year and industry controls, we evaluate the impact of each ESG pillar individually and jointly on both pillar-specific ratings and overall ESG rating. The results present positive and statistically significant associations between environmental and social intensity disclosures and ESG performance – inferred through the use of ESG ratings provided by the Refinitiv database – while exhibiting insignificant effects on governance scores and a negative relationship on overall ESG scores when analysing governance intensity disclosure, suggesting potential greenwashing.

The findings provide insights into the credibility of ESG disclosures, and this research contributes to the literature by combining textual analysis with ESG ratings to assess reliability of corporate ESG reporting, offering useful insights to stakeholders, regulators and policymakers.

Keywords: ESG, greenwashing, textual analysis, ESG ratings, corporate disclosure

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Chapter 1

Introduction

The growing attention on Environmental, Social and Governance (ESG) issues reshaped the corporate landscape. Higher awareness has caused greater pressure on firms from investors, regulators and society to demonstrate their commitment to sustainability.

While it is undeniable that ESG practices have been accommodated into business strategies, greater concern has been raised over the credibility of those claims, as well as distress over the inability to properly assess true effective sustainable practices and distinguish them from merely symbolic talk. In particular, greenwashing – frequently described as the practice of conveying a misleading or exaggerated impression of greater ESG activism – has emerged as a central challenge for all stakeholders.

Financial narratives play a central role in this debate, as they constitute the primary source of sustainability signals and are not regulated or measured against any universally agreed standards or best practices. As such, they remain largely shaped by the communication style and strategic choices of corporate management.

The literature has documented the duality of this voluntary disclosure: on the one hand firms with stronger ESG practices tend to report more extensively; on the other hand, disclosures may be employed strategically to disguise malfunctioning and mitigate reputational risks associated with insufficient attention to ESG matters.

Despite extensive research has been conducted in recent years, important gaps remain open, as is the case of how textual ESG communication aligns with external evaluations of performance. Moreover, the methodological potential of textual analysis techniques has only recently begun to be applied in the ESG domain.

As such, the present research aims to contribute to the existing literature on textual analysis of ESG reporting practices and ESG ratings by providing empirical evidence on the influence of financial narratives on third-party evaluations and its relationship with greenwashing practices. The findings of this study can be helpful for a variety of stakeholders, as investors, regulators and policymakers, as they seek strategies to detect and ultimately fight greenwashing and its harmful effect on the economic environment firms operate.

The study is organized as follows: chapter 2 presents the literature review on ESG, financial narratives, ESG ratings and rating agencies, chapter 3 presents the methodology and data used for this research, chapter 4 presents the results and main findings and chapter 5 concludes on the analysis.

Chapter 2

Literature Review

2.1. Introduction to ESG and Corporate Sustainability

In recent years, the literature on ESG considerations has grown rapidly and become increasingly important for corporate strategy and decision making (Netto et al., 2020). It encapsulates a wide range of questions, including social responsibility, environmental measures and corporate governance sustainable practices which influence stakeholder behaviour as well as investor decisions and perceptions. The growing focus on ESG matters reflects broader societal concerns about sustainable business practices and ethical corporate conduct.

In recent years, investors indicated that "ethical business practices" was the most significant feature in which regards respect held for a given firm, even gaining importance over the confidence in management. Accordingly, 25% of global assets under management are taking into consideration ESG practices and certain studies have found that 75% of individual investors look to incorporate the matter into their investment decisions (Hill, 2020).

Institutional stakeholders can exert pressure on companies to comply with Corporate Social Responsibility (CSR) practices for a wide variety of reasons (Aguilera et al., 2006). These motives can be instrumental (self-interest and financial gains), relational (conforming to social or industry norms) and moral (ethical obligations and concern for stakeholders' welfare). In the UK, institutional investors increasingly consider ESG performance in investment decisions, influenced by legal duties, industry norms and long-term financial implications. This multidimensional pressure helps explain the reason why firms are beginning to prioritize ESG initiatives and disclosure beyond regulatory compliance. As such, it is possible to grasp the complex relationship between firm behaviour, stakeholders' expectations and corporate disclosure.

Aguilera et al. (2006) note that it is difficult to determine, without additional data, whether more-frequent discussion of CSR issues translates into meaningful changes in firm behaviour. Notwithstanding, according to the authors, when comparing the UK with the US, UK firms appear to pay greater attention to these matters, namely by three contributing factors: (i) a general increase in concerns about ethics; (ii) heightened awareness of risk and risk management and (iii) growth in media exposure concerning CSR (Solomon et al., 2004). In fact, the expression "Corporate Social Responsibility" appeared in Financial Times and London Times articles approximately every other day between 1980 and 2004, whereas it almost never did in the New York Times and Wall Street Journal. This suggests that the rising attention to ESG by the UK firms may be associated to its greater coverage in the media, or vice-versa. Additionally, we can infer that the growing importance of ESG matter is strongly associated with the attention of the public. In an interconnected world, we can expect tendencies to spread rapidly and ESG to become a primarily concern when evaluating sound business practices.

2.2. ESG Reporting and Textual Analysis

The relationship between environmental performance and environmental disclosure have been subject to scrutiny in the literature for several decades, often leading to inconclusive results. Early studies as Ingram & Frazier (1980) and Wiseman (1982) found weak associations, while others even suggested a negative correlation between the two variables (Bewley & Li, 2000; Hughes et al., 2001; Patten, 2002). These outcomes are often linked to methodological limitations, including inadequate measures of environmental performances, sample selection and insufficient control variables (Patten, 2002). Additionally, the methods applied tended to rely heavily on annual reports and other regulatory filings, as well as indexing procedures like Wiseman (1982) which highlighted quantitative disclosure while neglecting qualitative aspects such as tone, thus potentially biasing the results (Clarkson et al., 2008).

Theories of ESG Disclosure: Voluntary vs Socio-Political Perspectives

These studies are generally framed by two contrasting theories: "voluntary disclosure theories" and "socio-political theories", which includes political economy, legitimacy and stakeholder theory (Clarkson et al., 2008).

Voluntary disclosure theory suggests that companies with superior environmental performance, driven by proactive strategies, are more likely to inform investors and other stakeholders of their strategy by voluntary disclosing more environmental information. The goal is to signal their commitment and improve public perception, which can translate into higher firm valuation, leading to a positive association between performance and disclosure (Dye, 1985; Verrecchia, 1983; Bewley & Li, 2000; Li et al., 1997).

On the other hand, social-political theories suggest that disclosure may also be used defensively: companies facing reputational threats or poor legitimacy have incentives to increase disclosure in order to balance public expectations or divert attention from weaknesses (Gray et al., 1995), predicting a negative correlation between performance and disclosure excluding mandatory disclosures that some companies/industries are subject to.

The latter theory can be seen as an early conceptualization of what is now commonly referred to as "greenwashing". While the term itself is relatively new and has gained traction only in recent decades, the underlying concern has been recognized and present in the literature for much longer.

More recent work, such as Clarkson et al. (2008), revisited the conflicting theories with a more rigorous research design. By focusing on purely voluntary disclosure channels and using content analysis indexes developed with expert support, the authors found evidence in favour of voluntary disclosure theory, showing that "superior environmental performers are more forthcoming in truly discretionary disclosure channels (…)". Notwithstanding, the authors also present evidence that companies whose environmental legitimacy was questioned often resorted to softer claims regarding their environmental commitment, a behaviour aligned with socio-political theories. This duality left open the possibility for greenwashing, albeit in a more subtle form than previously described.

Financial Reporting

Financial reporting plays a fundamental role in shaping the communication between firms and their stakeholders, as it provides the basis for the decision-making processes and help maintain confidence in corporate decisions, notably as firms are bound to follow common sets of accounting and disclosure principles (Biancone et al., 2016). Thus, it is often argued that the primary function of financial reporting is to reduce information asymmetry between management and interested third parties, promoting transparency and accountability (Souza et al., 2019).

Notwithstanding, some scholars emphasize that financial reporting may also be subject to manipulation, as firms can strategically employ language and disclosure practices that allow for a more polished and brighter image of the operations and financial status of a given firm, thus influencing perceptions of the company's economic reality and playing a part in the decisions of its investors, clients and overall general public, as highlighted by Souza et al., (2019) and Bloomfield et al., (2002), in an assumption called "management obfuscation hypothesis". This hypothesis states that when companies are poor-performing, management has an incentive to intentionally thicken its accounting and financial narratives, reducing its readability for general readers, which is consistent with the socio-political theories and the greenwashing theory, when accounting for the specific factors of ESG.

Textual Analysis

It is increasingly observed that methods of textual analysis are widely applied in accounting and finance literature to address a variety of research questions (*e.g.*, Antweiler & Frank, 2004; Tetlock, 2007). These approaches are particularly relevant for examining issues surrounding agency theory, as they shed light on how companies may strategically use financial and ESG narratives to shape public's perception and, ultimately, have a hand on their decisions.

These methods allow researchers to obtain quantitative insights from narrative data. In the context of ESG, several studies have analysed annual reports using textual analysis (*e.g.*, Giles & Murphy, 2016; Lokuwaduge & Heenetigala, 2017; Loughran & Mcdonald, 2016).

Natural and statistical language processing, content analysis, stylometrics and computational linguistics represent some of the main techniques through which textual analysis is applied to financial narratives (Loughran & Mcdonald, 2016). These approaches fall within the broader field of qualitative analysis (Tetlock, 2007; Henry & Leone, 2009) and encompass methods such as targeted phrase identification, sentiment analysis, topic modelling and document similarity measures. Nevertheless, it is crucial to adopt a critical posture when selecting the specific textual analysis method, as different methodological choices can lead to varying conclusions and sample selections. This is particularly relevant given that textual analysis in finance and accounting is still an emerging field of research (Loughran & Mcdonald, 2016). Additionally, lack of standardised cross-sectional and temporal reporting templates represents a major limitation on the use of algorithmic textual analysis techniques, such as large-sample automated analysis of annual narratives, as "inconsistent document structure is a significant barrier to automate processing" (El-Haj et al., 2020).

Some of these studies rely on manual reading of texts to classify sentences, often using checklists or decision rules to assess the extent of ESG reporting (*e.g.*, Giles & Murphy, 2016; Tilling & Tilt, 2010). Manual approaches, however, are limited to small sample sizes and may be affected by subjective judgements. More recent studies have developed measures based on the GRI framework and attempt to incorporate disclosures from multiple sources beyond annual reports (*e.g.*, Lokuwaduge & Heenetigala, 2017; Tilling & Tilt, 2010), reflecting the evolution towards more systematic and comprehensive analyses of ESG communication.

The literature review presented above is particularly relevant for the present study, as it leverages the CFIE dataset and natural language processing (NLP) techniques (El-Haj et al., 2020; Gorovaia & Makrominas, 2025) to investigate how ESG-related textual disclosure may align, or deviate from, actual performance. By doing so, it sets the stage for a closer examination of greenwashing, where the distinction between substantive and symbolic communication becomes most critical.

2.3. Greenwashing: Definitions and Mechanisms

Greenwashing has emerged as a central concern in the ESG literature, broadly understood as the practice of conveying a misleading impression or providing selective disclosure about a firm's ESG practices (Netto et al., 2020). While legitimate ESG engagement reflects substantive efforts to integrate sustainability into business operations, greenwashing represents symbolic communication designed to overstate a company's commitment, often masking weak or even harmful practices (Baker et al., 2024). This concept has derived from the lenses of much older theories, such as *legitimacy theory* and *agency theory*.

A universally accepted and formal definition of greenwashing has yet to emerge, as the concept continues to evolve alongside the growing body of ESG research. The consequences of this lack of consensus are that academic research remain fragmented, guidelines for ESG good practices unclear, policy frameworks remain reactive, and no real legal consequences arise from the practice (Spaniol et al., 2024).

Research also documents the existence of a "greenium" (Gorovaia & Makrominas, 2025) whereby investors are willing to pay a premium for securities of companies that show environmental commitment. This further exacerbates the importance of accurately identifying and addressing greenwashing practices, as firms may derive substantial benefits from portraying themselves as ESG responsible, even when such claims are not supported by genuine sustainable investments.

Netto et al. (2020), define greenwashing as communication strategies that deceive stakeholders by promoting environmental or social achievements while omitting negative information or relying on symbolic rather than substantive actions. Similarly, Spaniol et al. (2024), based on a throughout analysis of existing definitions presented in the literature, highlight that greenwashing occurs when firms make unsubstantiated or deceptive ESG claims on the marketing of a product or a service to gain competitive advantage. Gorovaia & Makrominas (2025) characterize greenwashing as the use of overly positive and extensive sustainability communication by firms whose actual practices are inconsistent with their claims, particularly when violations or weak environmental performance are present. This aligns with the broader understanding of greenwashing as the deliberate construction of a misleadingly favourable image of corporate ESG.

From a legitimacy standpoint (Suchman, 1995), firms may strategically overstate their ESG practices to secure social acceptance and maintain public trust, particularly when their actual performance falls behind stakeholders' expectations.

At the same time, agency theory (Jensen & Meckling, 1976) highlights how information asymmetries between managers and stakeholders create opportunities for selective disclosure, where managers may present ESG narratives in a way that aims to protect their own interests and reputation, oftentimes at the cost of accuracy. Additionally, some authors associate greenwashing with decoupling behaviour, as they tend to engage in "green talk" to satisfy stakeholder requirements on disclosure practices regarding sustainability but without any concrete action (Netto et al., 2020). Together, these theoretical perspectives provide a useful foundation to understand and assert the mechanisms that drive greenwashing, as they emphasize both the external pressures firms face to preserve their legitimate image and the internal incentives on managers to drive public perception.

In empirical research, greenwashing is typically assessed through indirect measures. Common proxies include discrepancies between ESG disclosures and third-party ESG measures (*e.g.*, Clarkson et al., 2008 and Baker et al., 2024), the occurrence of controversies that contrast with firms' public claims (Baier et al., 2020), and textual analysis of corporate communication that reveal patterns of obfuscation or excessive positivity (*e.g.*, Baier et al., 2020; Bewley & Li, 2000 and Souza et al., 2019). These approaches underline the challenge of distinguishing substantive sustainability efforts from symbolic ones, reinforcing the importance of critically evaluating the mechanisms through which greenwashing operates.

2.4. ESG Ratings and their use as proxy for greenwashing

CSR information is released through a variety of communication channels not limited to official financial reports, such as company websites, social media, financial disclosures, and advertising. These channels differ in terms of target audience and level of formality.

Notwithstanding, the release of ESG information remains voluntary and varies according to firm characteristics, lacking statutory framework and legal regulation, which may compromise the quality and credibility of the disclosures.

Consequently, the measurement of actual ESG performance through firm-issued communications is difficult and ambiguous, which has led certain organizations to assume the role of supervisors of ESG practices, as is the case of ESG rating providers such as Sustainalytics, Moody's, Refinitiv, KLD, S&P, MSCI, among others (Gorovaia & Makrominas, 2025).

These rating agencies adopt different approaches and methodologies when evaluating ESG performance, which leads to several studies demonstrating widely divergent results when analysing similar firms. Berg et al. (2022) show that ESG ratings from six rating agencies only correlate by 38%, differing in measurement, weighting and scope, thereby highlighting the difficulty of agreeing on essential characteristics to classify sound ESG practices, as well as the challenge of quantifying largely qualitative indicators. According to the authors, the differences stem from: *(i) scope divergence*, where ratings are based on different set of attributes, *(ii) measurement divergence*, where rating agencies measure the same attribute using different indicators, and *(iii) weight divergence*, where rating agencies attribute different relative importance to the same attributes.

Evidence for a *"halo effect"* has also been documented in this research, whereby high-scoring firms in each category are more likely to receive favourable evaluations across other categories within the same agency's rating.

Despite its limitations, rating providers have established themselves as highly influential, as investors depend on their assessments to obtain external and independent evaluation of firms' ESG performance.

In this sense, ESG ratings enable investors to assess sustainability performance in much the same way credit rating agencies allow them to evaluate creditworthiness (Berg et al., 2022). Furthermore, a growing body of academic research relies on ESG ratings as key inputs for empirical analysis.

In this context, ESG ratings are closely linked to the concept of greenwashing. On one hand, they act like a corrective mechanism, providing benchmarks that may reveal discrepancies between firms' actual ESG performance and their self-reported communications (Clarkson et al., 2008). On the other hand, methodological inconsistencies and information gaps (Berg et al., 2022) may create opportunities for firms to strategically exploit disclosure practices, thereby influencing ratings and masking weak performance. This dual role positions ESG ratings as both tools for detecting greenwashing and potential targets for it.

The present study relies on ESG ratings from Refinitiv, a widely used provider (Berg et al., 2022; Gorovaia & Makrominas, 2025) that offers detailed scores across ESG dimensions. Refinitiv includes several categories commonly adopted by major rating agencies. At the same time, it also incorporates a few indicators not generally found in other providers' methodologies, most of which emerge from Refinitiv's economic dimension (*e.g.* net income growth, capital expenditure). However, as the present study relies not only on overall ESG ratings but also ratings attributed to subsets of categories, it is important to bear in mind the limitations that may arise from the procedure, as prior research has shown that divergences between rating agencies are even more pronounced in specific sub-categories of ESG performance (Berg et al., 2022).

2.5. ESG disclosure, greenwashing and research contribution

Textual disclosure has increasingly been used in the literature as a source of information, particularly on ESG engagement. On the one hand, sustainability-related narratives may provide relevant insights into firm's practices on the matter. On the other hand, as shown above, firms may use it as a channel to strategically project a favourable image while hiding weak ESG performance, raising concerns about the credibility of such disclosures.

Despite the fast development of this field, prior research has mainly focused on ESG disclosure, ratings and greenwashing in isolation. While discrepancies between self-reported ESG information and third-party evaluations have been found and frequently associated with the possibility of greenwashing, few studies combine textual disclosure measures with ESG ratings to explore how external evaluations align, or not, with corporate internal practices of communication. Moreover, the association of textual data with greenwashing behaviour remains fairly underexplored, giving rise to open questions as to whether ESG disclosure reflects genuinely responsible practices or is a way of merely symbolic communication.

2.6. Research Question

The global purpose of this study is to understand if the ESG textual content of communications disclosed by companies are related to greenwashing practices from said companies.

Despite the growing relevance of ESG, no universally defined methodology to assess the effectiveness of ESG practices was yet established. As a result, rating agencies and regulatory entities often rely on ambiguous and inconsistent criteria, which translate into significant discrepancies in results between them.

The lack of standardizations leads to a natural scepticism, where ESG disclosures performed by companies are often questioned, and accusations of greenwashing may arise without concrete evidence, given the difficulty to measure the level of commitment to ESG principles.

The conclusion of the work presented will be accomplished through the assessment of the association between a firm's emphasis on ESG topics and its improved ESG ratings – or, conversely, worsened ESG ratings, reflecting potential greenwashing behaviours.

This conclusion would be supported if bigger textual disclosures in any given ESG category were associated with worse ESG ratings.

As such, the analysis will focus on three different research questions, as proposed bellow:

(i) How does the amount of ESG-related textual disclosure individually affect the respective ESG Pillar scores?

(ii) How does the individual level of ESG disclosure impact the overall ESG rating?; and

(iii) When controlling for all three dimensions simultaneously, which type of ESG disclosure (Environmental, Social or Governance) has the strongest association with the overall ESG rating?

The last hypothesis intends to appear as the main research question. If there is any dimension that stands out significantly, companies may have an incentive to place greater emphasis on those specific topics, which may bias the ratings outcome to the detriment of other firms (having the same or even greater commitment to other ESG areas, less valued by the rating agencies). Such dynamics may signal greenwashing or some degree of manipulation of public perceptions.

If, on another hand, no disclosure dimension stands out (similar coefficients or statistically insignificant), it may indicate a balance on the rating processes – or, alternatively, that textual disclosures do not have an overall impact on the ESG ratings attributed to the companies.

Chapter 3

Methodology and Data

3.1. Sample selection and Data collection

The initial database was extracted from the comprehensive CFIE dataset compiled by El-Haj et al. (2020), which measured all official communications regarding ESG for a universe of 4 573 UK companies listed in the London Stock Exchange (LSE) and counted the number of words related to ESG matters on each of the communications, from the period comprised between 2002 and 2023, leading to 444 185 observations.

As the purpose of the work presented is to understand the potential for greenwashing in the last decade, we dropped all the information before 2013 and kept only 258 824 observations, for a total of 2,869 UK firms for the years between 2013 and 2023 (inclusive). This represents the universe of the variables with potential to be used as proxies for the independent variables of this study.

These variables were initially split into several files, with multiple rows for the same company-year combination. To consolidate them, the data was aggregated by year and DSCODE (company identifier used throughout the analysis), summing up the values for each of the potential proxies, through Stata.

All the remaining variables were extracted from Refinitiv Eikon Datastream, using the DSCODE of each company for matching purposes, for the 2013-2023 period, following the rationale behind the independent variables to be used.

When extracting the dependent variables and merging the datasets, some of the initial firms had to be dropped as no data regarding the ESG rating scores was available and, as such, the dataset ended up with a total of 1 017 companies with information for at least one year on the timeframe defined, corresponding to 6 799 observations.

The next step involved structuring the combined dataset to ensure that all variables, both independent and dependent, were aligned for the same company-year combination. After the match, there were 5 432 observations left (984 firms).

Following this, the control variables were then included in the sample. Given that those variables had different numbers of available observations, a filter was applied to exclude data with missing values in any one of the relevant variables.

After the cleaning process, the dataset was reduced to 3 613 complete observations (783 unique firms), without any missing data for dependent, independent and control variables, for the years comprised between 2013 and 2023.

Year	Freq.	Percentage
2013	237	6.56%
2014	253	7.00%
2015	302	8.36%
2016	310	8.58%
2017	336	9.30%
2018	367	10.17%
2019	416	11.51%
2020	503	13.92%
2021	468	12.95%
2022	366	10.13%
2023	55	1.52%
TOTAL	**3 613**	**100%**

Table 1: Sample distribution over year

The choice of adopting the following procedure and work with a fully complete dataset was based on the need to guarantee the robustness and reliability of the analysis. While some missing data could not skew the results, the decision to exclude such observations entirely was made to maintain the full integrity of the results, as their inclusion could introduce potential biases and distort the relationship between variables.

Furthermore, with only complete observations the analysis becomes based on consistent and comparable data which strengthens the validity of the findings. This approach is consistent with practices adopted across empirical researchers, as the use of incomplete data is usually pointed as an amplified measure of inaccuracy of conclusions presented.

3.2. Independent Variable Measurements

The independent variables used in the empirical models herein are based on the ESG-related textual content in companies' annual reports and other formal communications. The variables are constructed considering the proportion of ESG-related keywords and/or phrases and expressions relative to the total number of words in each report.

This countdown is achieved through the dataset developed by El-Haj et al. (2020), that constructed an algorithm that allows for the identification and quantification of the occurrence of specific terminology associated with ESG matters, for each UK-based company, on a given year, on a given disclosed communication.

In this respect, it is important to highlight that the formal communications analysed by the aforementioned system are identified and include *(i)* letters from board chair and similar; *(ii)* CEO reviews; *(iii)* governance statements; *(iv)* remuneration reports; *(v)* business reviews; *(vi)* financial reviews; *(vii)* operating reviews; *(viii)* highlights; *(ix)* auditors reports; *(x)* risk management; *(xi)* chairman's governance and *(xii)* CSR disclosures. There are also some neglectable communications, duly identified in the dataset as *ad-hoc* and that do not belong to the abovementioned categories.

The global independent variable "ESG Disclosure Intensity" (ESG_DI), correspond to an aggregate measure, from the original database, which captures the extent to which companies mention any ESG-related textual content.

It is important to note that the variable mentioned is independent from the others, not being structured as a sum (*i.e.*, ESG_DI is not a sum of the individual independent variables EN_DI, Social_DI and GOV_DI – further explained below), but extracted also from the original dataset – at this respect, the variable chosen to represent the overall ESG disclosure reality (ESG_DI) was PA_ESG1. The reason behind this is that it is not possible to guarantee there are no overlap of keywords, which would bias the intrinsic values of the variable.

However, to further develop the research, the global independent variable was "divided" into a set of subcategories to allow for further study of the individual impacts on the environment, social and governance categories.

In the initial dataset, we found several variables that could serve as proxies for these subcategories, with the algorithm counting words that could be attributed to more than one of these variables, as long as they respect the corresponding set of standards. This fact could potentially lead to multicollinearity issues if highly correlated variables were included in the analysis.

As such, a pre-selection of the proxies to be used as independent variables in this study was made, to avoid high redundancy among variables that would distort regression results.

Only one proxy was chosen to represent each subcategory of ESG (*i.e.*, three proxies: one for environmental, one for social and one for governance).

Despite the high correlation found between the possible variables to be included, no multicollinearity was found in which regards the environmental, social and governance intensity variables, which indicates that the use of more than one variable in the regressions would not bias the results.

Notwithstanding, the choice of using only one variable for each subset of independent variables further ensure the robustness of the analysis.

Given the highly skewed nature of the count variables, a logarithmic transformation was performed to improve normality. However, some observations contained a value of zero – which indicates no disclosure in a given ESG dimension – resulting in missing values when performing the logarithmic transformation (the natural algorithm of zero is of undefined nature).

Notwithstanding, these zero values carry meaning, reflecting a meaningful lack of disclosure, and removing them from the analysis would bias the results obtained. As such, the zero values were retained in the dataset, by using a log(x + 1) transformation, which is a standard approach for handling count data with zero values (Wooldridge, 2013). This method preserves the interpretability of the variables, accommodates zero values and improves the statistical properties of the regressions.

3.2.1. Environmental Disclosure Intensity

This variable represents an indicator of the intensity of environmental-based disclosures. The specific variable chosen to represent this dimension was selected by taking correlation tests among all the environmental indicators available on the original dataset. Among the initially considered metrics, the PA_SHELDUS variable (Huang et al., 2022) proved to be the most appropriate and representative of the reality we were trying to capture, while also delivering statistically significant results on the regressions performed.

It is important to note that SHELDUS corresponds to the Spatial Hazard Events and Losses Database for the United States. We use it as a proxy for the environmental disclosure intensity as it allows for broader and more systematic identification of environmental discourse, specifically addressing real problems that companies have faced, as opposed to other possible proxies that focus exclusively on specific environmental issues such as climate change or biodiversity. As showed by Huang et al. (2022), firms located close to areas affected by natural disasters are more prone to increase their ESG disclosure transparency. As such, the use of SHELDUS ensures that the vocabulary extracted covers real-world environmental hazards, enhancing the relevance and objectivity of the proxy, as well as safeguarding the variety of topics and the companies' overall engagement with those topics, while seeking to avoid disclosures driven solely by regulatory compliance or reputational concerns.

3.2.2. Social Disclosure Intensity

This variable represents an indicator of the intensity of social-based disclosures. The specific variable chosen to represent this dimension was selected by taking correlation tests among all the social indicators available on the original dataset. Among the initially considered metrics, the DI_DEI variable (Baker et al., 2024) proves to be the most appropriate and representative of the reality we were trying to capture.

Baker et al. (2024) developed a DEI ("Diversity, Equity and Inclusion") dictionary that counts the frequency of DEI-related terms in financial disclosures, showing that diversity in personnel and equal opportunities (for both race and gender) are the most common themes addressed in DEI communications. The dictionary created by the authors was constructed through several online DEI dictionaries and removed terms with alternative meanings, in order to minimise the risk of capturing unrelated discussions as DEI discussions. Most of the words regard racial and gender diversity (although it also contains several mentions to sexual orientation and disabilities), which should also be expected in the study presented herein, as the Social Disclosure Intensity Variable, from the dataset constructed, was also validated by prior research (El-Haj et al., 2020).

The method adopted seems to be the most appropriate to capture the wording terms that address the Social Disclosure reality under analysis, as it is wide enough to capture a variety of subjects related to social matters, not narrowing the research to a specific subtopic, which would happen with the other possible variables available to this research, as, for example, GENDER.

Using the method, the DEI proxy will capture discussions regarding gender but will not limit the social disclosures under analysis to one topic, allowing for a broad analysis of the disclosure. The main reason for this approach is not to bias the results obtained, as we follow the rationale that if a company adopts any social policy, it is natural that their financial statements and disclosures would be marked by publicity around the measure adopted.

It is also expected that the company's social score increases if it adopts a measure with strong social value.

Notwithstanding, should we opt for a narrower variable that only captures a subtopic that was not related to the specific social-relevant measure adopted by the company, it could be labelled as greenwashing or a valuating error when, in fact, the Social_DI variable was simply not capturing the reality disclosed.

As such, in this analysis, it is important to ensure that the independent variables are specific enough to differentiate between the three dimensions that constitute ESG, while also being broad enough to capture all (or nearly all) of the underlying realities embedded within each dimension.

Additionally, it should be mentioned that this type of analysis (dictionary-based approach) focuses on the volume of social discourse, unlike what is seen in semantic classification approaches such as BERT-based models. It assumes that higher word counts signal greater attention to the social dimension of ESG, which is an overall assumption followed throughout this research.

3.2.3. Governance Disclosure Intensity

This variable represents an indicator of the intensity of governance-based disclosures. The specific variable chosen to represent this dimension was selected by taking correlation tests among the governance indicators available on the original dataset. Among the initially considered metrics, the DI_CRisk variable proves to be the most appropriate and representative of the reality we were trying to capture, while also capturing a wider variety of words/expressions related to companies' governance.

The chosen metric captures the frequency and emphasis of governance-related terms within corporate reports, reflecting the extent to which firms disclose concerns and strategies regarding governance issues.

The underlying rationale is that risk-related governance discourse often signals board-level awareness and proactive communication, usually associated with sound governance practices, as corporate governance can be an indicator for relationships within the firm and between the firm and its environment. It is argued that two of the main relationships that define the corporate governance system within a given firm are the ones established between the CEO and the board of directors (internal governance relationships) and the ones established between the firm and its equity investors (external governance relationships) (Aguilera et al., 2006), which should be implicit within the communications in the dataset chosen and are ideally captured by the chosen proxy to represent the Governance Disclosure Intensity variable.

Initially, three proxies were considered to capture this reality (PA_Risk1, Trust and CRisk). Each was tested using a fixed-effect regression model to assess its explanatory power over the Governance Score. Although the three variables have demonstrated statistical relevance, the variable CRisk had the highest coefficient in the single-variable regression model and maintained its strength when included alongside the other two. Additionally, the variables produced higher variance (VIFs), raising multicollinearity concerns.

As such, considering both the statistical performance and the theoretical fit, PA-Risk1 and Trust were dropped and CRisk was ultimately chosen as a proxy for Governance Disclosure Intensity. Despite its limitations, it was considered to best capture the strategic and risk-oriented tone that generally frames governance communication in corporate narratives as a disclosure practice that can influence stakeholders' trust and perception (as well as being used as a structural mechanism).

3.3. Dependent Variable Measurements

The databases for the dependent variables (ESG Ratings) are divided as follows:

i. TRESGS: which represents the overall ESG rating scores for a given company in a given year [1];

ii. SOSCORE: which represents the social pillar rating score for a given company in a given year [2];

[1] According to the database used: "Refinitiv's ESG Score is an overall company score based on the self-reported information in the environmental, social and corporate governance pillars".

[2] According to the database used "Refinitiv's Social Pillar Score is the weighted average relative rating of a company based on the reported social information and the resulting four category scores".

iii. CGSCORE: which represents the corporate governance pillar rating score for a given company in a given year [3];

iv. ENSCORE: which represents the Environmental Pillar rating score for a given company in a given year [4].

3.4. Control Variables

To introduce our model, we start by collecting data on various variables that the literature has commonly identified as affecting ESG disclosure and performance (Clarkson et al., 2008), as stated below:

i. Industry:

For the Industry variable, we are using "TRBC (Thomson Reuters Business Classification) Industry Group", from Refinitiv Eikon Datastream, which groups companies in a sufficiently detailed way, allowing for sectoral differences without causing excessive granularity in the dummy variables, which can be included in the model as industry fixed-effects.

The TRBC classification is widely used throughout the available literature on ESG studies when a sector segmentation is in order, which allows for robust comparative analysis as well as providing a strong taxonomy for the evaluation of the ESG practices inside comparable industry groups, being aligned with academic practices, that use similar sector classifications to control for industry differences, as shown in Fatemi et al. (2018) and Khan et al. (2016).

[3] According to the database used "Refinitiv's Governance Pillar Score is the weighted average relative rating of a company based on the reported governance information and the resulting three governance category scores".

[4] According to the database used "Refinitiv's Environmental Pillar Score is the weighted average relative rating of a company based on the reported environmental information and the resulting three environmental category scores".

ii. Firm Size

It is important to control for firm size as, in general, bigger companies have more resources to allocate to ESG initiatives, which in turn will improve its ESG ratings (Clarkson et al., 2008, Lang & Lundholm, 1993).

To proxy this factor, we use the natural logarithm of market capitalisation for each year and each company of the sample, to normalise the distribution, also available in Refinitiv Eikon Datastream, whose source is Worldscope.

iii. Profitability

More profitable firms may have more resources to invest in ESG projects, thus positively influencing its ESG ratings, as well as have a higher propensity to disclose "good news", which can then be associated by the analysts responsible for the ratings to its ESG measures (Clarkson et al., 2008, Lang & Lundholm, 1993). We use the Return on Assets of each firm, in each year, from Worldscope, to capture this effect, using Refinitiv Eikon Datastream database.

iv. Leverage

Companies that are more leveraged may have less available resources to invest in ESG matters and are expected to be subject to higher scrutiny both from competent authorities and their stakeholders, which may cause a decrease in their ESG ratings as these companies should be allocating funds to their core activities (Clarkson et al., 2008). Notwithstanding, more leveraged firms may have an incentive to invest further into their disclosure tools, as their stakeholders must demand higher levels of disclosure as the firm's debt increases (Leftwich et al., 1981, Jensen & Meckling, 1976). To measure how leveraged each firm is each year, we use "Total Debt % Common Equity", available on Refinitiv Eikon Datastream and divide the amount obtained by 100, in order to extract the debt-to-equity ratio.

v. Growth Expectation

We include Market-to-Book value as a substitute for Tobin Q (Clarkson et al., 2008) computation to try to capture market expectations on growth opportunities and investments of the firms.

While market capitalization controls for firm size and ROA controls for profitability, Tobin Q inclusion would try to reflect how investors perceive the prospects of the firm. As the Tobin Q variable was not available in the database, the market-to-book value was used to try to obtain a similar effect.

Companies with high market-to-book value are expected to experience an increase in their ESG ratings, as ESG investments are perceived as positive in investors' eyes and influence their growth expectation on a firm. Its inclusion will help ensure that the relationship between ESG ratings and ESG disclosure is not driven by differences in market valuation and investment potential.

vi. Volatility

Historical volatility, available at the Refinitiv Eikon Datastream database, is included to capture firm-specific risk in any given year, which may influence greenwashing behaviour and ESG disclosures.

Companies operating in more uncertain information environments – often reflected in higher stock price volatility – may have stronger incentives to communicate ambitious ESG strategies to influence investors' perceptions and mitigate concerns over financial instability or uncertainty (Lim, 2001).

The inclusion of this control variable ensures that the relationship between ESG-related textual content and ESG ratings is not biased by the risk profile of each company.

vii. Capital Intensity

Capital intensity is measured through total assets divided by revenue, both available on Refinitiv Eikon Datastream database.

The variable is included in the model to reflect the reliance on physical assets to generate revenue. The rationale is that companies with higher capital intensity (specifically asset-heavy industries) are also probably facing more attention and scrutiny, as well as regulatory pressures in which regards ESG matters, namely environmental ones, and, as such, should be subject to higher levels of disclosure (Clarkson et al., 2008), revealing a possibility for greenwashing.

3.5. Research Design

To try to answer the research questions presented in the previous chapter, seven linear regressions are estimated through fixed effects panel data models. The main independent variables are measured by the frequency of ESG-related textual content, as computed through the text analysis algorithm already described, and the dependent variables include both individual ESG Pillar scores and the aggregated ESG score, obtained from Refinitiv. The particularities of the variables used are described in the subsections above. Control variables are also included in the models to account for firm-specific characteristics that may influence the rating scores.

Each regression aims to resolve a hypothesis (H_0), which are outlined below:

H_1: Environmental related disclosure has a significant effect on the Environmental Score.

$$\boldsymbol{ENSCORE_{it}} = \propto + \boldsymbol{\beta_1 EN\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

H_2: Social related disclosure has a significant effect on the Social Score.

$$\boldsymbol{SOSCORE_{it}} = \propto + \boldsymbol{\beta_2 Social\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

H_3: Governance related disclosure has a significant effect on Governance Score.

$$\boldsymbol{CGSCORE_{it}} = \propto + \boldsymbol{\beta_3 GOV\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

H_4: Environmental related disclosure has a significant effect on the overall ESG Score.

$$\boldsymbol{TRESGS_{it}} = \propto + \boldsymbol{\beta_4 EN\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

H_5: Social related disclosure has a significant effect on the overall ESG Score.

$$\boldsymbol{TRESGS_{it}} = \propto + \boldsymbol{\beta_5 Social\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

H_6: Governance related disclosure has a significant effect on the overall ESG Score.

$$\boldsymbol{TRESGS_{it}} = \propto + \boldsymbol{\beta_6 GOV\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

H_7: Environmental, Social and Governance disclosures have joint impact on the global ESG Score.

$$\boldsymbol{TRESGS_{it}} = \propto + \boldsymbol{\beta_7 EN\_DI_{it}} + \boldsymbol{\beta_8 Social\_DI_{it}} + \boldsymbol{\beta_9 GOV\_DI_{it}} + \boldsymbol{Controls_{it}} + \boldsymbol{\varepsilon}$$

By performing these estimations, the study intends to shed light on whether firms' ESG-related communication efforts are linked to true sustainable practices or whether excessive emphasis is being given to certain ESG topics, without it being reflected in the ratings, which may signal misleading behaviour that can be associated with greenwashing.

3.6. Research Methodology

The methodology employed in the regression is a panel data regression model with firm fixed effects, estimated using the within estimator.

This method controls for unobserved heterogeneity that remains constant over time within firms, such as corporate culture or long-standing industry-specific characteristics (including the industry classification extracted from the database, which ultimately was not applied given the chosen methodology).

By focusing on within-firm variation, the risk of omitted variable bias is reduced, allowing for a better isolation of the relationship between ESG disclosure and ESG ratings. Standard errors are clustered at the firm level to account for potential correlation of residuals within firms over time, enhancing the robustness of the estimates.

The analysis is further supported by descriptive statistics that explore the frequency and intensity of ESG wording across firms and over time.

Ethical considerations include compliance with data usage agreements, transparency regarding the construction of the ESG textual content variables, and appropriate citation of proprietary and secondary data sources.

Potential limitations include reliance on secondary data, assumptions inherent to the chosen model (*e.g.* exclusion of time-invariant variables), and possible measurement errors in ESG ratings.

Chapter 4

Results

In Table 2, we can find descriptive statistics of the whole sample used in the regressions.

Variables	Mean	St. Dev	Min.	Max.
Independent Variables				
ESG_DI	-3.24424	0.36994	-8.16440	-2.65671
EN_DI	-6.83783	0.820115	-13.8155	-4.62036
Social_DI	-4.95268	0.388421	-13.8155	-4.11282
GOV_DI	-3.63565	0.257400	-5.46608	-2.38295
Other variables (Dependent and Control variables)				
TRESGS	49.0694	20.0545	2.79000	95.5500
SOSCORE	50.1684	22.1145	0.37000	97.7300
CGSCORE	52.7427	23.4169	0.83000	98.7200
ENSCORE	44.0751	26.1311	0.00000	97.7100
FirmSize	13.5322	3.25765	0.00000	23.6393
ROA	4.89960	15.6673	-262.790	267.240
DtERatio	69.9527	568.566	-25 130.9	5 881.49
MTBV	3.88993	31.4137	-1 148.89	747.670
Volatility	0.33508	0.22375	0.00000	3.51450
CIntensity	3 128.43	167 807	-6 624 103	3 878 573

Table 2: Descriptive statistics

The descriptive statistics presented offer an initial overview of the dataset, allowing for the identification of relevant patterns in the intensity of ESG-related textual disclosure across firms.

Among the independent variables, *Environmental Disclosure (EN_DI)* displays the lowest mean at -6.8378, suggesting that, on average, firms dedicated a smaller proportion of their textual communication to environmental topics compared to *Social Disclosure (Social_DI)* (- 4.9527) and *Governance Disclosure (GOV_DI)* (- 3.6357). Governance Disclosure is the least negative, which could indicate a stronger focus on governance-related content in corporate narratives. The aggregate *ESG Disclosure Index (ESG_DI)* presents a mean of -3.2442, with values ranging from -8.1644 to -2.6567.

It is worth noting that all independent variables' mean values are negative. This is a direct result of the way these variables are constructed. First, the indicator for each disclosure dimension was computed as the ratio between the number of ESG-related words and the total number of words in the given communication. To avoid zeros, a constant of 0.000001 was added, and then the natural logarithm of the adjusted ratio was applied. Given that the initial values were extremely small (far below 1), the log transformation naturally produced negative results. As such, the more negative the value, the smaller the proportion of ESG-related wording relative to the total words in the analysed text. Values closer to zero indicate relatively higher ESG disclosure intensity, even though still representing a small fraction of the overall narrative.

In which regards the dependent variables, the ESG pillar scores extracted from Refinitiv show mean values around the mid-range, with Governance showing the highest average score (52.74), followed by Social (50.17) and Environmental (44.08), while the overall ESG score (49.07) suggests moderate performance across the sample with substantial heterogeneity, given by the wide range in these scores. The dispersion verified is not irrelevant to the analysis as it suggests that variations in disclosure intensity may occur both in high and low-performing firms.

Regarding the control variables, firm size shows a mean log value of 13.53, with some extreme variations in profitability (ROA ranging from – 262.79 to 267.24) and leverage (debt-to-equity ratio ranging from -25 130.9 to 5 881.49, reflecting a few extreme outliers). Market-to-book value also shows a wide variation, showing the presence of both mature, low-growth firms and high-growth firms in the sample, enabling the capture of market expectations and firm growth prospects. Volatility remains relatively low on average (0.33), although some firms exhibit much higher risk levels (maximum value of 3.51). Finally, Capital Intensity also shows a wide range of values, enabling the validation of the variety of the chosen sample, with structural differences across industries and business models.

Overall, these results show that while ESG disclosure intensity is consistently low in proportional terms (as expected), firms differ widely in ESG ratings and their financial characteristics. The heterogeneity consideration is important to capture whether ESG textual emphasis is consistently associated with higher ESG scores or whether such patterns may reflect strategic communication tactics, which could be associated to greenwashing practices.

4.1. Environmental-related disclosure and ESG performance

The first set of regressions investigates the impact of environmental-related disclosure on firms' ESG performance, aiming to address the first and fourth hypothesis set out in section 3.5., as follows:

- H_1: Environmental related disclosure has a significant effect on the Environmental Score; and
- H_4: Environmental related disclosure has a significant effect on the overall ESG Score.

Table 3 reports the fixed-effects regression results, clustering standard errors at the firm level, for both the Environmental Score and the overall ESG score.

	ENSCORE H1	TRESGS H4
EN_DI	3.5408***	3.1584***
FirmSize	-0.1403	0.1001
ROA	0.0210	0.0080
DtERatio	-0.0001	0.0001
MTBV	-0.0021	-0.0022
Volatility	3.4677	-1.2990
CIntensity	1.32e-07***	1.21e-06***
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3 613	3 613
Adj R-squared	0.0558	0.0686
F-statistic	114.21	37.80
Prob (F-statistic)	0.0000	0.0000

*** denotes p-values <0.01, ** denotes p-values <0.05, * denotes p-values <0.10

Table 3: Hypothesis 1 and 4 coefficient's estimation

The results provide strong empirical support for both H_1 and H_4, indicating that environmental disclosure (EN_DI) has a statistically significant positive impact on ESG performance. The coefficients for both Environmental Score (ENSCORE) and overall ESG Score (TRESGS) indicate that a 1% increase in the proportion of environmental-related words in corporate disclosures (EN_DI) is associated with a 0.035-point increase in the Environmental Score and a 0.032-point increase in the overall ESG score.

The results suggest that marginal increases in the relative emphasis placed on environmental topics in firms' public communications correlate with measurable gains in their ESG performance.

Additionally, it is important to note that the models' joint significance and control for fixed effects reinforce the robustness of the relationship.

4.2. Social-related disclosure and ESG performance

The next set of regressions aim to address the relationship between social-related disclosure and firms' ESG performance, analysing the 2nd and 5th hypothesis set out in section 3.5., as follows:

- H_2: Social related disclosure has a significant effect on the Social Score; and
- H_5: Social related disclosure has a significant effect on the overall ESG Score.

Table 4 reports the fixed-effects regression results, clustering standard errors at the firm level, for both the Social Score and the overall ESG score.

	SOSCORE H2	**TRESGS H5**
Social_DI	6.0124***	7.5337***
FirmSize	0.3026***	0.1429
ROA	0.0126	0.0132
DtERatio	-0.0002	0.0001
MTBV	-0.0047	0.0003
Volatility	-4.3739	-2.0880
CIntensity	3.39e-07	1.38e-06***
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3 613	3 613
Adj R-squared	0.0514	0.0940
F-statistic	4.14	21.94
Prob (F-statistic)	0.0002	0.0000

*** denotes p-values <0.01, ** denotes p-values <0.05, * denotes p-values <0.10

Table 4: Hypothesis 2 and 5 coefficient's estimation

The results show a positive and statistically significant association between the intensity of social-related textual disclosure and both dependent variables, providing strong and empirical support for both H_2 and H_5.

Specifically, when aiming for the impact on the Social Score (SOSCORE), the coefficient is 6.0124 ($p<0.01$), indicating that, holding other variable constant, a proportional increase in the share of social-related wording in firm communications is associated with higher Social Scores (a one-unit increase in the log of the ratio of social-related words to the total number of words in a given communication is linked to a 6.0124 increase in the Social Score). For the total ESG score model the estimated effect is even larger (7.5337 with $p<0.01$), suggesting that stronger social-related disclosure is also reflected in higher overall ESG ratings.

Firm size shows a positive and statistically significant effect in the Social Score model but loses statistical relevance in the overall ESG model. Capital Intensity is only significant in the overall ESG regression, though its magnitude is negligible. The other controls are not statistically significant in either model.

The inclusion of year and industry fixed effects ensures that the results account for unobserved heterogeneity across both time and sector. We can also infer that the explanatory variables account for a larger share of the variation in ESG performance when all ESG dimensions are aggregated, contrary to what might typically be expected. The F-statistics confirm that the models are jointly significant at the 1% level.

4.3. Governance-related disclosure and ESG performance

The third set of regressions aim to address the relationship between governance-related disclosure and firms' ESG performance as set out in hypothesis 3 and 6 of section 3.5., as follows:

- H_3: Governance related disclosure has a significant effect on Governance Score; and
- H_6: Governance related disclosure has a significant effect on the overall ESG Score.

Table 5 summarises the fixed effects regression results obtained, clustering standard errors at the firm level, for both the Governance Score and the overall ESG score.

	CGSCORE H3	TRESGS H6
GOV_DI	-3.2714	-3.6578*
FirmSize	0.0786	0.0985
ROA	-0.0007	0.0034
DtERatio	0.0007**	0.0001
MTBV	0.0036	-0.0015
Volatility	-2.2715	-0.6648
CIntensity	2.59e-06***	1.32e-06***
Year-fixed effects	Yes	Yes
Industry-fixed effects	Yes	Yes
Observations	3 613	3 613
Adj R-squared	0.0037	0.0040
F-statistic	317.27	64.43
Prob (F-statistic)	0.0000	0.0000

*** denotes p-values <0.01, ** denotes p-values <0.05, * denotes p-values <0.10

Table 5: Hypothesis 3 and 6 coefficient's estimation

The results do not provide statistical evidence to support H_3, as shown by the negative, statistically insignificant coefficient of -3.2714, indicating that governance disclosure does not appear to meaningfully influence governance score. Conversely, the results for H_6 reveal a negative relationship between governance-related disclosure and the overall ESG score, with a coefficient of -3.6578, significant at the 10% level, suggesting that greater emphasis on governance-related communication is associated with lower overall ESG ratings.

The pattern presented suggest that firms increasing their governance discourse do not necessarily achieve higher ESG ratings, and the increase in those types of disclosures can even be associated to lower evaluations, which indicates a disconnection between disclosure and performance, consistent with the notion of greenwashing – the communications may function as a mechanism to highlight ESG (specifically, governance) practices that do not translate into effective measures applied by the companies.

Notwithstanding the above, these results should be interpreted with caution given the low explanatory power observed in the models.

4.4. Joint effects of the 3 disclosure pillars on ESG performance

Lastly, and after analysing the individual impact of each ESG dimension, H_7 tests for the hypothesis of Environmental, Social and Governance disclosures jointly influence the global ESG Score, as stated in section 3.5. The results are shown in Table 6:

	TRESGS H7
EN_DI	1.6010***
Social_DI	5.7660***
GOV_DI	-5.7241**
FirmSize	0.1413
ROA	~0.0137
DtERatio	0.0001
MTBV	-0.0004
Volatility	-1.7596
CIntensity	1.28e-06***
Year-fixed effects	Yes
Industry-fixed effects	Yes
Observations	3 613
Adj R-squared	0.1101
F-statistic	22.03
Prob (F-statistic)	0.0000

*** denotes p-values <0.01, ** denotes p-values <0.05, * denotes p-values <0.10

Table 6: Hypothesis 7 coefficient's estimation

The results obtained show a heterogeneous pattern across the three ESG dimensions. Environmental disclosure is positively and significantly associated with the overall ESG score ($\beta = 1.601$, $p = 0.001$), while social disclosure exhibits the strongest positive effect ($\beta = 5.766$, $p < 0.001$) and, in contrast, governance-related disclosure shows a statistically significant negative relation with ESG performance ($\beta = –5.724$, $p = 0.020$). The results herein presented are in line to what was expected given the results obtained in the previous regressions.

The negative coefficient obtained for the governance disclosure metric reflect a potential discrepancy between communication and actual performance, which could indicate that increased emphasis on this type of communication is given when the firms are struggling to meet ESG criteria.

Among the control variables, only capital intensity remains positive and statistically significant.

Additionally, it is important to highlight that the within R-squared of 0.1101 indicates that the explanatory power of the model improves substantially when all three ESG dimensions are included simultaneously, compared to single-dimension regressions.

Overall, the findings provide support for H_7 as the disclosure have significant effects on ESG scores when assessed jointly.

Chapter 5

Conclusions

This study investigates the relationship between ESG-related textual disclosure and ESG ratings, aiming to identify patterns leading to greenwashing. The rationale was analysing whether an increased emphasis on ESG narratives translated into better ESG ratings or, on the contrary, divergences suggested symbolic disclosure strategies.

The results gathered suggest an ambiguous response. In the first set of regressions, focused on the impact of environmental disclosure both on Environmental Score and overall ESG score, a positive and significant association was found. The consistency of the effects across both scores weakens the greenwashing hypothesis, as it would be unlikely to produce systematic positive results as the ones recorded. On the other hand, it is possible that firms already take this into account when preparing financial information, enhancing their rating performance by placing greater emphasis on environmental topics of their public reports – which may indicate greenwashing behaviour.

Similarly, Social Disclosure Intensity shows a highly positive and significant correlation with the Social Score and even higher with the ESG overall score. The results obtained allow us to infer that social disclosure has a strong influence on overall ESG image, even greater than when evaluating only social measures, suggesting that attention given to social problems in communications improves the public image of a firm.

These findings provide strong evidence to the claims that firms that disclose more extensively in social matters tend to receive higher social and overall ESG ratings. This positive relationship may reflect the fact that greater transparency in social matters – such as employee welfare, community engagement, diversity and inclusion – is rewarded by rating agencies. However, while these results are consistent with genuine improvements in social performance, they do not preclude the possibility that part of the observed effect could stem from strategic disclosure aimed at improving ratings without equivalent substantive changes, a possibility explored further in the greenwashing discussion.

In contrast, governance-related disclosure reveals a different pattern. The regressions carried out shows no statistically significant impact on governance scores and a negative association with the overall ESG rating. Following the rationale behind the research herein presented, this suggests that increased governance discourse may not correspond to genuine concerns and may not translate into effective actions and improvements, reflecting firms' strategies to polish their image. This behaviour aligns with the notion of greenwashing, where firms intensify their governance communication to avoid reputational problems without implementing major changes.

Regarding the joint effects of the three pillars on ESG performance, the conclusions obtained are strengthened further. It can be inferred that environmental and social disclosures are contributing positively to higher ESG-rating scores and thus can be associated with effective measures taken on by firms with practical consequences on their real-world operations, acting as a legitimate channel for communicating substantive ESG practices.

Conversely, higher governance talk is negatively correlated with the ESG-rating scores verified (thus with weaker statistical significance compared to the other two), raising concerns about the reliability of such narratives as standalone indicators of ESG commitment. From the results obtained, it can be argued that when firms are strategically employing "green talk" to obscure weaknesses, they may concentrate their focus on governance measures – whose veracity may also be harder to verify from a third-party perspective, as governance practices are often reported through procedural or formal indicators (e.g. codes of conduct, board committees) that are less directly observable.

Our study contributes to the existing literature in various ways. First, it integrates a large-scale textual analysis with ESG ratings from Refinitiv, creating a pathway for inference about greenwashing practices. Second, it provides empirical evidence that the credibility of ESG disclosures varies across dimensions, with governance emerging as the most vulnerable to symbolic communication, supporting socio-political theories. Finally, it enables us to better understand how ESG disclosure practices interact with external perceptions and evaluations, a topic of growing relevance for investors, regulators and policymakers.

Notwithstanding, it is important to acknowledge the limitations of the study. First, greenwashing is proxied exclusively through ESG ratings from Refinitiv database, which may bias the results as opposed to using a variety of database suppliers. Additionally, the conducted analysis is restricted to UK-listed firms, which may limit the generalization of the results. Finally, disclosure intensity is measured through the proportion of ESG-related words, which, while capturing emphasis, may overlook the substantive quality of the communication. These limitations suggest that some caution should be given when considering the results presented. Future research can be built from these findings by extending the analysis beyond UK firms and incorporating other methods of textual analysis (e.g. semantic or sentiment-based models).

For the academia, the results from this study highlight the importance of critically assessing the financial narratives regarding ESG messages, helping to recognize both their informative value and their potential for manipulation.

Declaration of generative AI / AI-assisted technologies in the writing process

During the preparation of my thesis, "Sustainable Finance – The ESG textual content of annual reports and greenwashing", CHATGPT was used for the following tasks: literature review, data analysis interpretation, research design, improving clarity and grammar of written sections and generating alternative formulations of the abstract with the prompts used listed at the end of the document in the Prompts List section. After using this tool, I reviewed and edited the content as necessary, and I take full responsibility for the content of the work presented.

I also declare that I am aware of and respect the Artificial Intelligence Rules of Conduct of Católica Porto Business School.

Bibliography

Aguilera, R. V., Williams, C. A., Conley, J. M., & Rupp, D. E. 2006. Corporate governance and social responsibility: A comparative analysis of the UK and the US. *Corporate Governance: An International Review*, *14*(3), 147–158. https://doi.org/10.1111/j.1467-8683.2006.00495.x

Antweiler, W., & Frank, M. Z. 2004. Is all that talk just noise? The information content of Internet stock message boards. *Journal of Finance*, *59*(3), 1259–1294. https://doi.org/10.1111/j.1540-6261.2004.00662.x

Baker, A. C., Larcker, D. F., Mcclure, C., Saraph, D., & Watts, E. M. 2024. Diversity Washing. Working paper. *Journal of Accounting Research*. Available at: https://ssrn.com/abstract=4298626

Berg, F., Kölbel, J. F., & Rigobon, R. 2019. Aggregate Confusion: The Divergence of ESG Ratings. *Review of Finance* (Forthcoming). Available at: https://ssrn.com/abstract=3438533

Bewley, K., & Li, Y. 2000. Disclosure of environmental information by Canadian manufacturing companies: A voluntary disclosure perspective. *Advances in Environmental Accounting and Management*, *1*, 201–226. https://doi.org/10.1016/S1479-3598(00)01011-6

Bloomfield, R. J. 2002. The "Incomplete Revelation Hypothesis" and Financial Reporting. *Accounting Horizons*, 16(3), 233–243. https://doi.org/10.2308/acch.2002.16.3.233

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. 2008. Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis. *Accounting, Organizations and Society*, *33*(4–5), 303–327. https://doi.org/10.1016/j.aos.2007.05.003

de Freitas Netto, S. V., Sobral, M. F. F., Ribeiro, A. R. B., & Soares, G. R. d. L. 2020. Concepts and forms of greenwashing: A systematic review. *Environmental Sciences Europe* 32: 19. https://doi.org/10.1186/s12302-020-0300-3

de Souza, J. A. S., Rissatti, J. C., Rover, S., & Borba, J. A. 2019. The linguistic complexities of narrative accounting disclosure on financial statements: An analysis based on readability characteristics. *Research in International Business and Finance*, *48*: 59–74. https://doi.org/10.1016/j.ribaf.2018.12.008

Dye, R. A. 1985. Disclosure of Nonproprietary Information. *Journal of Accounting Research, 23*(1): 123-145. https://doi.org/10.2307/2490910

El-Haj, M., Alves, P., Rayson, P., Walker, M., & Young, S. 2020. Retrieving, classifying and analysing narrative commentary in unstructured (glossy) annual reports published as PDF files. *Accounting and Business Research*, *50*(1), 6–34. https://doi.org/10.1080/00014788.2019.1609346

Fatemi, A., Glaum, M., & Kaiser, S. 2018. ESG performance and firm value: The moderating role of disclosure. *Global Finance Journal*, *38*, 45–64. https://doi.org/10.1016/j.gfj.2017.03.001

Giles, O., & Murphy, D. 2016. SLAPPed: the relationship between SLAPP suits and changed ESG reporting by firms. *Sustainability Accounting, Management and Policy Journal*, *7*(1), 44–79. https://doi.org/10.1108/SAMPJ-12-2014-0084

Gorovaia, N., & Makrominas, M. 2025. Identifying greenwashing in corporate-social responsibility reports using natural-language processing. *European Financial Management*, *31*(1), 427–462. https://doi.org/10.1111/eufm.12509

Gray, R., Kouhy, R., & Lavers, S. 1995. Corporate social and environmental reporting. *Accounting, Auditing & Accountability Journal*, *8*(2), 47–77. https://doi.org/10.1108/09513579510146996

Hill, J. 2020. *Environmental, Social, and Governance (ESG) Investing: A Balanced Analysis of the Theory and Practice of a Sustainable Portfolio*. London: Academic Press. https://doi.org/10.1016/B978-0-12-818692-3.00001-3

Huang, Q., Li, Y., Lin, M., & McBrayer, G. A. 2022. Natural disasters, risk salience, and corporate ESG disclosure. *Journal of Corporate Finance*, 72: 102152. https://doi.org/10.1016/j.jcorpfin.2021.102152

Hughes, S. B., Anderson, A., & Golden, S. 2001. Corporate environmental disclosures: are they useful in determining environmental performance? *Journal of Accounting and Public Policy*, 20(3), 217–240. https://doi.org/10.1016/S0278-4254(01)00031-X

Ingram, R. W., & Frazier, K. B. 1980. Environmental Performance and Corporate Disclosure. In *Source: Journal of Accounting Research* 18(2): 614-622. https://doi.org/10.2307/2490597

Jensen, M. C., & Meckling, W. H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Khan, M., Serafeim, G., & Yoon, A. 2016. Corporate Sustainability: First Evidence on Materiality. *The Accounting Review,* 91(6): 1697-1724. https://doi.org/10.2308/accr-51383

Lang, M., & Lundholm, R. 1993. Cross-Sectional Determinants of Analyst Ratings of Corporate Disclosures. *Journal of Accounting Research* 31(2), 246-271. https://doi.org/10.2307/2491273

Leftwich, R. W., Watts, R. L., & Zimmerman, J. L. 1981. Voluntary Corporate Disclosure: The Case of Interim Reporting. *Journal of Accounting Research* 19, 50-77. https://doi.org/10.2307/2490984

Li, Y., Richardson, G. D., & Thornton, D. B. 1997. Corporate Disclosure of Environmental Liability Information: Theory and Evidence*. *Contemporary Accounting Research*, *14*(3), 435–474. https://doi.org/10.1111/j.1911-3846.1997.tb00535.x

Lim, T. 2001. Rationality and analysts' forecast bias. *Journal of Finance*, *56*(1), 369–385. https://doi.org/10.1111/0022-1082.00329

Lokuwaduge, C. S. D. S., & Heenetigala, K. 2017. Integrating Environmental, Social and Governance (ESG) Disclosure for a Sustainable Development: An Australian Study. *Business Strategy and the Environment*, *26*(4), 438–450. https://doi.org/10.1002/bse.1927

Loughran, T., & Mcdonald, B. 2016. Textual Analysis in Accounting and Finance: A Survey. *Journal of Accounting Research*, *54*(4), 1187–1230. https://doi.org/10.1111/1475-679X.12123

Patten, D. M. 2002. The relation between environmental performance and environmental disclosure: a research note. *Accounting, Organizations and Society*, *27*(8), 763–773. https://doi.org/10.1016/S0361-3682(02)00028-4

Solomon, A., Solomon, J., & Suto, M. 2004. Can the UK experience provide lessons for the evolution of SRI in Japan? *Corporate Governance: An International Review*, *12*(4), 552–566. https://doi.org/10.1111/j.1467-8683.2004.00393.x

Spaniol, M. J., Danilova-Jensen, E., Nielsen, M., Rosdahl, C. G., & Schmidt, C. J. 2024. Defining Greenwashing: A Concept Analysis. *Sustainability*, *16*(20), 9055. https://doi.org/10.3390/su16209055

Suchman, M. 1995. Managing Legitimacy: Strategic and Institutional Approaches. *Academy of Management Review*, *20*, 571-611. https://doi.org/10.2307/258788

Tetlock, P. C. 2007. Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance*, *62*(3), 1139–1168. https://doi.org/10.1111/j.1540-6261.2007.01232.x

Tilling, M. V, & Tilt, C. A. 2010. The edge of legitimacy: Voluntary social and environmental reporting in Rothmans' 1956-1999 annual reports. *Accounting, Auditing & Accountability Journal*, *23*(1), 55–81. https://doi.org/10.1108/09513571011010600

Verrecchia, R. E. 1983. Discretionary disclosure. *Journal of Accounting and Economics*, *5*(C), 179–194. https://doi.org/10.1016/0165-4101(83)90011-3

Wiseman, J. 1982. An evaluation of environmental disclosures made in corporate annual reports. *Accounting, Organizations and Society*, *7*(1), 53–63. https://doi.org/10.1016/0361-3682(82)90025-3

Wooldridge, J. M. 2013. *Introductory Econometrics: A Modern Approach* (5th ed.). Mason, OH: South-Western Cengage Learning.

List of Prompts

1. Summarize the main academic literature on ESG disclosure and its link to financial performance.
2. How can I organize the regression models linking disclosure intensity variables (environmental, social, governance) with ESG ratings and overall ESG scores to test individual and aggregate effects?
3. Suggest typical control variables used in ESG-related panel regressions and explain briefly why they are relevant.
4. How should I interpret statistically significant versus insignificant coefficients in this type of ESG disclosure analysis?
5. Explain how to interpret negative coefficients between governance disclosure and ESG scores in a research context.
6. Explain in simple academic terms the meaning of the beta coefficients in fixed-effects regressions.
7. What does the p-value (p-statistic) means on the significance of a regression result?
8. How should I interpret the F-statistic in the context of panel regressions?
9. Explain how to interpret the R-squared value in fixed-effects regressions and its limitations.
10. Suggest clear ways to present and interpret regression results in tables and narrative form for a thesis.
11. At the final stage, review the overall grammar and clarity of the text.
12. Reformulate the abstract to make it more concise and academic.

The above list of prompts is not exhaustive. ChatGPT was occasionally consulted throughout the preparation of the dissertation for minor adjustments, clarifications and general academic support.