Significance of Transparency and Accountability in ESG Reporting

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Abstract

This study aims to assess the potential of ESG disclosure legislation to motivate companies towards more responsible practices. Companies increasingly participate in "greenwashing," the portrayal of a commitment to ESG principles through empty rhetoric rather than concrete actions. Leveraging the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) as an exogenous shock, we employ a difference-in-differences (DiD) approach to compare changes in both ESG rhetoric and market valuation between affected firms and an unaffected control group. While the Dodd-Frank Act demonstrably influenced consumer perception of ESG efforts, a disconnect exists with limited improvements in actual environmental performance. Further, we find that the positive influence of high ESG ratings on market valuation might be boosted by the presence of deceptive language in a company's filings.

Keywords: Corporate Finance, Social Responsibility, Ratings and Ratings Agencies

JEL Codes: G30, G24, G18

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1 Introduction

The rapid pace of globalization and a growing emphasis on social consciousness are shaping today's dynamic economics. This has brought the intersection of corporate behavior, ethical responsibility, and financial performance into sharp focus, giving rise to the concept of the socially conscious business model. However, a critical challenge has emerged – ensuring the veracity and reliability of environmental, social, and governance (ESG) disclosures. The surge in corporate disclosures regarding environmental stewardship, social initiatives, and governance frameworks has prompted an examination of their authenticity. The specter of "greenwashing," wherein corporations make insubstantial commitments with lofty rhetoric, casts a shadow over the credibility of ESG disclosures.

Beginning in 2012, the Securities and Exchange Commission ("SEC") began to require companies to publicly disclose their use of conflict minerals that originated in the Democratic Republic of the Congo or an adjacent country. The Specialized Corporate Disclosure provision of the Dodd-Frank Act originated from the legislative process following the Global Financial Crisis of 2007 and 2008. The crisis shaped these initiatives as a means for publicizing information that is of relevance to members of the public and not necessarily to direct investors. It is also the closest example of environmental disclosure legislation enacted in the US to date.

Dodd-Frank presents a unique opportunity to analyze the impact of environmental disclosure policies through a natural experiment. The inclusion of the Specialized Corporate Disclosure provision within a broader legislative response to the financial crisis was largely unexpected. This unexpected nature minimizes the possibility that firms strategically changed their behavior in anticipation of the mandate. Additionally, the requirement only targeted companies utilizing conflict minerals from specific regions. This creates a quasi-experimental setting where firms within the same industry and facing similar market conditions can be categorized as either ‘filers’ or ‘non-filers’ based upon the specific geographic source of their materials.

This thesis investigates the link between environmental disclosure policies and corporate valuation, focusing on three crucial questions. First, how does ESG disclosure regulation impact firms? Second, how did the implementation of the Dodd-Frank Act’s specialized disclosure mandate influence both financial and ESG performance? Finally, how can we understand the effects of Dodd-Frank in this context, particularly regarding investor behavior? Do investors distinguish between genuine and deceptive ESG communication when making investment decisions?

Our analysis yielded intriguing insights regarding the impact of the Dodd-Frank Act’s disclosure mandate. On the one hand, we observed a positive association between the mandate and market valuation, particularly for firms filing in the post-regulatory period. This suggests that investors placed a higher value on the increased transparency provided by these disclosures. This finding aligns with the idea that investors might perceive mandated disclosures as a signal of good corporate governance, even if the actual ESG practices haven’t demonstrably improved.

However, a more surprising finding emerged when we examined the interaction between deception probability and ESG scores. The analysis revealed a positive interaction, indicating that the positive influence of high ESG scores on market valuation might be boosted by the presence of deceptive language in a company’s filings. This is a counterintuitive finding that warrants further investigation. One possible explanation could be that some investors might be prioritizing short-term financial gains associated with a positive ESG image, even if the underlying practices are questionable. This could be due to a lack of awareness of potential deception or a focus on short-term financial metrics over long-term sustainability goals. Alternatively, it’s possible that companies might be strategically using deceptive language to inflate their ESG scores, capitalizing on investor preference for firms with strong ESG performance. Further research is needed to fully understand the underlying mechanisms driving this interaction and the role of investor behavior in this dynamic.

Despite limitations like the reliance on self-reported ESG metrics, this research offers a valuable contribution to the current literature of the subject. By analyzing the impact of the Dodd-Frank Act, we provide insights into how disclosure mandates can influence investor perception of ESG messaging. We also highlight the need for more nuanced approaches when assessing the credibility of ESG commitments.

2 Literature Review

Environmental, social, and governance (ESG) performance is a multidimensional concept that reflects the extent to which a firm addresses the environmental, social, and governance issues that affect its stakeholders and society at large. Examples of environmental considerations include a firm's carbon footprint, pollution levels, and resource management practices. Social factors encompass labor practices, diversity and inclusion efforts, and community engagement. Governance aspects focus on a firm's leadership structure, executive compensation, and transparency in decision-making. ESG performance has become increasingly important for firms, investors, and regulators as it is believed to have implications for firm value and corporate risk. However, the literature on ESG performance and its impact on firm value is inconclusive as it reveals various challenges and gaps in the measurement, disclosure, and valuation of ESG performance. This literature review aims to summarize the main findings and debates in the literature, focusing on three ESG topics: the credibility of ESG disclosure, the linguistic analysis of ESG disclosure, and the materiality of ESG performance.

Within this literature, a substantial strand focuses on themes like reporting practices and their association with ESG campaigns. This research builds upon this foundation by focusing upon the effectiveness of mandated disclosures. Additionally, we introduce text analysis methods to assess the credibility of ESG disclosures, addressing a crucial gap in the literature on ESG disclosure effectiveness. Our contribution lies in both the specific policy context we examine (Dodd-Frank) and the methodology that we employ to investigate the impact of ESG disclosure mandates and the associated challenges of greenwashing.

2.1 Dodd-Frank Act

Published studies investigating Section 1502 of the Dodd-Frank legislation are few and scarce. Most commonly, qualitative interviews are used to investigate the attitude of US corporations towards the disclosure mandate. Primarily, their findings indicate that industries and corporations with direct consumer interactions have stronger incentives to surpass baseline compliance and that they actively engage in social reform initiatives. Brand image and reputation are found to be instrumental in motivating these firms (Ireland (2016)). Prior examinations all conclude that non-traditional disclosure legislation should be further researched for their potential to facilitate broader social reform. There is a noticeable lack of quantitative research looking at the varied effects of ESG behaviors, such as pollution, consumption practices, and human rights abuses. Analyses exploring the extent to which the valuation of corporations is influenced by "non-traditional disclosure legislation" are also absent. Our research directly addresses this identified gap in quantitative research on the effects of non-traditional disclosure legislation like the Dodd-Frank Act by employing econometric analysis. Additionally, we move beyond simply examining ESG performance and delve into the credibility of disclosures themselves using text analysis methods. This comprehensive approach sheds light on the complex relationship between mandated disclosures, investor behavior, and potential greenwashing practices.

2.2 The Credibility of ESG Disclosure

A central challenge of the literature is the lack of credibility among ESG disclosures, which refers to the extent to which an ESG disclosure reflects the actual ESG performance of a firm. Due to the lack of formal channels for these types of disclosures, an ESG disclosure is defined as environmental, social, or governance related information that is included in corporate accounting reports (e.g., 10-K report or annual report). Several studies have found evidence of inconsistency, inaccuracy, and deception in ESG disclosure, suggesting that firms may use ESG disclosure as a strategic tool to manipulate or mislead their stakeholders or regulators. For example, Cho et al. (2010) finds that firms with poor environmental performance tend to disclose more environmental information, and in a far more positive light, than firms with good environmental performance, indicating a possible "greenwashing" strategy. Similarly, Ingram and Frazier (1980) find little agreement between ESG disclosures and executed activities, suggesting that ESG reports may not reflect the actual ESG practices of firms. More recently, Pinnuck et al. (2021) report that almost 40% of ESG reports in their dataset contained incorrect and misleading information, such as false claims, omissions, or contradictions. For instance, a company might claim to be committed to sustainable forestry practices in its disclosures, while engaging in deforestation practices that contradict those claims.

The lack of credibility of ESG disclosure poses a serious challenge for the evaluation and valuation of ESG performance, as it undermines the reliability and comparability of ESG information. Our analysis revealed intriguing results regarding the relationship between mandated disclosures and the use of deceptive language. Interestingly, being a filer of Form SD, mandated by the Dodd-Frank Act, was associated with a slight increase in the incidence of deceptive language in the initial period.

2.3 The Linguistic Analysis of ESG Statements

The measurement of ESG credibility, which often relies on subjective and qualitative indicators that are difficult to quantify and standardize, is frequently mentioned as a challenge. To overcome this, some studies have proposed the use of linguistic analysis as a novel and objective method to assess ESG performance and its impact on firm value. Linguistic analysis is based on the assumption that language reveals the underlying intentions, attitudes, and emotions of the speaker or writer, and that linguistic cues can be used to detect deception, sentiment, or tone in ESG disclosure. For example, Humpherys et al. (2011) determine that linguistic cues extracted from mandatory financial disclosures can be used to identify deception. They find that fraudulent disclosures are characterized by greater use of activation language, words, imagery, pleasantness, group references, and less lexical diversity than non-fraudulent disclosures. Further, they argue that linguistic analysis can be a useful tool for auditors to flag questionable financial disclosures. Kim et al. (2012) find that firms exhibiting corporate social responsibility are less likely to manipulate operating activities and are more transparent and reliable when communicating financial information to investors. They use linguistic features outlined by Kinder et al. (2006) to measure corporate social responsibility, and discretionary accruals to measure earnings manipulation. Specifically, they find that the language used and behavior with respect to financial filings differs between those that are socially responsible and those that are not. They suggest that linguistic analysis can be a complementary measure of ESG performance and its effect on financial reporting.

2.4 Materiality of ESG Performance

A third challenge in the literature is the valuation of ESG performance, which often depends on the context and the perspective of the stakeholders. Prior studies show mixed and inconclusive results on the relationship between ESG performance and firm value, as different studies use different measures, methods, and samples to examine this relationship. However, a common theme that emerges is the importance of materiality, which refers to the relevance and significance of ESG performance for the core business of a firm. Materiality implies that not all aspects of ESG performance are equally important or valuable for all firms, and that the impact of ESG performance on firm value may vary depending on the industry, the market, and the stakeholder. For example, Guiral et al. (2020) finds that ESG performance has a positive impact on firm value only when it is material to the firm's core business. They also find that this relationship is stronger for firms with higher information asymmetry and lower analyst coverage. They argue that material ESG performance reduces information asymmetry and enhances investor confidence in the firm's prospects. It is also suggested that material ESG performance can signal the firm's quality and competitive advantage in the market.

While the literature emphasizes materiality, a gap remains in understanding how disclosure credibility might influence the perception of materiality. For instance, could a firm with deceptive ESG disclosures overstate the materiality of certain ESG factors to their business? Our research delves into the nuances of ESG communication, which can provide valuable insights into this underexplored area. Future research that combines our text analysis approach with valuation studies could shed light on how disclosure credibility interacts with materiality assessments and ultimately influences firm value.

3 Data

This section delves into the data utilized to explore the relationships described. We leverage three primary sources: first, the LSEG's Refinitiv ESG Scores database provides comprehensive and standardized ESG performance metrics encompassing environmental, social, and governance aspects. Second, we incorporate 10-K filings for SP 500 companies from 1996 to 2022, focusing on the Management's Discussion and Analysis (MDA) section. This textual data is then processed using the Loughran-McDonald methodology for linguistic analysis. Finally, to assess disclosure credibility, we integrate data from the Stanford-Cornerstone Securities Class Action Clearinghouse (SCAC) database, which allows us to identify firms accused of accounting fraud through securities class action lawsuits. By combining these diverse data sources, we aim to gain a holistic understanding of a firm's ESG performance, its communication strategies revealed through 10-K filings, and potential red flags of deceptive language that might undermine disclosure credibility.

3.1 ESG Performance

Our ESG performance measurements come from the the LSEG's Refinitiv ESG Scores database, which is a comprehensive and standardized dataset spanning three pillars: environmental, social, and governance. Each pillar consists of several subcategories and themes that cover various topics and issues related to ESG. The dataset includes more than 630 measurements for each company, as well as intermediate measurements that aggregate or weight observations into scores or rating for each pillar, subcategory, theme, or overall ESG performance.

The dataset uses a transparent and consistent methodology that allows for comparability and bench-marking across companies and sectors. The dataset covers publicly traded companies from 1996 to 2022 and is updated annually.

The observations are all records of numerical data (e.g., tons of carbon emitted, percentage of women on the board). Each set of observations are translated into intermediate measurements, on a scale from zero to one hundred, which represent aggregations or weighted calculations of these observations.

3.2 Corporate Filings

The main sources of ESG disclosure information are the 10-K filings of public companies with the U.S. Securities and Exchange Commission (SEC). The 10-K is a comprehensive annual report that provides a detailed overview of the financial performance, business operations, and overall financial condition of a company to investors, analysts, regulators, and other stakeholders. The 10-K filings also include a section called 'Management's Discussion and Analysis of Financial Condition and Results of Operations' (MD&A), which is where companies typically disclose their initiatives, goals, and achievements.

Textual information within the MD&A section of the annual report is a strong indicator of fraudulent activity as it is not subject to stringent regulation. Importantly, the MD&A section provides an opportunity for management to express predictions, presumptions, and decision making; they may be tempted to manipulate or selectively exclude the information presented here in order to present the organization in a more favorable light.

The data sample for this project includes all 10-K filings for those S&P500 member firms consistently within the index from 1996 to 2022. The data was obtained from the SEC Electronic Data, Gathering, Analysis, and Retrieval (EDGAR) system, which is a public online database.

Table 1 provides initial insights into the overall language used in the sample. While there is a slight skew towards negative and litigious language on average, the high standard deviations indicate significant variability across companies. These are encouraging amounts of deviations, given the expectation that the variations in language give insight into corporate operations.

The data processing process follows the methodology of Loughran and McDonald (2011). They describe a two stage process, the first of which, "Stage One", cleans each filing document of extraneous materials. "Stage Two", parses each document into tokens and tabulates

Table 1: **Summary Statistics of 10K Linguistic Characteristics**

	$N_{Negative}$	$N_{Positive}$	$N_{Uncertainty}$	$N_{Litigious}$	$N_{StrongModal}$	$N_{WeakModal}$
count	204105	204105	204105	204105	204105	204105
mean	714.70	204.29	497.67	756.33	128.69	224.68
std	741.01	191.29	438.52	1276.33	142.43	232.26
min	0	0	0	0	0	0
25%	231	74	178	167	47	56
50%	528	164	405	386	96	164
75%	969	280	707	828	164	316
max	27927	8727	9680	76289	8238	6439

This table provides an overview of the key linguistic features extracted from the text of 10-K filings. These statistics summarize aspects like use of modal verbs (conveying possibility or obligation) and sentiment (positive and negative).

various word counts based upon predefined semantic dictionaries. Both are described in detail below:

3.2.1 Stage One Parse

The stage one parse aims to create files where all of the 10K documents have been parsed to exclude markup tags, ASCII-encoded graphics, and tables, which are not the focus of the textual analysis. The parsing consists of three steps: first, all document segments of GRAPHIC, ZIP, EXCEL, JSON, and PDF types are deleted from the file, as they can account for more than 90% of the document size and are not relevant for text analysis. Second, the header and footer information provided by the SEC are deleted from the text file, as they are not part of the original filing. However, the header information is retained and included in the tagged items discussed below. Finally, all remaining extended character references are removed. These are special characters that are not part of the standard ASCII character set, such as é, ü, or ñ. They are replaced by their equivalent ASCII characters, such as e, u, or n.

3.2.2 Stage Two Parse

The Stage Two Parse further processes the files by parsing each document into tokens and tabulating various word counts. A token is a unit of text that is separated by spaces or punctuation marks. The parsing process consists of four steps: first, the document is split into tokens based on spaces and punctuation marks. Each token is converted to lowercase and any leading or trailing punctuation marks are removed. Second, stopwords are removed from the document based on a predefined list of stopwords. Stopwords are common words that do not carry much meaning or information, such as "the", "and", "of", etc. Third, stemming is applied to the tokens. Stemming is a process of reducing words to their root form, such as "running" to "run" or "cars" to "car". This helps to group words that have similar meanings and reduce the dimensionality of the data. The stemming algorithm used is the Porter stemmer, which is a widely used and effective method for English texts. Finally, the frequency of each type of token in the document is counted using predefined semantic dictionaries. The table also includes information such as the document ID, the filing date, the CIK, the SIC, and the form type.

3.3 Disclosure Credibility

The Stanford-Cornerstone Securities Class Action Clearinghouse (SCAC) is a database of securities class action lawsuits filed in U.S. Federal courts. The database covers information such as the parties involved, allegations, filing dates, jurisdiction, and the lead plaintiff.

We use this data to create the 'alleged_fraud' indicator, which indicates if a firm had a class action lawsuit filed alleging violation of SEC Rule 10b-5 in the year after the 10-K filing date, or if the 10-K file date falls within the purported violation period reported in the 10b-5. The 10b-5 sample includes only firms accused of accounting fraud. The SCAC provides the case number, filing date, violation period, and other information for each 10b-5 lawsuit (Stanford Law School (2023)).

To generate the 'alleged_fraud' indicator, the Corporate Filings (10-K) dataset is first merged with the SCAC Filings database using CIK and year as the key. Then, for each 10-K observation, it is checked whether the 10-K file date falls within one year of the 10b-5 filing date or within the 10b-5 violation period. If either of these conditions is met, 'alleged_fraud' is assigned a value of 1. If not, 'alleged_fraud' is assigned a value of 0.

3.4 Merging Tables

The Stanford SCAC and Loughran-McDonald linguistic sets are merged on the CIK (Central Index Key) and year columns as join keys, as they uniquely identify a 10K filing in a given year. Successful matches are recorded, indicating cases where the company was involved in a securities class action lawsuit in the same year as the filing. The same process is repeated for the 'year + 1' case to capture cases where the lawsuit was filed in year after the filing.

To merge the ESG data with the previous dataframe, the data is reshaped by unpivoting the columns into rows. The long form ESG data is inner-joined with the previously joined table on both the CIK and year columns as join keys. This way, we obtain a final dataframe that contains the ESG performance, fraud incidence, and linguistic features for each 10K.

4 Model

In this section, we delve into the intricate landscape of ESG credibility assessment and its consequential influence on firm valuation. Our analysis is structured around two pivotal methodologies: a logistic regression approach to uncover deception within annual reports, and a difference-in-differences framework to estimate the impact of ESG credibility on market capitalization. We begin by defining ESG credibility and hypothesizing its positive correlation with stakeholder perceptions and company valuation. Leveraging linguistic analysis and prior literature, we construct a logistic regression model to identify linguistic markers indicative of deceptive language within corporate filings. Subsequently, we transition to estimating the influence of ESG credibility using the DID approach, necessitated by the potential endogeneity in ESG disclosures. Focusing on the Dodd-Frank Act as an exogenous shock, we explore how mandated ESG disclosures, particularly those related to conflict minerals, affect firm value. Crucially, our regression specification accounts for treatment status, post-mandate period, interaction effects, and control variables, ensuring robust estimation of ESG's impact on market capitalization.

4.1 Analyzing the Credibility of Corporate Filings

One of the key variables in this thesis is the credibility of ESG disclosures, which we define as the extent to which stakeholders perceive the ESG claims of a firm as truthful, comprehensible, complete, and balanced. We hypothesize that ESG credibility positively influences how stakeholders evaluate ESG performance metrics with respect to the valuation of a company.

Various methods have been used to measure the credibility of ESG disclosures, including surveys and content analysis. However, these methods suffer from low response rates, artificial settings, and subjective judgements. We make use of a logistic regression approach to infer whether there is deception within an annual report.

As described above, we utilize the SCAC dataset to identify annual reports accused of violations of SEC Rule 10b-5 (Stanford Law School (2023)).

Various linguistic features including quantity, affect, and uncertainty were extracted for each 10-K filing using the Loughran-McDonald sentiment word lists (Loughran and McDonald (2011)). Prior literature established that these linguistic attributes vary between fraudulent and non-fraudulent filings (Goel et al. (2010)). By employing logistic regression, we aim to construct a baseline model capable of distinguishing deceptive language patterns within annual reports. This approach enables us to quantify the influence of these linguistic characteristics on the probability of a given MDA being deceptive.

The logistic regression model is specified as follows:

$$P(Deception)_{i,t} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_{i,t})}} \tag{1}$$

where $P(Deception)_{i,t}$ is the estimated probability of the 10-K filing of firm i in year t being fraudulent, β_0 is the intercept term, β_1 is the vector of coefficients for the linguistic features $X_{i,t}$ and e is the base of the natural logarithm. We use this probability score as a proxy for the credibility of ESG disclosures.

The following is a transformation of the logistic regression that allows us to estimate the coefficients using linear regression techniques:

$$log(\frac{P(Deception)}{1 - P(Deception)}) = \beta_0 + \beta_1 X \tag{2}$$

4.2 Estimating the Influence of ESG Credibility

4.2.1 Dodd-Frank Wall Street Reform and the Special Disclosure

There is a potential endogeneity problem in this regression model, as the disclosure of ESG topics in the annual filing is mainly a voluntary activity within the United States. This means that the ESG scores and fraud probability scores may be correlated with unobserved factors that also affect firm value, such as management quality, corporate culture, or stakeholder pressure. To address this problem, we employ a difference-in-differences (DID) approach, which compares the changes in outcomes between two groups of firms: a treatment group that was affected by an exogenous shock or policy change and a control group that was not.

We use the 'Specialized Corporate Disclosure' provisions from the Dodd-Frank Wall Street Reform and Consumer Protection Act as this exogenous shock.

Title XV, Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act contains added Section 13(p) to the Securities Exchange Act of 1934, which requires registrants to "disclose annually whether any conflict minerals that are necessary to the functionality or production of a product of the firm, defined as those originating in the Democratic Republic of the Congo or an adjoining country, and if so, to provide a report describing, among other matters, the measures taken to exercises due diligence on the source and chain of custody of those minerals" (U.S. Securities and Exchange Comission (2010)). This includes a reasonable country of origin inquiry (RCOI) to determine whether such minerals may have originated in the DRC or an adjoining country. The firm must also perform due diligence measures aligning with the Organization of Economic Co-Operation and Development's "Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, Second Edition" OECD (2023). These guidelines cover all aspects of business responsibility, including human rights, labour rights, environment, bribery, consumer interests, competition, and taxation.

Firms report annually via Form SD ("Special Disclosures") for each calendar year; May 31, 2014 was the first filing deadline of Form SD covering the reporting period of January 1st through December 31st, 2013. If the registrant does source conflict materials, they will also be required to include, as an exhibit to Form SD, a Conflict Minerals Report (CMR) which provides additional detail. Beyond these disclosures, the rule requires that an independent private sector audit (IPSA) be obtained. Attached is Apple Inc.'s Form SD Filing for the reporting period of January 1st to December 31st, 2022.

We assume that the disclosure requirements of the Dodd-Frank Act increased the information content and credibility of ESG discussions for firms using conflict minerals (the treatment group) compared to firms in other industries (the control group).

4.2.2 Regression Specification

The DID model is specified as follows:

$$
\begin{aligned}
Q_{i,t} = &\beta_0 + \beta_1 TREAT_i + \beta_2 POST_t + \beta_3 TREAT_i \times POST_t \\
&+ \beta_4 TREAT_i \times POST_t \times PC\_ESG_t + \beta_5 P(Fraudulent)_t \\
&+ \beta_6 P(Fraudulent)_t \times PC\_ESG_t + \beta_7 X_t + \epsilon_t
\end{aligned} \tag{3}
$$

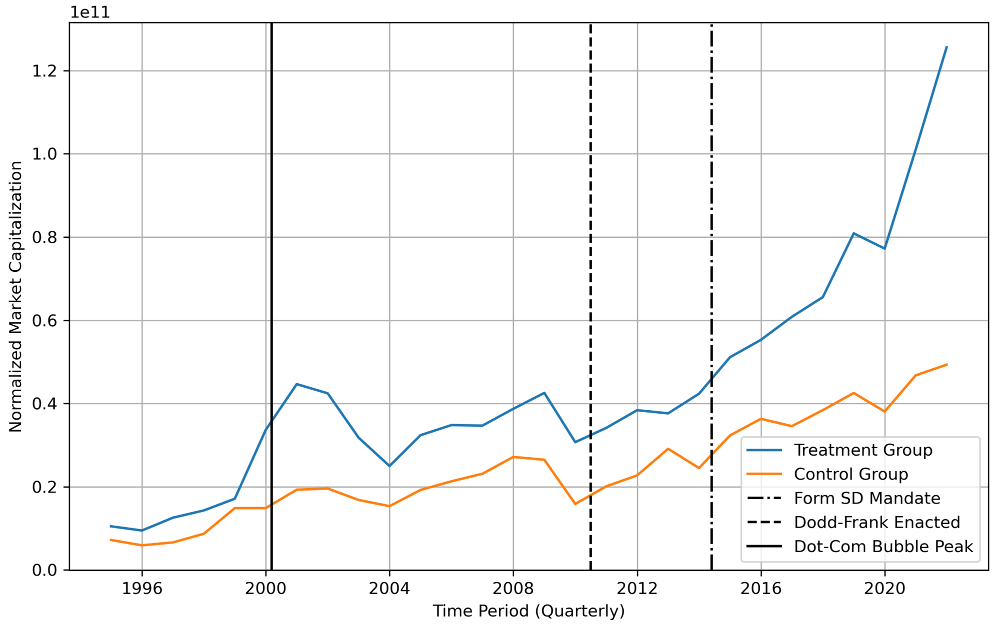
where Q_i is the market capitalization of firm i in year t, $TREAT_i$ is a dummy variable that equals 1 if firm i uses conflict minerals (is required to file form SD), $POST_t$ is a dummy variable that equals 1 if year t is after the mandate of Form SD filings and 0 otherwise, $TREAT_i x POST_t$ is the interaction term between treatment status and post-period status of firm i in year t, PC_ESG is the main principal component of the Refinitiv ESG Scores, $P(Fraudulent)_{i,t} \times PC\_ESG_{i,t}$ is the interaction between ESG performance principal component and the fraud probability scores, $X_{i,t}$ is a vector of control variables for form i in year t, β_0 is the intercept term, β_1 to β_7 are the coefficients to be estimated, and $\mu_{i,t}$ is the error term.

4.2.3 Assumptions for Diff-in-Diff

Parallel Trends The parallel trends assumption stipulates that, absent the intervention, the treated and control groups would have followed similar trajectories in the outcome variable of interest. In other words, any observed post-intervention differences between the groups can be confidently attributed to the intervention only if their pre-intervention trends were comparable.

In the context of Dodd-Frank, assigning any change in environmental performance solely to the Act's influence hinges on the assumption that, in its absence, both treated and control groups would have exhibited similar trends over time.

Figure 1: Market Capitalization



Visual inspection shows a significant divergence in market capitalization between those in the treatment group and the control group following exposure to the mandate. Relatively parallel trends exist prior to Dodd-Frank.

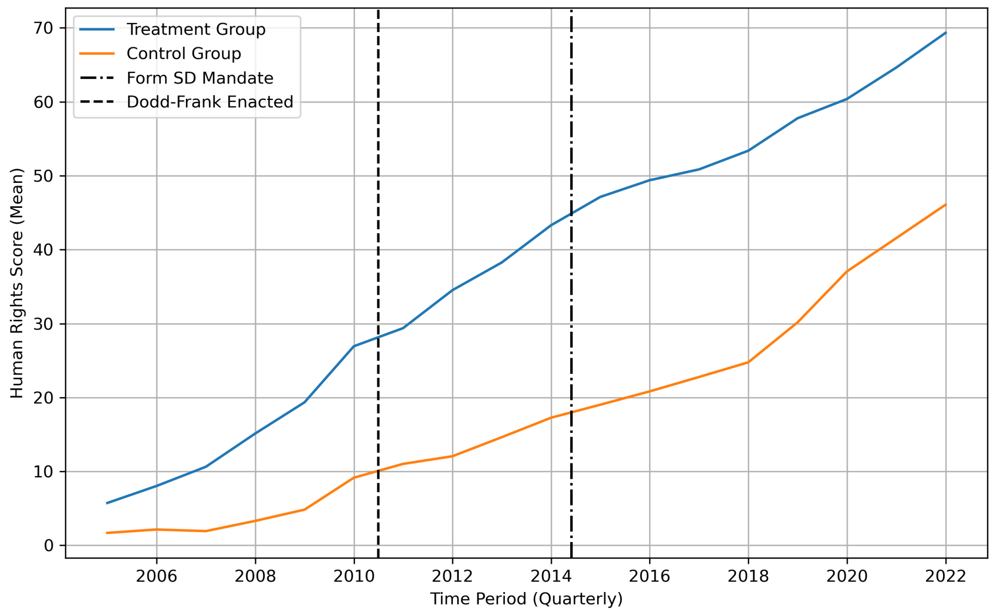
Visually inspecting time series plots of market capitalization for both groups (Figure 1), spanning the pre- and post-periods, provides a qualitative assessment of their trend divergence following the intervention. Additionally, the visual inspection offered preliminary support for parallel trends, suggesting comparable pre-intervention trajectories for both groups.

Table 2: Control Group Statistics Prior to Matching

	Mean	Median	Standard Deviation
Company Market Cap ($ Billions)	27.22	14.20	3.97
PC_E	-0.3257	0.0000	2.1311
PC_S	-0.3989	-0.3567	2.0511
PC_G	0.0240	0.0000	1.1875

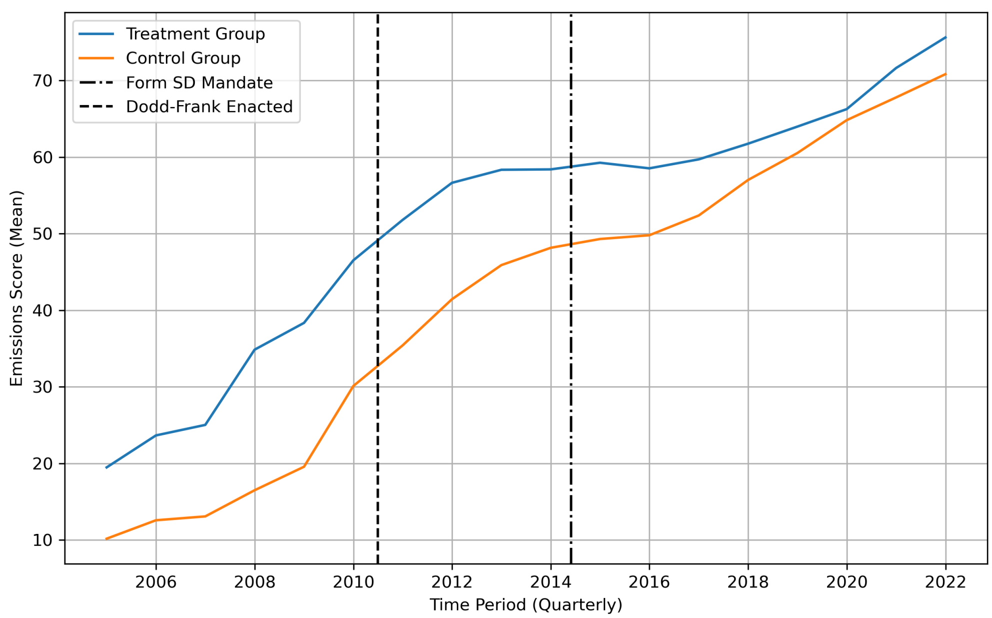
Exchangeable Random Variables We argue that the treatment and control groups satisfy the exchange-ability assumption as firms were not selectively targeted for the Form SD disclosure mandate based upon firm specific characteristics. The requirement applies broadly

Figure 2: Human Rights



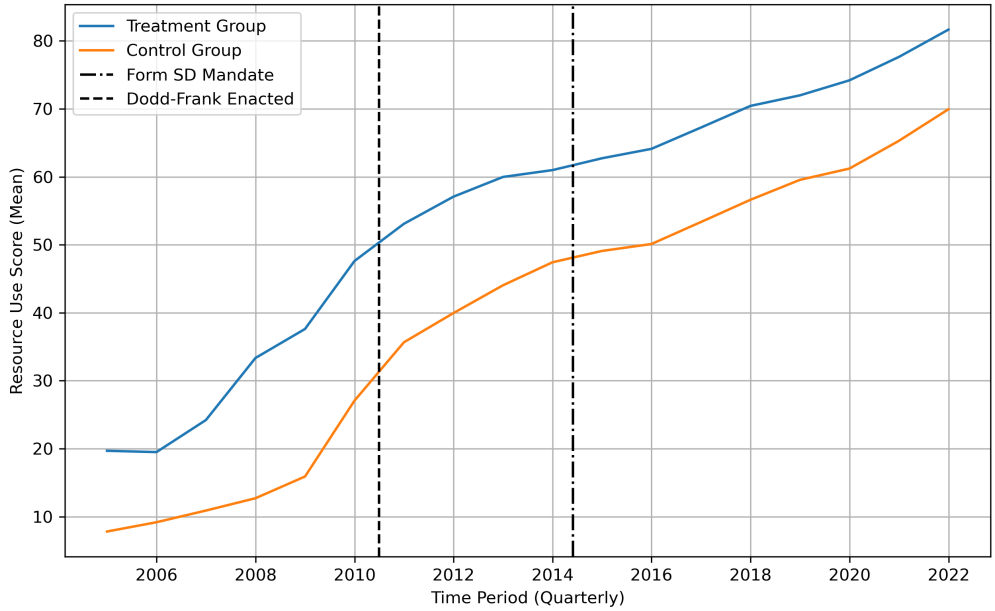
Minimal divergence is seen in the post-Dodd period, and increases in performance ratings can be assumed to be due to improvements with time.

Figure 3: Emissions



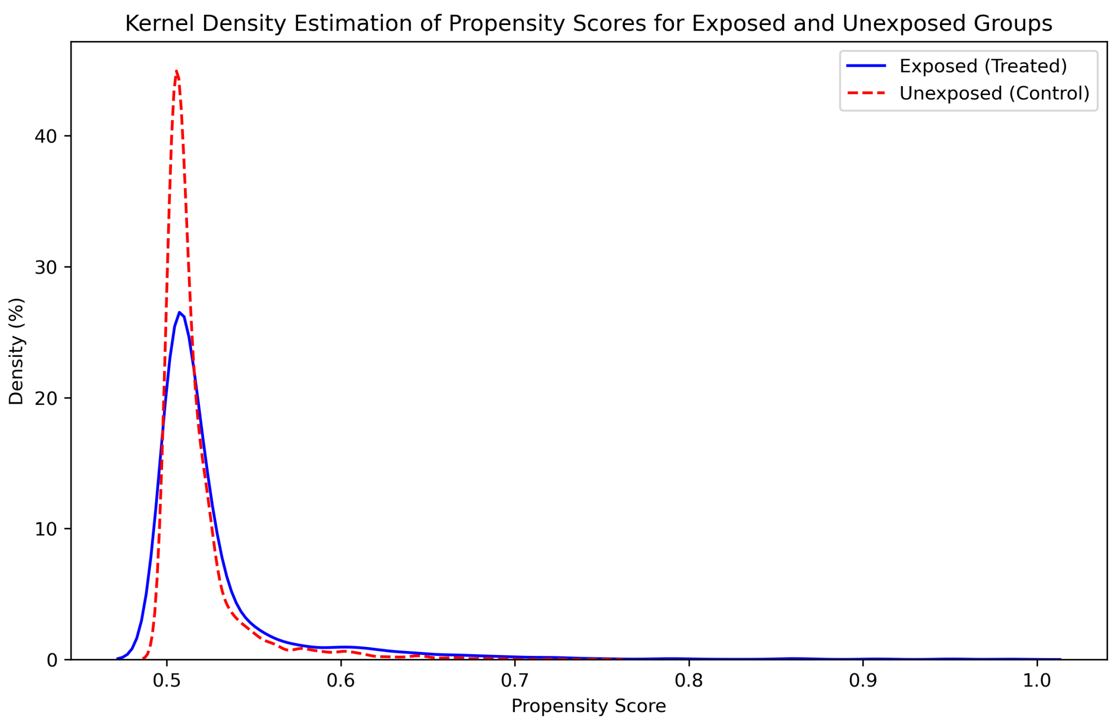
Minimal divergence is seen in the post-Dodd period, and increases in performance ratings can be assumed to be due to improvements with time.

Figure 4: Resource Use



Minimal divergence is seen in the post-Dodd period, and increases in performance ratings can be assumed to be due to improvements with time.

Figure 5: Kernel Density Estimation of Propensity Scores



Shows the distribution of propensity scores for the treatment and control groups following the application of propensity score matching. The kernel density estimation depicts the probability density of each score, allowing us to visualize overlap between groups.

Table 3: Treated Group Statistics Prior to Matching

	Mean	Median	Standard Deviation
Company Market Cap ($ Billions)	44.592	16.89	9.50
PC_E	0.0012	0.0000	2.1448
PC_S	0.0119	-0.0000	2.2111
PC_G	-0.0409	-0.0000	1.1870

Table 4: Control Group Statistics Post Matching

	Mean	Median	Standard Deviation
Company Market Cap ($ Billions)	27.22	14.19	3.96
PC_E	-0.3300	0.00	2.1310
PC_S	-0.3989	-0.3657	2.0511
PC_G	0.0240	0.0000	1.1875

to companies sourcing conflict materials, and it was included randomly within the wider omnibus Dodd-Frank Wall Street Reform Act. The companies span a range of industries and differ across size, profitability, governance, and other attributes both between and within the treatment and control groups. To further address potential differences, we control for detailed industry and year fixed effects in the regression specification. While we cannot rule out all possible confounding factors, we believe that it is reasonable to assume the treatment and control samples face broadly comparable conditions. Propensity score matching (PSM) was performed between units to create comparable groups based on observed pre-intervention characteristics (Figure 5).

Two SIC industry groupings, encompassing financial industries and electronics manufacturing, were homogeneous in their exposure to treatment. Dropping these observations and performing PSM for the observation of kernel densities validates the exchangeable random variables assumption.

Pre-matching statistics of Table 2 and Table 3 and revealed notable imbalances between the groups, which were particularly evident in the 'Company Market Cap' and 'PC_E' variables, where substantial differences existed in both mean and median values. However, fol-

Table 5: Treated Group Statistics Post Matching

	Mean	Median	Standard Deviation
Company Market Cap ($ Billions)	27.66	14.22	3.96
PC_E	-0.1700	0.0000	2.0900
PC_S	-0.1900	-0.0000	2.0800
PC_G	0.0100	-0.0000	1.1800

lowing the propensity score matching procedure, the post-matching statistics of Table 4 and Table 5 indicated a significant improvement in covariate balance. Specifically, the mean and median values of 'Company Market Cap' and 'PC_E' variables exhibited minimal differences between the treated and control groups, suggesting successful covariate balancing.

Positivity The inclusion of firms from both treatment and control groups with varying likelihoods of having to comply with the Form SD disclosure mandate reinforces the positivity assumption. This assumption posits that the probability of treatment (i.e., filing Form SD) is greater than zero for all units in the sample, given a set of observed covariates. In our study, the presence of firms across the spectrum of compliance likelihoods suggests that the decision to file Form SD was not solely determined by predetermined firm characteristics. Rather, it indicates a diverse range of factors, such as sourcing and manufacturing practices, that influenced firms' obligations to comply with the mandate. By including firms with differing probabilities of treatment, the PSM analysis ensures a more comprehensive assessment of the treatment effect, accounting for the heterogeneity within the sample and enhancing the robustness of our causal inference. Thus, the presence of firms across varying compliance likelihoods strengthens the validity of our findings and lends support to the assumption of positivity in our analytical approach.

4.2.4 Hypotheses Tested

his study investigates the interplay between ESG performance, disclosure credibility, and firm value. We posit three key hypotheses. First, we hypothesize that credible ESG disclosures, as measured through the linguistic analysis of 10-K filings, moderate the relationship between a firm's ESG performance and its market valuation. Specifically, we expect firms with strong ESG performance to experience a more pronounced positive impact on their market value when their ESG disclosures are perceived as credible. Second, we build upon existing research by examining the direct relationship between positive ESG performance and firm valuation. We anticipate a positive association, suggesting that firms with robust environmental, social, and governance practices are valued higher by the market. Finally, we hypothesize that the credibility of ESG disclosures positively influences investor perception of firm value. Firms that utilize more transparent and trustworthy language in their disclosures are expected to be viewed more favorably by investors, potentially leading to higher valuations.

5 Results

5.1 Linguistic Logistic Regression

The baseline approach to inference of misleading statements in corporate filings appeared to be somewhat relevant in accuracy. The overall predictive capability of this approach was quite low, given the number of observations included in the analysis (Table 6). Two of the six language categories, 'N_StrongModal' and 'N_WeakModal', were found to be statistically insignificant in the relationship. This makes intuitive sense as the definition of modality in this case implies usage that does not contribute additional context to the statement but rather emphasize the rhetoric created by the rest of the sentence. This baseline approach therefore draws from only a limited number of linguistic dimensions. An additional, perhaps more complex usage of the language could give more insight and therefore more power to the generated 'Probability of Deception' variable.

Table 6: Linguistic Logistic Regression Results

	(1)
	Deceptive Language Logit
N_Negative	97.86*** (5.149)
N_Positive	113.35*** (15.740)
N_Uncertain	89.63*** (11.90)
N_Litigious	38.12*** (3.74)
N_StrongModal	-9.57 (20.33)
N_WeakModal	13.30 (16.32)
Intercept	-8.52*** (0.153)
Observations	163280
Observed R^2	0.07193

5.2 Probability of Deception

Our analysis of deception probability and ESG scores (Table 7) yielded noteworthy findings. Firstly, companies mandated to file the specialized disclosure under Doff-Frank (Form SD Filers) exhibited a statistically significant 1% increase in the likelihood of using deceptive language in their filings compared to the control group. This seemingly counter intuitive result may require further investigation.

A silver lining emerges when we consider the post-Dodd-Frank period. There is a statistically significant decrease in the likelihood of deceptive language use for all companies compared to the pre-Dodd-Frank period. This suggests a potential overall decline in deceptive language use after the legislation's implementation, which is an encouraging sign.

Moving beyond the main effects, we delved into interaction effects to understand how ESG scores and Form SD filings may influence one another in relation to deception probability. Interestingly, no significant interaction was found between ESG scores and the post-Dodd-Frank period. In simpler terms, the impact of a company's ESG performance on the likelihood of deceptive language use did not change significantly after the introduction of the disclosure mandate. This finding suggests that the Dodd-Frank Act might not have directly influenced how companies use ESG scores to potentially mask deceptive practices.

However, a more nuanced relationship emerged when we examined the interaction between Form SD filing and social and governance scores. Companies mandated to file Form SD showed a reduced impact of increasing social scores on the likelihood of deceptive language.

5.3 Form SD and Market Valuation

We can see a strong and statistically significant benefit in valuation amongst those mandated who were to file the specialized disclosure with the SEC in the treatment period. Figure 1 identifies an exponential divergence in the market capitalization of exposed firms in the treatment period. Interestingly, we find minimal difference in many ESG outcomes between the treatment and control groups (Table 9). This implies that the mandated disclosure did provide the anticipated changes in the firms' environmental, social, and governance practices.

This raises questions about the effectiveness of legislative mandates as a tool for addressing corporate behavior. Investors might have reacted positively to the increased transparency in these areas, leading to the market capitalization increases seen, without necessarily expecting significant changes in ESG practices. The specialized disclosure by nature can be seen as a focus on disclosure, and not action. While Dodd-Frank mandates transparency regarding human rights activities, it does not require them to improve their actions or supply chains. Firms may be strategically using the disclosure to manage their public image, focusing on presenting a facade of good practices and transparency rather than implementing concrete changes in their operations that address human rights concerns.

The Form SD likely provided investors with more detailed and specific insights into the firm's operations and financial health. Investors may have gained a clearer understanding of the firm's risk profile and future prospects, leading to greater confidence in their investment decisions. It is also possible that the specialized disclosure might have signaled a commitment to good corporate governance and transparency, mitigating the perceived risk associated with investing in the firm. A key finding emerged when we examined the interaction between Form SD filing and the post-Dodd-Frank period. Companies mandated to file Form SD in the post-Dodd-Frank period experienced a strong increase in the benefits to market capitalization attained via filing compared to companies that filed Form SD earlier or companies not mandated to file at all. This suggests that the positive impact of Form SD filing on market valuation became more pronounced after the implementation of the Dodd-Frank Act. This finding aligns with the idea that investors might have placed a higher value on the increased transparency provided by Form SD disclosures in the post-regulatory environment.

An additional interaction between treatment in the post period and the principal components of the ESG scores gives an insignificant, negative impact on valuation. Firms with high ESG performance scores may already be well regarded by investors who prioritize such factors. The additional information from Form SD may have a less pronounced impact on their valuation as the market has already priced in the positive aspects of their ESG performance.

Another significant finding involved the positive influence of high ESG scores on a company's market capitalization; this was found to be boosted by the presence of potentially deceptive language in their filings. This is a counter intuitive finding that warrants further investigation. One possible explanation could be that some investors might be prioritizing short-term financial performance gains associated with a positive ESG image, even if the underlying practices are questionable. Additionally, the positive coefficients for both the social and governance principal components highlight that strong performance in these specific ESG areas is independently associated with higher market valuation.

Overall, these findings paint a complex picture of the factors influencing market capitalization. The increased market valuation associated with Form SD filing is particularly pronounced in the post-Dodd-Frank period, suggesting a potential investor preference for transparency. The positive interaction between deception probability and ESG scores requires further exploration to understand the underlying investor behavior.

6 Conclusion

There seems to be an argument in support of implementing additional safeguards for financial reporting. This study investigated the impact of mandatory disclosures imposed by the Dodd-Frank Act on firm valuation and ESG outcomes. While we observed a significant increase in market capitalization for firms mandated to file form SD, there was no corresponding change in reported ESG outcomes. This disparity suggests limitations in the effectiveness of disclosure-based approaches for addressing complex issues like human rights abuses.

Our findings highlight two key limitations of relying solely on disclosure mandates as safeguards. Primarily, weak enforcement mechanisms for inaccurate disclosures, coupled with the lack of detailed reporting standards, may allow corporations to manage their image through vague disclosures without addressing underlying concerns. Additionally, the synergistic relationship between deceptive language present in corporate filings and the benefits derived from high ESG ratings suggests a potential issue with investor behavior. Investors may be prioritizing short-term financial gains associated with a positive ESG image, even if their underlying practices are questionable. This could be due to a lack of awareness of potential deception or a focus on short-term financial metrics over long-term sustainability goals.

To effectively assess the potential for disclosures to encourage ESG-related improvements, a multifaceted strategy might be necessary. This could include comprehensive reporting standards, third-party audits, and increased investor activism that could push for concrete action plans. Comprehensive reporting standards would establish clear guidelines for companies to disclose their ESG practices, ensuring transparency and consistency across industries. Third-party audits would provide independent verification of companies' ESG disclosures, enhancing credibility and trust among stakeholders. Additionally, increased investor activism, such as shareholder resolutions and engagement efforts, could pressure companies to prioritize ESG issues and implement meaningful changes.

Further research can shed light on these alternative strategies and the limitations of disclosure-based approaches. Exploring the effectiveness of comprehensive reporting standards in driving ESG improvements, the reliability of third-party audits in verifying ESG disclosures, and the impact of investor activism on corporate behavior would provide valuable insights. Moreover, examining the challenges and barriers associated with these strategies, such as compliance costs, regulatory constraints, and stakeholder resistance, can inform policymakers, investors, and companies about the potential drawbacks and areas for improvement. By adopting a holistic approach and considering various mechanisms for promoting ESG practices, stakeholders can work towards achieving meaningful and sustainable outcomes in the realm of environmental, social, and governance issues.

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Table 10: **Summary Statistics: Firm ESG Performance Scores**

ESG Measurement	count	mean	std	min	25%	50%	75%	max
Community Score	5138	75.54	22.10	0.00	64.77	82.14	93.08	99.90
Corporate Responsibility Awards Score	5145	47.02	39.72	0.00	0.00	72.79	81.82	96.05
Emissions Score	5138	47.74	34.92	0.00	8.33	53.19	79.22	99.76
Environmental Controversies Score	5183	51.32	7.55	0.00	50.00	53.25	53.72	55.71
Environmental Innovation Score	5138	27.16	32.41	0.00	0.00	6.61	52.30	99.70
Environmental Supply Chain Management Score	5151	38.24	39.63	0.00	0.00	0.00	77.96	98.21
Fundamental Human Rights ILO UN Score	5151	16.03	34.22	0.00	0.00	0.00	0.00	98.68
Green Buildings Score	5099	38.36	43.73	0.00	0.00	0.00	87.36	99.25
Human Rights Contractor Score	5183	33.20	40.04	0.00	0.00	0.00	78.41	98.86
Human Rights Score	5138	28.28	34.45	0.00	0.00	0.00	59.36	99.02
Management Score	5138	59.90	26.53	0.35	39.35	62.61	82.95	99.98
Net Employment Creation Score	5175	47.37	26.25	0.18	25.73	46.32	67.41	99.73
Policy Bribery and Corruption Score	5183	57.82	24.08	0.00	58.82	63.72	70.05	97.50
Policy Business Ethics Score	5183	56.18	23.57	0.00	56.67	61.21	67.05	97.22
Policy Child Labor Score	5151	22.11	36.89	0.00	0.00	0.00	67.52	99.45
Policy Energy Efficiency Score	5183	47.07	34.56	0.00	0.00	65.79	73.33	97.37
Policy Fair Competition Score	5183	58.53	29.06	0.00	63.64	68.97	74.67	98.00
Policy Forced Labor Score	5183	20.88	36.03	0.00	0.00	0.00	64.86	99.66
Policy Human Rights Score	5151	23.21	37.65	0.00	0.00	0.00	72.36	99.56
Policy Water Efficiency Score	5151	41.86	40.00	0.00	0.00	65.22	79.95	98.44
Product Responsibility Score	5138	45.98	31.98	0.00	20.13	44.13	75.47	99.72
Resource Use Score	5138	48.34	35.89	0.00	4.69	54.32	82.00	99.89
Shareholders Score	5138	59.15	26.55	0.05	39.00	62.19	81.79	99.95
Wages Working Condition Controversies Score	5183	50.90	13.83	0.00	53.15	54.47	57.27	58.08
Workforce Score	5138	60.79	25.26	0.41	41.67	63.77	82.14	99.90

This table summarizes the environmental, social, and governance (ESG) performance scores for the firms included in this study. The scores encompass various aspects like a company's emissions score (environmental impact), environmental controversies score (history of environmental issues), and net employment creation score (social impact through job creation).

Table 7: **Deception Probabilities and Environmental Performance**

	Probability of Deception			
	(1)	(2)	(3)	(4)
Interactions:		ESG x Post	ESG x SD Filer	ESG x SD Filer x Post
Filer of Form SD	1.11*** (.025)	1.11*** (.025)	1.11*** (.025)	1.11*** (.025)
Post	-0.06* (.031)	-0.06* (.031)	-0.06* (.031)	-0.07* (.033)
PC_E	0.35*** (.036)	0.36*** (.037)	0.33*** (.036)	0.34*** (.037)
PC_E x {Interaction}	-	-8.306e-03 (.019)	-3.516e-03 (.021)	-0.01 (.017)
PC_S	-0.02 (.011)	-9.05e-03 (.015)	0.01 (.015)	-0.01 (.012)
PC_S x {Interaction}	-	-0.03 (.024)	-0.08*** (.023)	-0.05 (.033)
PC_G	0.03*** (.011)	0.02 (.018)	-0.02 (.015)	0.01 (.013)
PC_G x {Interaction}	-	0.03 (.023)	0.11*** (.022)	0.08*** (.026)
Observations	7226	7226	7226	7226
Observed R-Squared	0.021	0.021	0.024	0.021

The probability of deception for the 10K filing at year t (columns 1 - 4). All coefficients represent percentage points. The first column reports coefficients obtained without interactions upon 'PC E', 'PC S', and 'PC G'. Columns (2), (3), and (4) report specifications that interaction 'PC E', 'PC S', and 'PC G' with the scheme described in at each column head. These were calculated using non-robust covariance calculations. (*) p-value $\leq 0.05, (**)p-value \leq 0.01, (***)p-value \leq 0.001$

Table 8: **Relationship Between Market Capitalization, Environmental Performance, and Environmental Signaling**

	Normalized Market Capitalization
	(1)
Filer of Form SD	-3.33e-16 (0.10)
Post	0.1735*** (0.018)
Filer of Form SD x Post	0.0234*** (0.008)
Probability of Deception	-0.0210 (0.013)
Filer of Form SD x Post x Probability of Deception	-0.0094 (0.013)
Probability of Deception x PC_ESG	0.1647*** (0.017)
Filer of Form SD x Post x PC_ESG	-0.0490** (0.024)
PC_E	-0.0170 (0.020)
PC_S	0.1292*** (0.0190)
PC_G	0.0727*** (0.020)
Intercept	0.0418*** (0.010)
Observations	7222
Observed R^2	0.0226

The analysis leverages a DID framework to isolate the causal effect of Form SD filing on market value. This is achieved by comparing the change in market capitalization for firms that filed Form SD (treatment group) after the Dodd-Frank Act (post-treatment period) to the change in market capitalization for firms that did not file Form SD (control group) across both pre- and post-Dodd-Frank periods. The coefficients are based upon the standardization of the dependent variable, market capitalization in USD. Noteworthy findings include a strong positive impact of Form SD filing in the post-Dodd-Frank period, a positive interaction between deception probability and ESG scores, and significant positive coefficients for both social and governance ESG components. Control variables include year fixed effects, industry fixed effects, number of employees, debt-to-equity ratio, and liquidity. (*) p-value < 0.05, $(**)p-value < 0.01, (***)p-value < 0.001$

Table 9: **Environmental Performance**

	Environmental			Social			Governance		
	Emissions Score	Env. Controv	Resource Use	Human Rights UN Score	Bribery and Corruption	Workforce Score	Corporate Responsibility Awards	Management Score	Shareholders Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Filer of Form SD	18.75***	2.012***	21.38***	10.39***	7.37***	9.19***	11.95***	9.09***	3.33***
Post	34.87***	47.71***	35.10***	13.80***	53.29***	51.67***	37.87***	52.46***	54.84***
Electronics FF_Indx	11.13***	-0.40*	11.76***	5.34***	-0.680	7.69***	7.17***	2.96***	1.36***
Observations	7222	7222	7222	7222	7222	7222	7222	7222	7222
Observed R-Squared	0.362	0.323	0.348	0.187	.172	0.169	0.122	0.134	0.064

Table 11: ESG Performance Measurements

Description	Category	Quality Name
Environmental	Emissions Score	Measures the company's exposure to and management of emissions-related issues, such as greenhouse gas emissions, air quality, carbon footprint, etc.
Environmental	Environmental Controversies Score	Measures the company's involvement in environmental controversies and the severity and frequency of such events.
Environmental	Environmental Innovation Score	Measures the company's commitment and effectiveness in developing environmentally beneficial products, services and technologies, as well as its expenditures and performance in research and development.
Environmental	Environmental Supply Chain Management Score	Measures the company's policies and practices to ensure that its suppliers comply with environmental standards and adhere to sustainable sourcing principles.
Environmental	Green Buildings Score	Measures the company's efforts to design, construct and operate buildings that have a reduced environmental impact and enhance human health and well-being.
Environmental	Policy Energy Efficiency Score	Measures the company's policies and targets to improve its energy efficiency and reduce its energy consumption and intensity.
Environmental	Policy Water Efficiency Score	Measures the company's policies and targets to improve its water efficiency and reduce its water consumption and intensity.
Environmental	Resource Use Score	Measures the company's exposure to and management of resource-related issues, such as energy use, water use, waste generation and disposal, etc.
Social	Community Score	Measures the company's commitment and effectiveness in supporting the economic and social development of the communities where it operates, as well as its charitable contributions and volunteer
Social	Fundamental Human Rights ILO UN Score	Measures the company's adherence to the fundamental human rights principles and standards as defined by the International Labour Organization (ILO) and the United Nations (UN), such as the Universal Declaration of Human Rights, the UN Guiding Principles on Business and Human Rights, the ILO Declaration on Fundamental Principles and Rights at Work, etc.
Social	Human Rights Contractor Score	Measures the company's policies and practices to ensure that its contractors and subcontractors respect human rights and labor standards, and to monitor and address any violations or abuses.
Social	Human Rights Score	Measures the company's exposure to and management of human rights-related issues, such as discrimination, harassment, privacy, freedom of expression, etc.
Social	Net Employment Creation Score	Measures the company's contribution to job creation, based on its net change in employee numbers, employee turnover rate, and use of temporary and part-time workers.
Social	Policy Bribery and Corruption Score	Measures the company's policies and practices to prevent, detect and combat bribery and corruption, both internally and externally, as well as its compliance with relevant laws and regulations.
Social	Policy Child Labor Score	Measures the company's policies and practices to prohibit and eliminate the use of child labor in its operations and supply chain, as well as its compliance with the ILO Minimum Age Convention.
Social	Policy Fair Competition Score	Measures the company's policies and practices to ensure fair and ethical competition in the markets where it operates, as well as its compliance with antitrust and competition laws and regulations.
Social	Policy Forced Labor Score	Measures the company's policies and practices to prohibit and eradicate the use of forced labor, slavery and human trafficking in its operations and supply chain, as well as its compliance with the ILO Forced Labour Convention and the UN Protocol to Prevent, Suppress and Punish Trafficking in Persons.
Social	Policy Human Rights Score	Measures the company's policies and practices to respect and protect human rights in its operations and supply chain, as well as its alignment with the UN Guiding Principles on Business and Human Rights and other relevant frameworks and standards.
Social	Product Responsibility Score	Measures the company's exposure to and management of product-related issues, such as product safety, quality, reliability, customer satisfaction, etc.
Social	Wages Working Conditions Controversies Score	Measures the company's involvement in controversies related to wages and working conditions, such as low pay, excessive working hours, poor health and safety, etc., and the severity and frequency of such events.
Social	Workforce Score	Measures the company's commitment and effectiveness in managing its human capital and ensuring the well-being, development and satisfaction of its employees.
Governance	Corporate Responsibility Awards Score	Measures the company's recognition and reputation for its corporate responsibility and sustainability performance, based on the number and quality of awards, ratings and certifications it has received from credible and independent organizations.
Governance	Management Score	Measures the company's governance structure, policies and practices, as well as the composition, diversity and independence of its board of directors and senior management.
Governance	Policy Business Ethics Score	Measures the company's policies and practices to ensure ethical conduct and decision-making in its business activities, as well as its compliance with relevant laws and regulations.
Governance	Shareholders Score	Measures the company's respect for and protection of the rights and interests of its shareholders, as well as its disclosure and communication practices.

Table 12: Linguistic Measurements of 10K Filings

Column	Description
N_Negative	the number of words that have a negative connotation or sentiment, such as "bad", "loss", "risk", "decline", etc. These words can indicate pessimism, dissatisfaction, or problems in the company's performance or outlook.
N_Positive	the number of words that have a positive connotation or sentiment, such as "good", "gain", "opportunity", "increase", etc. These words can indicate optimism, satisfaction, or achievements in the company's performance or outlook.
N_Uncertainty	the number of words that indicate uncertainty or ambiguity, such as "may", "could", "possible", "estimate", etc. These words can reflect the degree of confidence or precision in the company's information or projections.
N_Litigious	the number of words that relate to legal matters or disputes, such as "lawsuit", "liability", "violation", "allegation", etc. These words can signal the potential or actual involvement of the company in legal issues or conflicts.
N_StrongModal	the number of words that express a high degree of certainty or obligation, such as "must", "will", "shall", "require", etc. These words can indicate the firmness or commitment of the company's statements or actions.
N_WeakModal	the number of words that express a low degree of certainty or obligation, such as "might", "can", "should", "expect", etc. These words can indicate the flexibility or contingency of the company's statements or actions.

Note: These are generated for each 10K filing sourced from the SEC, using the dictionaries described above. The sentiment dictionaries can be found here.

Table 13: Non-Linguistic 10K Filings Data Columns

Column	Description
CIK	the SEC Central Index Key
FILING_DATE	the filing date for the form
ACC_NUM	the EDGAR assigned identifier unique to each submission
FORM TYPE	the specific form type (e.g. 10-K, 10-K/A, 10-Q405, etc.)
CoName	Company Conformed Name
SIC	the Standard Industrial Classification numerical code reported in the header of the filing that categorizes firms based on their business activities
FF_Ind	the Fama-French 48 industry classifiction based on the SIC number
N_Words	the count of all words, where a word is any token appearing in the McDonald Master Dictionary