Investor ESG Sentiment and Stock Returns: Media Coverage's Mediating Role

Gustavo Dantas* Bin Dong†

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Abstract

This study investigates how ESG-related media coverage influences stock returns, comparing investor responses during the stable market of 2019 and the COVID-19 crisis in 2020. Using data from S&P 1500 firms and MarketPsych, we find that ESG media attention significantly shapes investor behavior, with stronger effects during periods of uncertainty. Negative ESG coverage – especially in headlines – correlates with lower returns during crises, reflecting heightened investor risk aversion. In contrast, detailed news articles positively influence returns under normal conditions, while social media shows minimal impact. ESG controversies also have a more persistent negative effect during crises. These findings highlight the importance of media narratives in ESG analysis and investment strategy, particularly when traditional financial signals are less reliable.

Keywords: Socially Responsible Investment, Social Media, ESG, Score, Buzz, Behavioral Finance.

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*Universidade de São Paulo. Email: gustavogdantas@usp.br.
†Maastricht University. Email: b.dong@maastrichtuniversity.nl.

1 Introduction

The integration of Environmental, Social, and Governance (ESG) considerations into investment strategies has expanded rapidly in recent years, reflecting a broader transition toward sustainable finance. Between 2019 and 2022, assets managed using sustainable investment strategies surged by 78%, rising from $17 trillion to $30.3 trillion (Alliance (2022)). Despite ongoing geopolitical tensions and economic volatility, global ESG assets are projected to reach $40 trillion by 2030 (Bloomberg (2024)). This remarkable growth highlights the increasing importance of ESG indicators in financial decision-making and has spurred extensive research into their implications for investment performance.

However, the relationship between ESG factors and stock returns remains complex. ESG's influence is mediated through multiple channels—including ESG scores, regulatory benefits, risk mitigation, activist investor participation, and ESG-driven value creation – which have been well-documented in the literature (e.g., Dimson et al., 2015; Albuquerque et al., 2018). One persistent challenge in this domain is the divergence in ESG ratings across providers, which raises concerns about their reliability and consistency as standardized indicators of corporate sustainability (Berg et al. (2022)). Such inconsistencies complicate investor decision-making and introduce ambiguity regarding the financial materiality of ESG factors. Moreover, empirical studies offer mixed evidence on the financial consequences of ESG integration. While some research suggests positive, negative, or mixed effects of ESG on stock returns (e.g., Friede et al., 2015; Darolles et al., 2023; Margolis and Walsh, 2003; Peloza, 2009; Aguinis and Glavas, 2012; Eccles et al., 2014; Buchanan et al., 2018; Atz et al., 2023; Saini et al., 2023; Manuel Ammann, 2019), other studies find no significant relationship (e.g., Revelli and Viviani, 2015; Alves et al., 2025), underscoring the need to explore underexamined mechanisms that may influence ESG's impact on financial markets.

From a behavioral finance perspective, an expanding body of literature has explored how cognitive biases and heuristics shape investor perceptions, sentiments, beliefs, and ultimately, investment decisions (e.g., Kliger and Kudryavtsev, 2010; Chieh-Shuo et al., 2017; Abdin et al., 2017; Floros and Gavrilakis, 2022). While earlier work primarily focused on risk perception (e.g., Jordan and Kaas, 2002; Hoffmann et al., 2015), more recent studies have investigated how perceptions of ESG performance influence investment attitudes and intentions (e.g., Zhang et al., 2024; Park and Jang, 2021; Roman Kräussl, 2024). Yet, critical mechanisms through which ESG considerations shape investor beliefs remain insufficiently explored—particularly the mediating role of media in the perception formation process.

Given the centrality of information perception in investor decision-making, a deeper examination of how ESG-related media content influences belief systems is essential. Drawing on Dretske (2000) framework—where perception involves the acquisition of information, cognition its processing, and belief the result of aggregated perceptions—this study posits that investor ESG perceptions, like risk perceptions, are shaped by informational

cues. ESG-related media narratives may therefore play a significant role in influencing how investors assess firms and make allocation decisions. This research aims to investigate this pathway, focusing on how ESG media content affects perception, belief formation, and ultimately, investment behavior.

In particular, we examine the behavioral mechanisms through which ESG-related media exposure impacts stock market dynamics. The COVID-19 pandemic provides a unique empirical context: a major exogenous shock that many researchers have leveraged to examine financial markets under heightened uncertainty (e.g., Baker et al., 2020; Morales and Andreosso-O'Callaghan, 2020; Onali, 2020). Studies during this period have also explored ESG performance and resilience (e.g., Broadstock et al., 2021; Albuquerque et al., 2020; Demers et al., 2021; Hoang et al., 2020). Building on this literature, our study investigates how ESG-related media coverage affects investor perceptions and stock returns across two distinct market conditions: the pre-COVID period (2019) and the COVID crisis period (2020). This comparison allows us to assess whether heightened uncertainty amplifies the influence of ESG media narratives on financial outcomes.

Using data from the Refinitiv MarketPsych platform—covering media sentiment and ESG controversy metrics—combined with ESG ratings from MSCI and Refinitiv, we address the following research questions:

Q.1. *How do investors' ESG-related perceptions, influenced by media, affect stock returns in stable (non-crisis) market conditions?*

Q.2. *To what extent do different media channels shape these perceptions during stable periods?*

Q.3. *How did the COVID-19 crisis alter the relationship between ESG perceptions and stock returns?*

Q.4. *Did the influence of media on ESG perceptions differ under conditions of heightened uncertainty?*

Our findings contribute to the ESG literature by demonstrating that media-driven ESG perceptions significantly affect stock returns, particularly during periods of crisis. We find that negative ESG coverage—especially in traditional news headlines—has a stronger impact on investor behavior under market stress, while social media plays a more limited role. Additionally, we uncover a temporal dimension: ESG controversies exert a more persistent influence on returns during crises compared to stable periods.

By bridging the gap between ESG rating divergence and media influence, this study offers new insights into how investors process ESG-related information under different market environments. Our results suggest that media narratives are critical in shaping ESG perceptions, especially when conventional financial signals are clouded by macroeconomic uncertainty.

2 Data and Methodology

Building on the framework introduced in the previous section, this study investigates how investor perceptions—shaped by ESG-related media content—influence stock returns under varying market conditions. Specifically, we examine two distinct periods: the pre-COVID year (2019), representing a stable market environment, and the COVID year (2020), characterized by heightened uncertainty and global disruption. Additionally, we analyze the combined period (2019–2020) to capture broader and potentially persistent trends.

This section presents an overview of the data sources, followed by a discussion of the methodological approach used to evaluate the relationship between ESG media exposure, investor perception, and stock performance.

2.1 Data Sources

The empirical analysis relies on three main datasets[1]: Refinitiv's Market-Psych for media content data and both Refinitiv (via Thomson Reuters Eikon) and MSCI (Morgan Stanley Capital International) for ESG Scores, all sourced from FactSet. The selection of MSCI and Refinitiv indicators aligns with standard industry practices and established academic literature (Dorfleitner et al. (2015); Nagy et al. (2016)). Both providers are widely recognized for their credibility and influence within the investment community, ensuring robust and reliable data.

2.1.1 Media Appearance Data

As this study centers on media-driven investor perceptions, the primary dataset utilized is Refinitiv MarketPsych Analytics, which applies natural language processing (NLP) techniques to analyze both the textual and contextual dimensions of news and social media. We focus on three key variables derived from this dataset that represent different aspects of firm-level media presence: Buzz, ESG Controversies, and Mentions.

The Buzz variable serves as a proxy for media attention, quantifying the number of ESG-related references made to a specific firm across various media sources. To capture the diversity of information channels that may shape investor perceptions, we differentiate three distinct types of Buzz:

1. Buzz in Social Media – ESG mentions appearing in social media posts.

2. Buzz in News Articles – ESG mentions located within the body of news stories.

3. Buzz in News Headlines – ESG mentions appearing in the headlines of news items.

[1]For details, see https://www.msci.com/research-and-insights/visualizing-investment-data/esg-ratings-how-are-companies-scored and https://www.lseg.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf.

In addition to these components, we include an Overall Buzz measure, which aggregates ESG-related word and phrase occurrences from all media sources, including those beyond the specified categories. Buzz values are continuous and may be non-integer due to the weighting methodology applied by MarketPsych's NLP engine. For instance, the presence of a "minimizer" word—such as "less" in "less concerned"—reduces the intensity score of the associated term. Importantly, Buzz is a volume-based metric and does not distinguish between positive and negative sentiment.

To complement the sentiment-neutral Buzz metric, we incorporate the ESG Controversies score. This variable captures a firm's negative ESG media exposure and is scaled from 0 to 100. The score reflects the aggregate volume of news reports highlighting violations of environmental, social, or governance principles. A higher score indicates more frequent or more severe ESG-related controversies reported in the media and thus serves as an important indicator of reputational risk.

The Mentions variable captures the total number of times a firm is referenced across all forms of media—regardless of ESG relevance. While this measure does not isolate ESG-specific content, it offers a useful control for general media visibility. Notably, the Buzz score is typically higher than the Mentions score for a given firm, as a single mention may contain multiple ESG-related keywords or phrases, increasing the Buzz value disproportionately.

The definitions and calculations of these variables are detailed in Table 1, and their distributions—specifically for ESG Controversies and Mentions—are presented in Appendix B.4.

All metrics provided by the Refinitiv MarketPsych database are derived from MarketPsych Data's proprietary NLP engine, which processes millions of news and social media items daily from thousands of global sources. Media content is categorized into three channels for analysis: News, Social Media, Combined Content (News and Social Media).

Press releases are excluded from all categories. While the database offers full media coverage dating back to 1998, this study focuses exclusively on content from 2019 and 2020 to match the designated timeframes for empirical analysis.

Until February 2020, MarketPsych included only English-language content in its processing engine. From that point onward, it expanded coverage to incorporate real-time machine translation for Arabic, Chinese, Japanese, and Portuguese news sources.

For the News data, MarketPsych draws from Reuters and other major international media outlets, with Internet-based news sources added in 2005 via LexisNexis. This inclusion is limited to leading financial and ESG publications. For Social Media, content has been collected since 2008, also via LexisNexis, and was later expanded to include Twitter posts. The dataset includes the top 20% of blogs and microblogs related to finance and ESG, selected based on popularity metrics and relevance.

2.1.2 ESG Score Data

The second key data source is the Refinitiv ESG database, which evaluates firms' performance, commitment, and effectiveness across the three primary pillars of environmental (E), social (S), and governance (G) responsibility. Refinitiv provides two ESG assessment frameworks: the Refinitiv ESG Rating and the Refinitiv ESG Score. This study utilizes the Refinitiv ESG Score, a composite score ranging from 0 to 100 that aggregates firm performance across the E, S, and G dimensions.

The ESG Score is derived from ten thematic categories:

1. Environmental: resource use, emissions, and innovation;
2. Social: workforce, human rights, community engagement, and product responsibility;
3. Governance: management, shareholder practices, and corporate social responsibility (CSR) strategy.

These indicators are based on publicly reported company data and third-party sources, systematically compiled and scored by Refinitiv. In our analysis, the Refinitiv ESG Score is employed as the primary ESG performance measure in the core empirical results.

Additional descriptive statistics are provided in Table Table A.6 in the Appendix, which summarizes industry classifications, the number of firms in each industry, and their corresponding mean ESG Scores from both Refinitiv and MSCI, alongside the Overall Buzz metric. The distributions of ESG Scores across firms, visualized in B.1, show that both Refinitiv and MSCI scores are approximately normally distributed.

To validate the robustness of our findings, we also incorporate MSCI ESG Scores as a secondary benchmark. Unlike Refinitiv's 0–100 scale, MSCI scores companies on a 0–10 scale, assessing their exposure to ESG risks and their capacity to manage those risks relative to industry peers.

MSCI evaluates ESG performance across three main categories, each with multiple subcomponents:

1. Environmental (E): climate change, environmental opportunities, natural capital, pollution, and waste;
2. Social (S): human capital, product liability, social opportunities, and stakeholder opposition;
3. Governance (G): corporate governance, corporate behavior, and public policy engagement.

MSCI ESG Scores are constructed using a combination of public disclosures and proprietary analyst-driven research, and have been widely adopted in academic and industry research for their rigor and consistency.

In this study, MSCI scores are used exclusively in the Robustness Tests section to verify the consistency of results obtained using Refinitiv scores. This dual-score approach helps address concerns about ESG rating divergence across providers and strengthens the credibility of our findings.

2.1.3 Data Structure

The dataset used in this study integrates ESG-related media and rating data from MarketPsych and MSCI, covering the period 2019 to 2020. This time frame is particularly relevant as it captures the transition from a stable market environment (2019) to a period of elevated uncertainty triggered by the COVID-19 pandemic (2020). The pandemic, widely regarded as an exogenous shock to global financial markets, provides a quasi-natural experiment that allows us to examine how investor perceptions and market behavior shift in response to systemic risk.

Our sample is restricted to publicly listed U.S. companies, which represent a substantial portion of global market capitalization. Focusing on a single national context helps minimize confounding effects due to country-specific legal, institutional, or ESG-reporting differences. After excluding firms with incomplete data for any key independent variable over the two-year window, the final dataset comprises 1,262 U.S.-based firms. The primary variables in our analysis—*ESG*, *ESG_ Controversies*, *Buzz*, *Mentions*, and *Return* (the dependent variable)—are measured on a monthly basis, whereas financial control variables such as *Momentum* (sourced from Refinitiv), *Total_ Equity*, and *Market_ Value* are reported annually.

Table 1 provides a summary of the key characteristics of the dataset spanning the years 2019 to 2020, offering insights into the composition and attributes of the U.S. firms analyzed. A central focus is placed on MarketPsych's Buzz variables, which capture firm-level media attention across four dimensions: Overall Buzz, News Buzz, Social Media Buzz, and Headline Buzz. These indicators reflect the frequency and breadth of ESG-related mentions in media content.

Descriptive statistics reveal substantial cross-sectional variation in Buzz values, indicating heterogeneous levels of media visibility across firms. The distribution of Overall Buzz exhibits a strong positive skew, with most firms receiving relatively low media coverage and a small number of firms attracting disproportionately high attention. This pattern is visualized in 1(a) and further disaggregated by media channel in Appendix B.3.

To enhance interpretability and mitigate skewness in the distribution, we apply a natural logarithmic transformation to Overall Buzz. As shown in 1(b), the log-transformed variable approximates a normal distribution, making it more suitable for statistical modeling and comparison across firms.

Consistent with prior discussion, Overall Buzz serves as a strong proxy for a firm's media visibility, particularly in the context of ESG-related narratives. Its behavior during

the sample period reinforces the role of media attention as a potentially influential factor in shaping investor perceptions and, ultimately, stock performance.

Similarly, the Mentions variable exhibits a positively skewed distribution, indicating that most firms receive limited media attention, while a small number of outliers experience substantially higher coverage. Given that Buzz represents a count of ESG-related terms within firm-specific media mentions, it is expected that both variables demonstrate similar distributional characteristics, reflecting the concentration of media attention among a subset of firms.

In contrast, the ESG Controversies score displays a more balanced and symmetric distribution, more closely resembling a normal distribution. This variable ranges from 0 to 100 and captures the intensity of negative ESG-related media exposure. Its more even distribution suggests that, unlike media visibility, reputational controversies are less concentrated and more evenly spread across firms during the sample period.

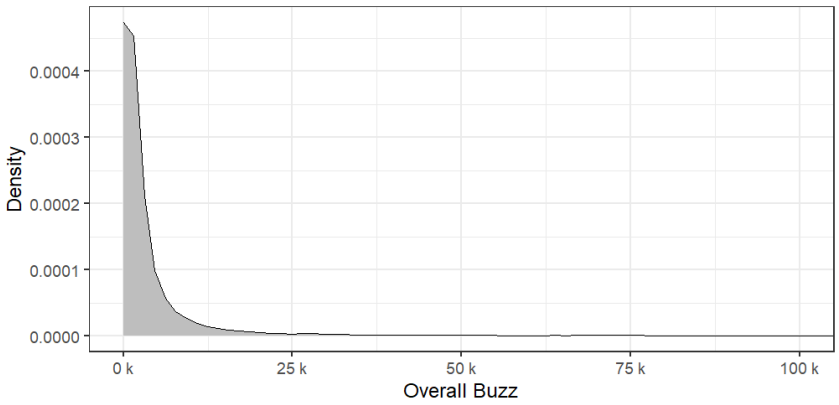
The ESG Scores, both from Refinitiv and MSCI (industry-adjusted), suggest that firms in the sample generally demonstrate strong sustainability practices, though notable variability across firms remains. The distributions of these scores are presented in B.1, reflecting differences in ESG performance even within similar industry contexts. In terms of financial characteristics, variables such as Total Equity, Market Value, and Momentum exhibit substantial heterogeneity, highlighting the broad range of firm sizes and financial profiles represented in the dataset. Additionally, firm-level returns show significant dispersion, capturing the dynamic performance landscape during the 2019–2020 period, which includes both pre-pandemic stability and pandemic-induced market volatility. These descriptive statistics emphasize the diversity in firm characteristics, which is essential for our regression analysis. Accounting for this variability allows us to more accurately identify the differential impact of ESG-related media content and ratings on stock performance under varying market conditions.

Table 1: Summary Statistics

This table presents the summary statistics of the key variables used in our analyses. N denotes the number of non-missing observations for each variable. The mean and standard deviation are calculated based on these observations. The variable values are reported at the 25th, 50th (median), and 75th percentiles of their respective distributions.

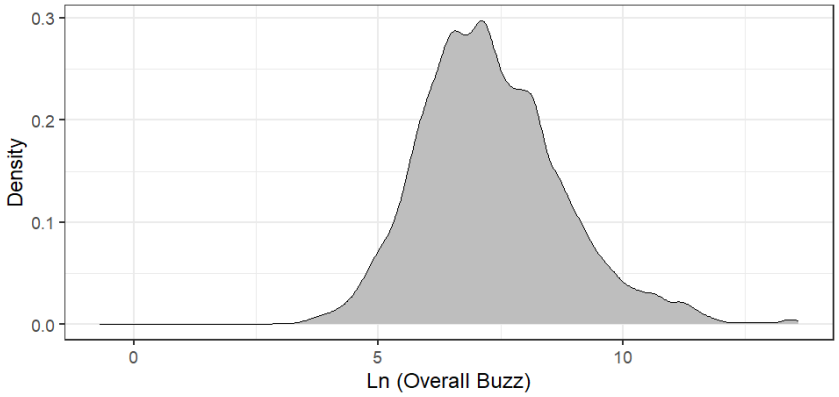
Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Median	Pctl(75)	Max	Skew
Total Equity 2018	30276	6328.4	19542.0	-10739.0	615.6	1493.6	4518.7	265325.0	8.1
Total Equity 2017	30288	6157.7	19178.0	-10230.0	579.8	1416.9	4281.5	267146.0	8.2
Market Value 2018	30288	17954.5	55373.2	142.7	1508.4	3582.5	12267.5	779673.5	8.7
Market Value 2017	30288	19517.3	56647.5	275.3	1760.1	4109.1	14113.4	860882.5	8.0
Market Psych's Buzz - Overall	30288	7097.7	37743.0	0.5	547.2	1296.2	3575.7	795693.6	14.8
Market Psych's Buzz - News	30200	124.0	616.7	0.0	23.6	44.2	82.0	33702.4	20.4
Market Psych's Buzz - Social Media	30288	65.9	372.0	0.0	7.2	13.2	30.2	20539.0	21.0
Market Psych's Buzz - News Headlines	29600	7.2	25.9	0.0	1.8	3.5	6.5	2007.2	28.3
Mentions	30288	34.5	160.7	1.0	6.6	10.5	19.8	8040.2	19.6
ESG Controversies	30288	44.7	20.7	1.0	28.7	45.0	60.5	100.0	-0.2
Refinitiv's ESG Score	30288	63.7	16.4	8.9	52.3	64.8	76.7	98.0	-0.3
MSCI's Industry Adjusted ESG Score	30192	4.6	1.9	0.0	3.1	4.4	5.9	10.0	0.2
Momentum	30288	6.7	30.7	-82.8	-11.3	4.0	22.1	402.8	1.8
Return	30288	2.4	14.1	-83.2	-4.2	-4.2	8.2	295.3	1.5

We also considered a more restrictive version of the dataset, comprising 978 U.S.



Panel (a): Refinitiv Overall Buzz's Distribution

Note: This panel illustrates the distribution of Overall Buzz. On the X axis we can see each value adopted by that variable and on the Y axis the density of that value. Overall Buzz is a highly right skewed (skeweness measures the asymmetry of a distribution) distribution, with a strong right tail. The visual impact of extreme outliers has been removed by limiting the x-axis range to the 100k threshold. It is inferable that *Buzz* is highly unequal among companies, which is natural considering that news appearance is highly related to a firm's size or visibility in the public eye.



Panel (b): Refinitiv Ln(Overall Buzz) Distribution

Note: This panel illustrates the distribution of the natural logarithm of Overall Buzz. The transformation significantly reduces the skewness, making the distribution closer to normal and mitigating the visual influence of extreme values.

Figure 1: Distribution of Overall Buzz

firms, which excludes any company with missing data for any variable in any month during the 2019–2020 study period. This tighter profile offers a balanced panel, ensuring complete monthly observations across all variables. However, given the relatively limited drawbacks of using an unbalanced panel and the fact that the larger sample of 1,262 firms yields higher R-squared and adjusted R-squared values, we proceed with the full dataset as our primary sample for analysis. This approach allows us to retain greater statistical power and maintain broader generalizability without sacrificing model performance.

2.2 Econometric Model

The variable $Return_{t,i}$ is obtained from FactSet along with Refinitv's and MSCI's ESG Scores, and remains as the dependent variable in the model below. It measures the monthly return of each firm's stock where i indexes the firms in our sample and t denotes the latter's month on which we observe the relation. $\varepsilon_{t,i}$ represents the term for time-varying unobserved factors while μ_i is the sum of all unobserved time-invariant factors, or simply, the individual specific term.

As independent variables to our base equation (1) we use a control vector ($C_{t,i}$) composed by the following control variables, as shown in Equation (2): $Longterm\_Book\_Value\_Avg_{t,i}$, $Market\_Value\_2018_i$, $Total\_Equity\_2018_i$, $Market\_Value\_2017_i$, $Total\_Equity\_2017_i$ and $Momentum_{t,i}$. MSCI's $Momentum_{t,i}$ represents the tendency of a stock to continue its current trajectory and it is calculated by and obtained through MSCI's database. Our main independent variables of interest are included in $X^v_{t,i}$, which is our representation of vector of interest, compounded by measures of *Buzz*, and other media measures: $ESG\_Controversies_{t,i}$, $Mentions_{t,i}$ and $ESG\_Score_{t,i}$.

$$Return_{t,i} = \beta X^v_{t,i} + \delta C_{t,i} + \mu_i + \varepsilon_{t,i} \tag{1}$$

$$C_{t,i} = Longterm\_Book\_Value\_Avg_{t,i} + Market\_Value\_2018_i + Total\_Equity\_2018_i + Market\_Value\_2017_i + Total\_Equity\_2017_i + Momentum_{t,i} \tag{2}$$

We utilize the $X^v_{t,i}$ vector to employ our most relevant changes between models, such that we utilize 3 different variations of the vector: $X^1_{t,i}$, described on equation 3, $X^2_{t,i}$ described on equation 4, and $X^3_{t,i}$, described in equation 6, within 3.2. The first two variations mainly represent changes in the degree of discrimination through which we observe *Buzz*. $X^1_{t,i}$ contains the variable $Overall\_Buzz_{t,i}$ as the only *Buzz* measurement, taking an umbrella approach on types of media. Meanwhile, $X^2_{t,i}$ is compounded of *Buzz* measurements of different specific media types, namely $News\_Buzz_{t,i}$, $Social\_Media\_Buzz_{t,i}$ and $News\_Headlines\_Buzz_{t,i}$. Finally $X^3_{t,i}$, described later, in Section 3.2, keeps $Overall\_Buzz_{t,i}$ but alters the interaction of $ESG\_Controversies_{t,i}$ and $ESG\_Score_{t,i}$. Refinitiv's $Mentions_{t,i}$ and $ESG\_Controversies_{t,i}$ variables (explained further in the variable table on Appendix A) are also considered worthy of attention given they as well represent a firm's media performance, associated with controversies related to ESG and raw number of mentions, respectively, both of which are key to enhance our analysis. Finally we do not include a control for industry overall performance, as a dummy vector since it is bound to be contained within the individual specific term μ_i. Nevertheless we include it on our Robustness Test in 4.2, when we check results against OLS.

$$X^1_{t,i} = Overall\_Buzz_{t,i} + ESG\_Controversies_{t,i} + Mentions_{t,i} + ESG\_Score_{t,i} \tag{3}$$

$$X^2_{t,i} = News\_Buzz_{t,i} + Social\_Media\_Buzz_{t,i} + News\_Headlinesz\_Buzz_{t,i} + ESG\_Controversies_{t,i} + Mentions_{t,i} + ESG\_Score_{t,i} \quad (4)$$

Based on our assumptions we understand that companies' stock returns are bound to display results influenced not only from time-invariant sector-specific factors but also from firm-specific ones. Besides it, correlation between unobserved heterogeneity ($\mu_{t,i}$) and our observable variables is also likely to exist (which is notable as we don't control firm specific characteristics on any observable variables), meaning that in theory the Fixed Effects model is preferred. Nonetheless, we perform a Hausman Test using our fitting model on 2019 – 2020 data to test our assumptions. Table A.3 presents the test and confirms the hypothesis: in fact individual effects ($\mu_{t,i}$) are correlated with the explanatory variables ($X^v_{t,i}$). We also check for multicolinearity between our independent variables (specially given the use of *News Headlines Buzz* and *News Buzz*) using the variance inflation factor (VIF), and find it to be low-medium, most importantly within the maximum benchmark (vif < 7). The Fixed Effects Panel Data model, therefore, composes the base regression of this study and μ_i represents the firm's fixed effects term, which captures time-invariant characteristics.

3 Results

This section presents the core empirical findings of the study. We begin by reporting the baseline regression results in Table 2, followed by an extension using a lagged model specification, which offers additional insights into the temporal effects of ESG-related media exposure. Specifically, Section 3.1 outlines the results from the baseline model, while Section 3.2 explores the influence of lagged ESG Controversies on subsequent stock returns.

To evaluate the role of ESG-related media content in shaping investment outcomes, we assess the impact of Buzz on monthly stock returns across two distinct periods: pre-COVID (2019) and during COVID (2020). This temporal separation allows us to assess whether the relevance of ESG media exposure differs under stable versus crisis market conditions.

We test our hypotheses by examining the statistical significance and direction of the effects of Buzz and ESG Controversies, both in pooled regressions (2019–2020) and in year-specific analyses. Of particular interest is the comparison of the impact of ESG Controversies in 2020, the onset of the pandemic, with its influence in 2019, a relatively stable market year. This comparison enables us to understand how heightened uncertainty may amplify or moderate the effects of negative ESG-related media narratives on firm performance.

3.1 Impact from ESG and Media Content on Firms' Returns

Our primary analysis employs the firm-month level regression specified in Equation 1 within Chapter 2. Table 2 presents these results for 2019 and 2020, separately and as a combined period. Columns (1)–(3) report findings for *Overall Buzz*, while Columns (4)–(6) distinguish *Buzz* by media type.

We firstly look into Column (1), where the coefficient estimate for *Overall Buzz* is -0.00005 (t-statistic $= -2.9145$), indicating that *Overall Buzz* significantly explains monthly return variations across the two-year period. The negative coefficient suggests that an increase in *Overall Buzz* corresponds to a decrease in stock returns. This relationship also remains consistent when analyzing the two years separately, as seen in Columns (2) and (3), with coefficients of -0.00005 (t-statistic $= -2.7087$) for 2019 and -0.0001 (t-statistic $= -2.8992$) for 2020. Notably, there is an increase in the absolute magnitude of the coefficient from 2019 to 2020, which suggests that investors were more negatively influenced by media content during the pandemic year compared to the pre-pandemic period. This effect could be attributed to heightened market uncertainty, which would lead investors to rely more on overall media narratives when making investment decisions. The small magnitude in the coefficients observed can be attributed to the substantial difference in scale between *Returns* and *Buzz* values, with the latter being significantly larger. While one potential adjustment is to apply a logarithmic transformation to both variables, we found this unnecessary for our analysis.

These findings provide insights into two groups of four key research questions: The first group looks into (questions Q.1; Q.2) how investors' ESG-related beliefs impact stock returns under standard (non-crisis) conditions and to what extent they're influenced by media content. Secondly, we assess (Q.3; Q.4) how the heightened period of uncertainty altered the relationship between these beliefs and returns and whether media influence on these beliefs differed under these crisis conditions.

Regarding questions Q.1 and Q.2, we find that investors' decisions are significantly shaped by overall media content in a normal scenario, with a clear negative effect, as evidenced by the 2019 *Overall Buzz* coefficient. We identify two potential explanations for this phenomenon. First, a higher frequency of ESG-related terms across media platforms may signal heightened scrutiny or concern over ESG issues, prompting negative investor sentiment. This is particularly plausible given that *Buzz* does not distinguish between positive and negative sentiment. Second, a more compelling explanation, which is reinforced by our media-type-specific regression findings, suggests that investors may perceive companies' heightened focus on ESG discussions as a diversion from financial performance, leading to negative sentiment and lower return. This assumption is further developed when assessing effects from different media types.

Regarding question Q.4, our findings indicate that media influence on investor sentiment is more pronounced in periods of heightened uncertainty. The increased coefficient magnitude of *Overall Buzz* in 2020 relative to 2019 and the combined period suggests

Table 2: Effect from ESG Buzz and ESG Controversies on Stock Returns

We plot the dependent variable "Return" against ESG and Media Content variables. Control variables include financial variables such as Market Value, Total Equity and Momentum. This table has results for both Overall Buzz and Buzz discriminated in Media Types. Missing values were filtered out of the samples. Fixed Effects model was used. When we look at both periods we can see that there is influence of media content on returns. Table A defines the variables. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level. Non-significant sector coefficients resulting from sector change between years are excluded from the table

	Dependent Variable: Return$_{i,t}$					
	Overall Buzz$_{i,t}$			Buzz by Media Content		
	2019–2020 (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)	*2019–2020* (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)
	(1)	(2)	(3)	(4)	(5)	(6)
Social_Media_Buzz$_{i,t}$				−0.002	0.005**	−0.005
				(0.002)	(0.002)	(0.003)
News_Buzz$_{i,t}$				0.002***	0.002**	0.001
				(0.001)	(0.001)	(0.001)
News_Headlines_Buzz$_{i,t}$				−0.045***	−0.063***	−0.010
				(0.013)	(0.015)	(0.029)
Overall_Buzz$_{i,t}$	−0.00005**	−0.00005**	−0.0001**			
	(0.00002)	(0.00002)	(0.00004)			
Mentions$_{i,t}$	0.003**	−0.005*	0.005**	0.006	−0.011**	0.014*
	(0.001)	(0.002)	(0.002)	(0.004)	(0.006)	(0.008)
ESG_Controversies$_{i,t}$	−0.041***	−0.010	−0.107***	−0.042***	−0.010	−0.113***
	(0.008)	(0.010)	(0.018)	(0.008)	(0.010)	(0.018)
Refinitv ESG_Score$_{i,t}$	−0.006	−0.039***	−0.010	−0.006	−0.040***	−0.009
	(0.012)	(0.013)	(0.025)	(0.012)	(0.014)	(0.025)
Momentum	−0.033***			−0.033***		
	(0.004)			(0.004)		
Observations	30,276	15,144	15,132	29,588	14,782	14.806
R^2	0.004	0.002	0.004	0.005	0.003	0.004
Time Periods (months)	24	12	12	24	12	12

that during crisis conditions, investors become more sensitive to media coverage, using it as a key input in decision-making. This aligns with behavioral finance theories that suggest that, in times of uncertainty, investors rely more heavily on available information, even when its relevance to financial performance is ambiguous.

When we turn to Columns (4)–(6), which decompose *Overall Buzz* into specific media types, we observe substantial differences in impact between media sources and across periods. Notably, *Social Media Buzz* is only statistically significant in 2019, suggesting that information disseminated through social platforms may influence investor sentiment during stable periods, but loses explanatory power under periods of higher uncertainty (e.g. 2020). Contrary to other types of media, in the conjoint period of 2019–2020, *Social Media Buzz*'s coefficient is also non-significant, reinforcing the hypothesis that the credibility or relevance of social media content as a signal to investors is overall weaker than other media types, possibly due to perceived unreliability or noise.

The most significant impact appears to be from *News' Headlines*, which has a coefficient of -0.045 ($t - statistic = -3.462$) for the conjoint period of 2019-2020 and -0.063 ($t - statistic = -4.298$) for 2019, but shows a non-significant coefficient during

2020. Similarly, *Buzz* in *News*' body text is significative in 2019, with coefficient equals to 0.002 ($t - statistic = 2.547$), and in the conjoint period, during which, it computes 0.002 ($t - statistic = 2.847$), but not significative during 2020. This is interesting as it reinforces the theory that, in periods of heightened risk, investors may be more cautious with the types of information they act upon and the sources they trust, conversely, they may simply face greater attention constraints in the midst of the COVID pandemic. The latter hypothesis seems less likely, however, as ESG controversies still maintain strong significance in 2020. Therefore, it is more plausible that, in line with the first hypothesis, investors prefer to take their cues from financial indicators or reports rather than by media outlets and social media.

Compared to periods of heightened market risk, investor behavior during normal times appears to reflect greater receptiveness to detailed ESG-related information. This is evidenced by the positive and statistically significant coefficient of News Buzz in 2019, suggesting that firms receiving more comprehensive ESG coverage within the main body of news articles tend to experience higher stock returns. One possible explanation is that, in stable market conditions, investors possess greater cognitive bandwidth and exhibit lower levels of caution, enabling more deliberate processing of in-depth information. Full-length news content, which often provides contextualized and nuanced insights, may serve as a credible signal of ESG commitment and long-term strategic value.

In contrast, ESG mentions in news headlines tend to evoke stronger negative investor reactions during non-crisis periods. Headlines are often emotionally charged, simplified, or controversy-driven, making them more likely to attract immediate attention and trigger biased or affect-driven interpretations. The significant negative coefficient associated with headline-level ESG coverage in 2019 supports the notion that, in calmer markets, investors may react disproportionately to sensational or negative cues, either due to cognitive heuristics or the increased salience of such signals.

However, this pattern appears to shift in 2020, amid the uncertainty of the COVID-19 pandemic. During this crisis period, the influence of both detailed news and headline coverage on returns weakens, suggesting that investors adopt a more cautious and selective information-processing strategy, potentially deprioritizing ESG media narratives in favor of macro-level risk management.

At first glance, the lack of statistically significant effects for individual media types in 2020 may appear inconsistent with the earlier finding regarding Overall Buzz, which exhibits a consistently negative coefficient across time periods. This suggests a potential disconnect: while aggregate media content appears to influence investor behavior, the disaggregated media components—such as Social Media Buzz, News Headlines, and others represented in Columns (4)–(6)—do not individually explain returns during the pandemic year.

This discrepancy may reflect one of two possible mechanisms. First, investors might be disproportionately influenced by media channels not explicitly modeled in the disaggre-

gated specifications—such as blog content or financial commentary—thereby amplifying the effect observed for Overall Buzz. Alternatively, investors may respond not to any single media channel, but rather to the cumulative or composite signal conveyed across all media platforms. In this case, the negative coefficient on Overall Buzz could reflect either a cognitive bias—such as overweighting ESG coverage as a perceived tradeoff with financial performance—or a more deliberate and holistic evaluation, in which investors integrate multiple information sources before forming expectations.

In either scenario, the result implies that investors may not differentiate between sources in crisis contexts, instead relying on aggregate media sentiment as a heuristic for firm-level ESG signaling. This reinforces the importance of examining media composition and investor attention jointly, particularly in periods of elevated uncertainty.

Turning to the other variables in Columns (1)–(3), we observe that ESG Controversies had a statistically significant negative impact on stock returns both in the full-period analysis and in 2020. Specifically, the estimated coefficients were -0.041 ($t = -5.002$) for the aggregate period and 0.107 ($t = -5.954$) for 2020. In contrast, no significant effect was observed for ESG Controversies in 2019, suggesting that investors became more reactive to negative ESG-related events during periods of heightened uncertainty.

Conversely, the ESG Score – a composite measure of a firm's sustainability performance – was only positively associated with returns in 2019, and this effect disappeared during the crisis year. This inverse relationship between the salience of ESG Scores and ESG Controversies across different periods suggests a shift in investor priorities under uncertainty.

One possible explanation is that during times of crisis, investors may place greater weight on recent, high-salience information, such as negative news events or media content (Buzz), rather than on ESG ratings, which are typically updated less frequently and perceived as slower-moving or backward-looking indicators. ESG Controversies may be viewed as more timely and informative signals of firm-specific risks and management shortcomings—particularly relevant when market volatility heightens the value of real-time data.

Another possibility is that in periods of uncertainty, investors prioritize primary and emotionally resonant sources—such as news reports or controversies—over aggregated ESG ratings, which may be seen as more abstract or detached from unfolding developments. This shift could also be partially driven by cognitive biases, such as negativity bias or recency effects, which increase investor sensitivity to risk-related information during crises.

Taken together, these findings suggest that investor behavior becomes more reactive to ESG controversies and media content in volatile periods, while ESG Scores may play a more prominent role in stable environments, where long-term strategic positioning is more easily assessed.

To further investigate the role of media exposure in shaping investor behavior, we

examine the impact of the Mentions variable – defined as the simple rolling count of all media references to a firm, regardless of content type. Our results indicate that Mentions produces statistically significant effects across all specifications. For 2019, the coefficient is 0.005 (t = −2.316), indicating a negative association with stock returns. In contrast, the coefficient is +0.005 (t = 2.702) for 2020, and 0.003 (t = 2.656) when both years are analyzed jointly.

These findings reveal two key patterns:

1. A negative effect of media visibility on stock returns during normal market conditions (2019).

2. A positive effect during crisis conditions (2020) and in the aggregate model.

This shift in direction may reflect a change in how investors interpret and respond to general media attention under varying levels of market uncertainty. In periods of heightened risk and volatility, such as in 2020, investors likely become more risk-averse and information-sensitive, seeking familiarity and perceived transparency. Firms with higher media visibility—even if not ESG-specific—may be viewed as more reliable or stable, thus attracting greater investor interest.

By contrast, in more stable periods like 2019, media mentions—particularly if not accompanied by substantive ESG signals—may be interpreted more critically or even negatively. Investors may react to negative news tone, or fall prey to availability and negativity biases, thereby penalizing firms that are more frequently in the public eye, especially if coverage is unfiltered or ambiguous.

These results support the interpretation that the level of attention investors pay to media coverage changes across market conditions. During times of uncertainty, media visibility becomes a proxy for informational confidence, while in calmer periods, media exposure may increase reputational risk or amplify investor biases.

This hypothesis is further supported by the results in Columns (4)–(5), which point to differentiated investor responses across media types and contexts.

In the disaggregated Buzz model columns, the results for ESG Controversies align closely with earlier findings and further support the behavioral mechanism previously discussed. Specifically, we find that investors respond significantly to ESG Controversies only in two cases: the pooled period of 2019 – 2020, with a coefficient of −0.042 (t = −5.046), and in 2020 alone, with a coefficient of −0.113 (t = −6.103). No significant effect is observed in 2019, reinforcing the notion that negative ESG events become materially more salient during times of heightened uncertainty.

The notably stronger magnitude of the coefficient in 2020 suggests that during the COVID-19 crisis, investors were not only more exposed to ESG-related media coverage but also more reactive to it. This intensified response may stem from two non-mutually exclusive factors. First, the pandemic likely led to increased media consumption and information awareness, resulting in greater exposure to reports of ESG malpractices. Second, in a risk-averse environment, investors may have actively avoided firms associated with

controversial or unethical behavior, perceiving such issues as indicators of reputational or operational risk under conditions where trust and transparency became especially critical.

These results provide strong empirical support for the idea that investor sensitivity to ESG controversies is amplified during crisis periods, reflecting a shift in how information is processed and acted upon under uncertainty.

3.2 Intertemporal Effect of ESG Controversies on Returns

In light of the previous findings we deeper assess *ESG Controversies* variable and the duration of its effect on returns. In other words, we look to see if a higher amount of ESG malpractice reports during one determined month impact returns in that month and subsequent months, and if so, up to how many. To obtain this result we tweak equation 3 from our baseline setting. Fundamentally two changes are made that characterize this new vector of interest $X^3_{t,i}$: (1) we introduce the lagged *ESG Controversies* variable: $\mathbf{Lag}(ESG\_Controversies_{i,t})$ and (2) we add an interactive variable between Lagged *ESG Controversies* and ESG Score: $ESG \times \mathbf{Lag}(ESG\_Controversies_{i,t})$. By applying these changes we try to address a two main points: (1) to understand how *ESG Controversies* information, e.g. ESG malpractices reports, impact fades over time and (2) to measure, through the interactive variable, if ESG malpractice reports about companies with higher ESG Scores impact returns differently or in a higher degree. By introducing the interaction term we also allow the effect of ESG scores on returns to vary based on past ESG controversies, which tries to emulate the delay in ESG Score variation based on ESG reports. Hence, Table 3 present the results of Eq. 5.

$$Return_{t,i} = \alpha + \beta X3_{t,i} + \delta C_{t,i} + \gamma Industry\_Dummies_{t,i} + \mu_i + \varepsilon_{t,i} \tag{5}$$

$$X^3_{t,i} = Overall\_Buzz_{t,i} + ESG\_Controversies_{t,i} \times ESG\_Score_{t,i} + Mentions_{t,i} \tag{6}$$

We find interesting behavior for $ESG\_Controversies_{i,t}$, specially when comparing the distinct periods of 2019 and 2020. Columns (1)–(5) measure impact from, respectively, 1 month to 12 months behind in time, relatively to the reference period of returns for 2019. Columns (6) – (10) measure the same but for 2020.

Based of the results, we can see that, for 2019, $\mathbf{Lag}(ESG\_Controversies_{i,t})$, does show significative influence on returns up to 2 months after being published, but not after this period or within the same month. This is translated on coefficients being equal to 0.083 ($t - statistic = 3.496$) in in column (1) and 0.071 ($t - statistic = 3.3293$) in column (2). On the other hand, when analyzing 2020, which embraces columns (6) to (10), we find not only that the time period of impact from $\mathbf{Lag}(ESG\_Controversies_{i,t})$ is much larger, but the effect is significantly higher, as measured by its coefficients on each period. Lags are significant up to 6 months, as Column's (9) coefficient indicates. Columns (6), (7), (8), (9) and (10) have respectively coefficients of -0.116 ($t - statistic = -2.658$), -0.156, ($t - statistic = -3.907$), -0.292 ($t - statistic = -7.799$), -0.092 ($t - statistic$

$= -2.611$), and -0.054 ($t - statistic = -1.001$), which implies a statistically significant negative effect.

Notably, there is a reversal in $\mathbf{Lag}(ESG\_Controversies_{i,t})$'s and $ESG \times \mathbf{Lag}(ESG\_Controversies_{i,t})$'s coefficient's signal from 2019 to 2020. During 2019 $\mathbf{Lag}(ESG\_Controversies_{i,t})$ has a positive impact up to two months, which suggests companies with more ESG controversies, at least in the very short term, tend to have higher stock returns in the current month. However, $ESG \times \mathbf{Lag}(ESG\_Controversies_{i,t})$ shows a negative coefficient for the same period, which implies that the positive effect of past *ESG Controversies* on *Returns* is weaker for firms with high ESG scores. In other words, investors punish companies more harshly when an ESG controversy happens to a firm that was previously perceived as ESG-friendly. When assessing 2020, however, this effect is contrary with $ESG \times \mathbf{Lag}(ESG\_Controversies_{i,t})$'s coefficient turns positive and $\mathbf{Lag}(ESG\_Controversies_{i,t})$'s coefficient becomes negative, both being impactful up to 6 months disconsidering intra-month effects.

One potential mechanism that may explain the shift in the impact of ESG Controversies over time involves changes in investor risk behavior between 2019 and 2020. In 2019—a year characterized by relative market stability—investors may have been more inclined to tolerate or even reward high-risk firms, interpreting ESG controversies as either short-term noise or as signals of aggressive strategies that could yield higher returns. In this context, firms involved in ESG-related incidents may have been perceived as pursuing bold or disruptive business models, which, despite reputational risks, could align with investor appetites for growth, thereby generating positive coefficients on Lag(*ESG Controversies*).

In contrast, during the crisis year of 2020, the emergence of new controversies may have prompted investors to reevaluate prior ESG-related assumptions, particularly for firms that had previously received high ESG Scores. When ESG controversies followed strong ESG ratings, investors may have interpreted this as evidence of greenwashing or inaccurate ESG assessments, leading to a downward revision of firm value. This shift in perception is reflected in the negative and significant coefficient on the interaction term $ESG \times \mathbf{Lag}(ESG\_Controversies_{i,t})$. Such a result suggests that ESG scores, rather than serving as a buffer during crises, may exacerbate investor disappointment when subsequent controversies emerge—triggering price corrections for firms previously perceived as ESG leaders.

Overall, these findings highlight how investor tolerance for ESG-related risk is context-dependent, and how reputational trust embedded in ESG scores can be fragile during periods of heightened scrutiny and uncertainty.

The change during 2020, therefore, signifies a shift in stance where investors, by becoming more risk averse, were less likely to reward high-risk companies, or to see ESG reports as overblown and likely to be corrected. Instead, as market risk intensified, the likelihood of future corrections may have seemed less plausible, and investors began to perceive *ESG*

Controversies more negatively overall. However, as indicated by the positive coefficients of the interaction term $ESG \times \mathbf{Lag}(ESG\_Controversies_{i,t})$, firms with higher ESG scores appeared somewhat insulated from this effect—potentially due to greater investor trust, reputational capital, or perceived resilience during periods of market stress.

On a final note, the coefficients associated with ESG Scores exhibit a directional shift similar to that observed for ESG Controversies, albeit at a smaller magnitude. In 2019, ESG Scores were generally positively associated with stock returns across most lag structures, with the exception of the 12-month lag. However, in 2020, these coefficients reversed in sign, suggesting a decline in the perceived value of ESG scores during the crisis period.

One possible explanation is that ESG Scores serve as useful secondary indicators under normal market conditions, providing a broad signal of a firm's long-term orientation and stakeholder commitment. During a crisis, however, investors may question the timeliness and practical relevance of these ratings—particularly if they are perceived as ineffective in capturing firms' crisis preparedness or response capabilities. In such cases, high ESG scores may inadvertently signal inefficiency, rigidity, or misalignment with urgent market needs, leading investors to discount future returns.

An alternative explanation is that firms with higher ESG scores may be concentrated in sectors that underperformed during the COVID-19 crisis (e.g., utilities, consumer staples), thereby introducing a sectoral bias into the relationship. As sector-level controls were not explicitly included in this model specification, this possibility represents an avenue for further empirical refinement.

Taken together, these findings support the broader mechanism proposed in this study: a shift in investor risk preferences and information-processing behavior during periods of uncertainty. The results illustrate a reversal of the typical high-risk, high-reward investment logic—in which investors favor bold strategies like innovation or expansion—toward a more risk-averse posture, with increased sensitivity to negative ESG signals and skepticism toward generalized ESG labels.

Table 3: Continuous Effect of ESG Controversies on Stock Returns during the Pre-COVID and COVID Periods

This table explores Lag model derived from our baseline Fixed Effects Model. We notably lag *ESG Controversies* and introduce an interactive variable between it and ESG Score, to see how its effect behaves over time. Columns (1)–(5) show results for 2019 and columns (6)–(10) for 2020. In Columns (1)–(3) and (6) to (8), we look at lags of one to three months. On subsequent columns we show results for lags of 6 and 12 months. The results demonstrate that there is effect of previous ESG controversies on subsequent periods, even for a long period, implying that ESG reporting is likely to have effects even in the medium term. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level.

	Dependent Variable: Return$_{i,t}$									
	Pre-COVID / 2019					*COVID / 2020*				
	Lag 1	*Lag 2*	*Lag 3*	*Lag 6*	*Lag 12*	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 6*	*Lag 12*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Overall_Buzz$_{i,t}$	−0.0001***	−0.0001***	−0.0001***	−0.0001***	−0.0001***	−0.0001***	−0.0001***	−0.0001***	−0.0001***	−0.0001***
	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00002)	(0.00004)	(0.00004)	(0.00004)	(0.00004)	(0.00004)
Mentions$_{i,t}$	−0.005**	−0.005**	−0.005**	−0.005**	−0.005**	0.005***	0.006***	0.006***	0.006***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Lag(*ESG_Controversies$_{i,t}$*)	0.083***	0.071***	0.032	0.016	−0.046	−0.116***	−0.156***	−0.292***	−0.092***	−0.054
	(0.024)	(0.021)	(0.020)	(0.019)	(0.030)	(0.044)	(0.040)	(0.037)	(0.035)	(0.054)
ESG × **Lag**(*ESG_Controversies$_{i,t}$*)	−0.002***	−0.001***	−0.001**	−0.0004	−0.046	0.001	0.002***	0.005***	0.001**	−0.054
	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.030)	(0.001)	(0.001)	(0.001)	(0.001)	(0.054)
Refinitv ESG_Score$_{i,t}$	0.038*	0.018	−0.013	−0.028	−0.074***	−0.070*	−0.145***	−0.257***	−0.118***	−0.071*
	(0.020)	(0.019)	(0.018)	(0.018)	(0.024)	(0.037)	(0.035)	(0.034)	(0.033)	(0.042)
Observations	15,143	15,142	15,141	15,138	15,132	15,143	15,142	15,141	15,138	15,132
R^2	0.004	0.003	0.002	0.002	0.002	0.003	0.002	0.006	0.002	0.002
Time Periods (months)	12	12	12	12	12	12	12	12	12	12

4 Robustness Test

To assess the robustness of our findings, we employ three complementary approaches:

1. Alternative ESG Rating Source: First, we replace Refinitiv's ESG Score with the MSCI ESG Score to re-estimate the key regressions from Section 3. This allows us to examine whether our results hold when using an alternative, widely recognized ESG rating methodology. Given the known divergence between ESG rating providers, this test ensures that our findings are not driven by provider-specific scoring models or coverage biases.

2. Pooled OLS Estimation: Second, we re-estimate our baseline model using a Pooled Ordinary Least Squares (OLS) estimator. While statistical tests favor the Fixed Effects (FE) specification, the Pooled OLS model serves as a valuable benchmark to assess whether the direction and significance of our findings remain consistent in a more general framework that utilizes both within-firm and between-firm variation. This test ensures that our results are not driven solely by the specific variance decomposition of the FE model and allows us to observe if the core patterns persist even when unobserved firm-level heterogeneity is not explicitly controlled for.

3. Sector-Specific Fixed Effects: Third, we run a series of sector-specific fixed-effect regressions to explore whether the effects identified in the main model are driven by specific industries. Since sectoral variation may be muted in a standard firm-level FE model, this approach allows us to explicitly account for intra-sector dynamics and uncover potential heterogeneity in ESG-related investor responses across different sectors.

These robustness checks provide additional confidence in the stability and generalizability of our results, and also offer insight into possible boundary conditions of the observed relationships.

4.1 Replacing Refinitiv ESG Score for MSCI's

To assess the robustness of our findings to the choice of ESG rating provider, we re-estimate our baseline Fixed Effects models using the MSCI ESG Score in place of the Refinitiv ESG Score. We run this model for 2019 and 2020 separately and as the conjoint period. As shown in Table 4, the core results remain consistent with those reported in the baseline model in Table 2. Although, coefficient values may differ slightly, we can see the important mechanisms were maintained.

It is noticeable that variables measuring media content and sentiment, such as *Buzz* and *ESG Controversies*, retain similar signs and levels of statistical significance. For instance, *News Buzz* maintains the same positive and statistically significant association with stock returns in both specifications, with a coefficient of 0.002 ($t - statistic =$

Table 4: Effects from ESG Buzz and ESG Controversies on Stock Returns Controlling for ESG Score Provider

We plot the independent variable "Return" against media content and ESG variables with an alteration in the ESG Score provider from Refinitiv to MSCI. Control variables include financial variables such as Market Value, Total Equity and Momentum. This table reports that in fact, when we look at both periods we can see that there is influence on returns that comes from media content and a maintenance of baseline results. Table A defines the variables. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level. MSCI ESG Score only presents value for 2019-2020 as it has yearly periodicity. Non-significant sector coefficients resulting from sector change between years are excluded from the table

	Dependent Variable: Return$_{i,t}$					
	Overall Buzz$_{i,t}$			Buzz by Media Content		
	2019–2020 (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)	*2019–2020* (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)
Social_Media_Buzz$_{i,t}$				−0.002	0.005**	−0.005*
				(0.002)	(0.002)	(0.003)
News_Buzz$_{i,t}$				0.002***	0.002**	0.002
				(0.001)	(0.001)	(0.001)
News_Headlines_Buzz$_{i,t}$				−0.045***	−0.063***	−0.011
				(0.013)	(0.015)	(0.029)
Overall_Buzz$_{i,t}$	−0.00005***	−0.0001***	−0.0001***			
	(0.00002)	(0.00002)	(0.00004)			
Mentions$_{i,t}$	0.003**	−0.005**	0.005**	0.006	−0.011*	0.014*
	(0.001)	(0.002)	(0.002)	(0.004)	(0.006)	(0.008)
ESG_Controversies$_{i,t}$	−0.041***	−0.020**	−0.109***	−0.042***	−0.020**	−0.114***
	(0.008)	(0.009)	(0.017)	(0.008)	(0.010)	(0.017)
MSCI ESG_Score$_{i,t}$	−0.026			−0.019		
	(0.190)			(0.193)		
Momentum	-0.033***			-0.033***		
	(0.004)			(0.004)		
Observations	30,180	15,144	15,036	29,496	14,782	14,714
R^2	0.004	0.001	0.004	0.005	0.003	0.004
Time Periods (months)	24	12	12	24	12	12

2.910), in the aggregate period under both models-extremely similar to our baseline model. Likewise, *News Headlines Buzz* continues to exhibit a strong negative effect on returns, with a coefficient of -0.045 ($t - statistic$ = -3.497) in the robustness model and -0.045 ($t - statistic = 3.462$) in the baseline model.

Furthermore, the coefficient on *Overall Buzz* remains negative and highly significant across both models—for example, -0.00005 ($t - statistic = -2.8589$) in the 2019–2020 period under both ESG scoring sources. *ESG Controversies* shows similar results, particularly in the aggregate, with a coefficient of -0.041 ($t - statistic = -5.4899$), the same as our baseline model. The principal point of divergence between models emerges in the *ESG Score* variable itself: Refinitiv *ESG Score* has a monthly update frequency, which prevents the variable's effect from being absorbed by the Fixed Effects model. On the other hand, since MSCI's *ESG Score* has a yearly periodicity, the robust model shows no results for regressions analyzing the individual periods of 2019 and 2020. When assessing the aggregate period, we see that—similarly to our baseline results—MSCI's *ESG Score* is statistically insignificant (-0.026 , $t - statistic = -0.1375$). Therefore, the consistency in media-driven predictors confirms the robustness of our key findings under alternative

4.2 Robustness Check Using Pooled OLS

To ensure that our findings are not driven by model-specific assumptions, we re-estimate the baseline Fixed Effects (FE) regression using a Pooled Ordinary Least Squares (OLS) model. While Hausman test results strongly support the use of the FE estimator for both the aggregate period and the individual sub-periods, incorporating an OLS specification serves as a valuable robustness check. As a widely used benchmark in panel data analysis, OLS allows us to assess whether the direction and significance of our core findings remain consistent in a more general modeling framework that does not control for unobserved firm-level heterogeneity.

The FE model is well-suited for settings in which time-invariant firm-specific factors—such as managerial quality, industry reputation, or corporate culture—may be correlated with explanatory variables. By controlling for these latent factors, the FE specification mitigates bias due to omitted variable confounding, but at the cost of removing between-firm variation and excluding time-invariant variables from the model.

In contrast, the OLS model makes no assumptions about the correlation between firm-level effects and the explanatory variables and allows for the inclusion of both time-varying and time-invariant covariates, such as sector dummies. While this flexibility comes at the risk of bias from unobserved heterogeneity, it enables us to verify whether the central patterns in our analysis—particularly the role of ESG-related media and ratings—hold when firm-specific effects are not explicitly controlled for.

The results from the Pooled OLS model broadly confirm the patterns identified in the Fixed Effects (FE) analysis, reinforcing the robustness of our main conclusions. The coefficient for Overall Buzz remains negative, although it loses statistical significance under the OLS specification. This attenuation may be attributable to the lack of firm-level controls in the pooled model, which could introduce noise or bias from unobserved heterogeneity.

When disaggregating media content types, we again observe platform-specific effects. News_Buzz retains a positive association with stock returns, particularly in the pre-COVID period, while News_Headlines_Buzz continues to exhibit a negative and statistically significant impact, mirroring results from the FE model. These findings further support the idea that not all forms of media exposure are interpreted equally by investors—with headline-level information potentially triggering more immediate, negative reactions, and long-form news content being perceived as more informative and value-relevant.

The negative effect of ESG_Controversies on returns is also consistent across both estimation approaches, with the effect being especially pronounced in 2020, the year marked by heightened market uncertainty. Similarly, Mentions becomes more influential post-COVID, showing a positive, albeit modest, impact on returns. This suggests

Table 5: Effect from ESG Buzz and ESG Controversies on Stock Returns applying OLS controlled for Sectors

In this table we look to robust test our baseline findings. It shows the regression of stock e*Returns* against our vector of interest and control variables using OLS. Control variables include financial variables such as Market Value, Total Equity, RBICS Industries and Momentum. Vector of interests is defined in equations 3 and 4. This table has results for both *Overall Buzz* and *Buzz* discriminated in Media Types. When we look at both periods we can see that there is influence of media content on *Returns*, which falls in line with our baseline. Table A defines the variables. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level. Market Value and Total Equity from 2018 and 2017 were left out since they had extremely insignificant coefficients. Sectors with negligible variable coefficients were also omitted.

	Dependent Variable: Return$_{i,t}$					
	Overall Buzz$_{i,t}$			Buzz by Media Content		
	2019–2020 (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)	*2019–2020* (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	2.932***	1.947***	3.826***	3.089***	1.929***	4.096***
	(0.413)	(0.399)	(0.716)	(0.422)	(0.406)	(0.732)
Mentions$_{i,t}$	0.002***	0.0004	0.003***	0.004	−0.004	0.007
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.005)
Refinitv ESG_Score$_{i,t}$	0.006	−0.001	0.012	0.005	0.0004	0.009
	(0.005)	(0.005)	(0.009)	(0.006)	(0.005)	(0.010)
ESG_Controversies$_{i,t}$	−0.010**	0.005	−0.024***	−0.011**	0.004	−0.023***
	(0.004)	(0.004)	(0.007)	(0.004)	(0.004)	(0.008)
Overall_Buzz$_{i,t}$	−0.00000	0.00000	−0.00001			
	(0.00000)	(0.00000)	(0.00001)			
Social_Media_Buzz$_{i,t}$				−0.001	0.002*	−0.002
				(0.001)	(0.001)	(0.002)
News_Buzz$_{i,t}$				0.001*	0.001**	0.001
				(0.0005)	(0.0005)	(0.001)
News_Headlines_Buzz$_{i,t}$				−0.023**	−0.033***	−0.008
				(0.009)	(0.009)	(0.017)
Momentum	−0.004	−0.007**	−0.002	−0.004	−0.006**	−0.003
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
Observations	30,276	15,144	15,132	29,588	14,782	14,806
R^2	0.001	0.001	0.002	0.001	0.002	0.002
Time Periods (months)	24	12	12	24	12	12

that general media visibility, even when not ESG-specific, can influence investor behavior during periods of risk aversion and information sensitivity.

Taken together, these results demonstrate that even under a less restrictive estimation framework, the core relationships between ESG media variables and stock performance remain intact. This strengthens the validity and generalizability of our findings and highlights the growing relevance of ESG-related media narratives in shaping financial market outcomes – particularly during periods of systemic disruption.

4.3 Sector-Specific Results

To further assess the robustness of our findings and explore potential industry-specific dynamics, we re-estimate the baseline specification using sector-specific OLS regressions. The results, presented in Table 6, reveal heterogeneity in how ESG-related content influences stock returns across sectors. This analysis offers valuable insight into sectoral

effects that may be obscured in the main Fixed Effects model, which focuses on firm-level variation.

While the Fixed Effects model effectively controls for time-invariant firm-specific characteristics, it does not isolate sectoral patterns in investor responses. By contrast, the sector-specific regressions inherently absorb a significant portion of shared industry attributes—such as regulatory exposure, business models, and typical ESG risk profiles—which may shape how ESG information is processed by investors. Although this approach may not fully account for within-sector firm-level heterogeneity, it helps mitigate omitted variable bias by leveraging the comparability of firms within the same sector.

Overall, these results underscore the importance of industry context in understanding the impact of ESG-related media and rating signals on stock performance. They also point to potential strategic implications for sector-specific ESG communication and risk management, particularly in industries where investor sensitivity to ESG issues is higher or more nuanced.

Table 6: Effect from ESG Buzz and ESG Controversies on Stock Returns on Specific Sectors

This table presents the results for the regressions utilizing OLS on samples controlled by RBICS Industry types. We find some heterogeneity in between industries regarding the significance of some variables.

	Dependent Variable: $Return_{i,t}$					
	Technology	*Consumer Non Cyclical*	*Industry*	*Utilities*	*Healthcare*	*Telecom*
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	4.677***	2.411*	3.234***	1.405	1.654*	7.102**
	(1.041)	(1.322)	(0.949)	(0.970)	(0.954)	(3.581)
$Social\_MediaBuzz_{i,t}$	−0.001	0.001	−0.022**	−0.039*	−0.001	−0.026
	(0.002)	(0.005)	(0.009)	(0.020)	(0.004)	(0.026)
$News\_Buzz_{i,t}$	0.002	0.005**	−0.0004	0.001	0.003*	0.007
	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.010)
$News\_Headlines\_Buzz_{i,t}$	−0.044*	−0.130***	0.007	−0.246***	−0.103**	0.057
	(0.025)	(0.046)	(0.027)	(0.074)	(0.048)	(0.133)
$Mentions_{i,t}$	0.003	−0.002	0.058**	0.086*	0.001	0.036
	(0.004)	(0.010)	(0.023)	(0.045)	(0.010)	(0.065)
$ESG\_Controversies_{i,t}$	−0.004	−0.029*	−0.011	0.006	0.005	−0.026
	(0.014)	(0.017)	(0.012)	(0.012)	(0.011)	(0.036)
$Refinitv\ ESG\_Score_{i,t}$	−0.014	0.024	−0.001	−0.002	0.018	−0.089*
	(0.017)	(0.021)	(0.015)	(0.017)	(0.016)	(0.048)
$Momentum$	0.002	−0.027***	−0.006	−0.034**	0.005	−0.024
	(0.007)	(0.010)	(0.008)	(0.015)	(0.005)	(0.019)
Observations	3,279	2,260	3,820	1,101	3,343	379
R^2	0.002	0.009	0.004	0.023	0.004	0.028
Time Periods (months)	24	24	24	24	24	24

The results, displayed in Table 6, highlight clear sectoral differences in the pricing of ESG-related media exposure. The sectors most responsive to ESG media variables are *Consumer Non-Cyclical*, *Healthcare*, *Utilities*, *Industry*, *Technology*, and *Telecom*. For

instance, *News Buzz* is positively and significantly associated with returns in the *Consumer Non-Cyclical* sector (0.005, t-statistic ≈ 2.50) and in *Healthcare* (0.003, t-statistic ≈ 1.65), suggesting that traditional media plays a more prominent role in shaping investor sentiment in these sectors.

Other media-related variables also indicate sector-specific vulnerabilities. *News Headlines Buzz* exhibits strong and significant negative effects in *Utilities* (-0.246, t-statistic ≈ 3.32), *Consumer Non-Cyclical* (-0.130, t-statistic ≈ 2.83), *Healthcare* (-0.103, t-statistic ≈ 2.15), and *Technology* (-0.044, t-statistic ≈ 1.76). These results point to these industries' heightened sensitivity to ESG narratives in media headlines. In contrast, other sectors like *Industry* and *Telecom* show no statistically significant effects from this variable, reflecting a more muted response to ESG headline coverage.

Turning to *Mentions*, the results reveal a positive and significant association in *Industry* (0.058, t-statistic ≈ 2.52) and *Utilities* (0.086, t-statistic ≈ 1.91), suggesting that in these more capital-intensive sectors, frequent ESG-related references may serve as a signal of visibility or stability rather than scrutiny. Other sectors, such as *Consumer Non-Cyclical* and *Healthcare*, exhibit insignificant or negative coefficients, reinforcing the idea that the reception of ESG discourse varies substantially by industry.

ESG Controversies have a statistically significant negative impact only in *Consumer Non-Cyclical* (-0.029, t-statistic ≈ 1.71), indicating reputational risks are particularly penalized in sectors closely linked to everyday consumption and brand reputation. This aligns with the broader understanding that controversies carry higher investor costs in consumer-facing industries.

As for the *Refinitiv ESG Score*, its effects are largely insignificant across most sectors, with the exception of a weakly negative coefficient in *Telecom* (-0.089, t-statistic ≈ 1.85). This mirrors our earlier findings, where the fundamental ESG rating appears to have a limited role in explaining short-term return dynamics.

Overall, the sector-by-sector OLS regressions reinforce our baseline conclusions while offering more granular insights into how the effects of ESG-related media exposure and controversies vary across industries. Certain sectors demonstrate clear and consistent sensitivities to ESG-related content—both in terms of media coverage and controversy intensity—highlighting their greater investor responsiveness to ESG signals. In contrast, other sectors appear largely unaffected, suggesting that ESG factors may be less financially material or less prioritized by investors in those industries.

These findings emphasize the importance of industry-specific ESG communication strategies and the need for tailored approaches to ESG risk management. Results for additional sectors not discussed in the main text are provided in the Appendix for completeness and further reference.

5 Conclusion

This study provides robust empirical evidence that ESG-related media coverage significantly influences investor perception and stock returns—particularly under conditions of heightened market uncertainty. By analyzing media-driven ESG signals during two contrasting periods—2019 (a relatively stable market) and 2020 (marked by the COVID-19 crisis)—we demonstrate that investors respond more strongly to negative ESG narratives during turbulent times. In particular, ESG controversies and emotionally charged headline coverage exert a pronounced negative impact on stock returns in 2020, underscoring heightened risk aversion and greater investor sensitivity to adverse information.

Our findings reveal the importance of both the content and the channel of media communication. While long-form news articles—often more nuanced—were associated with positive investor reactions in stable periods, headline-driven coverage tended to provoke negative sentiment, especially in uncertain times. Social media, in contrast, had a limited standalone effect, suggesting that investors continue to rely primarily on traditional news sources when forming ESG assessments during crises.

Furthermore, the temporal analysis of ESG controversies indicates that their negative impact persists longer in crisis contexts, reinforcing the notion that investors place greater weight on real-time, event-driven ESG signals when market conditions deteriorate. This dynamic shift in attention and risk preferences calls for greater granularity in how ESG information is communicated, interpreted, and integrated into investment strategies.

Overall, our research underscores the need for investors, asset managers, and policymakers to account for media-driven ESG narratives—both in terms of source and tone—when assessing firm value and risk exposure. As media increasingly shapes ESG discourse, understanding its role becomes critical for effective portfolio management and policy development. Future research could delve deeper into the cognitive and behavioral mechanisms behind investor reactions to ESG media and explore how these dynamics evolve across different types of crises and market environments.

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A Appendix A

Table A.1: Lagged Media Types' Buzz effect on Stock Returns during the Pre-COVID and COVID Periods

This table explores the baseline Fixed Effects Model after lagging the different types of *Buzz*, to examine how their effects evolve over time—in other words, to assess the influence of *Buzz* from previous periods on subsequent returns. Columns (1)–(5) and (6)–(10) display the effects of various *Buzz* media types from prior months on current returns. In Columns (1) and (2), we analyze lags of one and two periods, respectively. In the subsequent columns, we test whether the effect persists across additional lagged periods. The results indicate that *Buzz* from periods beyond six months has no significant impact on returns, suggesting that ESG-related media coverage tends to have only short-term effects. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: $Return_{i,t}$									
	Pre-COVID / 2019					*COVID / 2020*				
	Lag 1	*Lag 2*	*Lag 3*	*Lag 6*	*Lag 12*	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 6*	*Lag 12*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag($SocialMediaBuzz_{i,t}$)	−0.021***	−0.004	0.016***	0.006	0.007	−0.015***	0.009	−0.006	−0.006	−0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.006)
Lag($NewsBuzz_{i,t}$)	−0.020***	−0.005	0.017***	0.006	0.005	−0.012**	0.005	−0.011**	−0.008	−0.0005
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lag($NewsInSocialMediaBuzz_{i,t}$)	0.020***	0.004	−0.017***	−0.006	−0.004	0.015***	−0.009*	0.006	0.006	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Lag($NewsHeadlinesBuzz_{i,t}$)	0.013	0.020*	−0.005	−0.001	−0.020	−0.093***	0.081***	0.119***	0.025	−0.031
	(0.012)	(0.011)	(0.010)	(0.010)	(0.015)	(0.026)	(0.024)	(0.023)	(0.022)	(0.029)
$Mentions_{i,t}$	−0.006***	−0.005**	−0.005**	−0.005**	−0.005**	0.004*	0.005**	0.005***	0.004**	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$ESGControversies_{i,t}$	−0.010	−0.011	−0.008	−0.011	−0.008	−0.107***	−0.102***	−0.105***	−0.112***	−0.101***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
$RefinitvESGScore_{i,t}$	−0.037***	−0.039***	−0.040***	−0.038***	−0.039***	0.002	−0.009	−0.003	−0.004	−0.007
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Observations	14,781	14,780	14,779	14,776	14,770	14,817	14,816	14,815	14,812	14,806
R^2	0.003	0.002	0.002	0.001	0.002	0.005	0.004	0.006	0.004	0.004
Time Periods (months)	12	12	12	12	12	12	12	12	12	12

Table A.2: Lagged Overall Buzz's effect on Stock Returns during the Pre-COVID and COVID Periods

This table explores the baseline Fixed Effects Model after lagging *Overall Buzz*, to examine how its effect evolve over time—in other words, to assess the influence of *Buzz* from previous periods on subsequent returns. Columns (1)–(5) and (6)–(10) display the effect of *Overall Buzz* media types from prior months on current returns. In Columns (1) and (2), we analyze lags of one and two periods, respectively. In the subsequent columns, we test whether the effect persists across additional lagged periods. The results indicate that *Buzz* from all periods have no significant impact on returns, suggesting that Overall ESG-related media coverage tends to have have effects only intra-month . Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Dependent Variable: $Return_{i,t}$									
	Pre-COVID / 2019					*COVID / 2020*				
	Lag 1	*Lag 2*	*Lag 3*	*Lag 6*	*Lag 12*	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 6*	*Lag 12*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lag($OverallBuzz_{i,t}$)	0.00000	0.00000	-0.00000	-0.00000	-0.00002	-0.00002	-0.00001	-0.00002***	-0.00001	-0.00003
	(0.00001)	(0.00000)	(0.00000)	(0.00000)	(0.00002)	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00004)
$Mentions_{i,t}$	−0.005**	−0.005**	−0.005**	−0.005**	−0.005**	0.004**	0.004**	0.004**	0.004**	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$ESGControversies_{i,t}$	−0.009	−0.009	−0.009	−0.009	−0.009	−0.105***	−0.105***	−0.105***	−0.106***	−0.105***
	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
$RefinitvESGScore_{i,t}$	-0.047***	−0.038***	−0.038***	−0.038***	−0.038***	−0.008	−0.008	-0.007	-0.007	-0.008
	(0.015)	(0.013)	(0.013)	(0.013)	(0.013)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Observations	11,735	15,142	15,141	15,138	15,132	15,143	15,142	15,141	15,138	15,132
R^2	0.002	0.001	0.001	0.001	0.001	0.003	0.003	0.004	0.003	0.003

Table A.3: Hausman Test | 2019−2020 | Overall Buzz

This table presents the Hausmann test for deciding between Random Effects Model and Fixed Effects Model. In this test, we define $H_0 : \beta_{RE} = \beta_{FE}$, which implies that in the null hypothesis, both coefficients are consistent. If we do not reject H_0, then the fixed and random effects estimators are consistent. In this case, we may choose the random effects estimator because it is more efficient. If we reject H_0, then the fixed effects estimator is the only consistent option and must be chosen. Random and Fixed Effects compared in this test use the same linear model of equation 1 with vector 3. This model presents 18 degrees of freedom.

Hausman Test	**Coefficient**	**Chosen Model**
P-value	$2.2e^{-16}$	Fixed Effects
R^2	141.76	

Table A.4: Hausman Test | 2019−2020 | Media Type Buzz

This table presents the Hausmann test for deciding between Random Effects Model and Fixed Effects Model. In this test, we define $H_0 : \beta_{RE} = \beta_{FE}$, which implies that in the null hypothesis, both coefficients are consistent. If we do not reject H_0, then the fixed and random effects estimators are consistent. In this case, we may choose the random effects estimator because it is more efficient. If we reject H_0, then the fixed effects estimator is the only consistent option and must be chosen. Random and Fixed Effects compared in this test use the same linear model of equation 1 with vector 4. This model presents 15 degrees of freedom.

Hausman Test	**Coefficient**	**Chosen Model**
P-value	$2.2e^{-16}$	Fixed Effects
R^2	143.06	

Table A.5: Variable Definition

Variable	***Description***	***Measurement***
Buzz	Sum of entity-specific ESG-related words and phrases on the media. It can be non-integer when any of the words/phrases are described with a "minimizer".	0 – Inf
ESG Controversies	An aggregate of media reports about a company's practices in violation of principled environmental, social, and governance behaviors.	0 – 100
Refinitiv's ESG Score	Weighted composite score calculated from specific metrics such as Climate Policy, Environmental Innovation, ResourceUse, HumanRights, Workforce, Improvement in Airborne Emissions	1 – 100
MSCI's Industry Adjusted ESG Score	Weighted score calculated from specific metrics such as Social, Environment and Governance, adjusted according to the industry standard	1 – 10
Market Value	The company's market value in an specific year	-Inf – Inf
Mentions	Simple count of the number of references to the company detected in the media	0 – Inf

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Table A.5 – *Continued from previous page*

Variable	***Description***	***Measurement***
Momentum	Stock return over the past 12 months (excluding the most recent month), capturing the continuation of past price trends	-Inf – Inf
News Buzz	Buzz including phrases and words only if they appeared in news' body texts	0 – Inf
News' Headlines Buzz	Buzz including phrases and words only if they appeared in news' headlines	0 – Inf
Overall Buzz	Buzz including all types of media, News, Social Media, News in Social Media and News' Headlines	0 – Inf
Social Media Buzz	Buzz including phrases and words only if they appeared in social media feeds or posts, that are not considered news	0 – Inf
Total Equity	The Company's Total Equity a said year	-Inf – Inf

Table A.6: MSCI's Industry Segments

Industry Segment	***Number of Companies***
Business Services	996
Consumer Cyclicals	2772
Consumer Non-Cyclicals	2304
Consumer Services	1296
Energy	1116
Finance	7344
Healthcare	3384
Industrials	3900
Non-Energy Materials	2376
Technology	3312
Telecommunications	384
Utilities	1104

Table A.7: Effect of Buzz and ESG on Returns from Random Effects Model

In this table we look to robust test our baseline findings. It shows the regression of stock e*Returns* against our vector of interest and control variables on a Random Effects model. Control variables include financial variables such as Market Value, Total Equity and Momentum. Vector of interests is defined in equations 3 and 3. This table has results for both *Overall Buzz* and *Buzz* discriminated in Media Types. When we look at both periods we can see that there is influence of media content on *Returns*, which falls in line with our baseline. Table A defines the variables. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level. Market Value and Total Equity from 2018 and 2017 were left out since they had extremely insignificant coefficients. Sectors with negligible variable coefficients were also omitted.

	Dependent Variable: Return$_{i,t}$					
	Overall Buzz$_{i,t}$			Buzz by Media Content		
	2019–2020 (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)	*2019–2020* (Aggregate)	*2019* (Pre COVID)	*2020* (Post COVID)
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	2.299***	2.323***	2.244**	2.572***	2.564***	2.444**
	(0.575)	(0.545)	(1.010)	(0.586)	(0.557)	(1.030)
Mentions$_{i,t}$	0.002**	0.0002	0.002*	0.003	−0.003	0.007
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.005)
Refinitv ESG_Score$_{i,t}$	0.002	−0.003	0.008	0.001	−0.002	0.004
	(0.005)	(0.005)	(0.010)	(0.006)	(0.005)	(0.010)
ESG_Controversies$_{i,t}$	−0.009**	0.004	−0.022***	−0.010**	0.003	−0.021***
	(0.004)	(0.004)	(0.007)	(0.004)	(0.004)	(0.008)
Overall_Buzz$_{i,t}$	−0.00000	−0.00000	−0.00001			
	(0.00000)	(0.00000)	(0.00001)			
Social_Media_Buzz$_{i,t}$				−0.001	0.002	−0.003
				(0.001)	(0.001)	(0.002)
News_Buzz$_{i,t}$				0.001*	0.001**	0.001
				(0.0005)	(0.0005)	(0.001)
News_Headlines_Buzz$_{i,t}$				−0.024**	−0.032***	−0.010
				(0.009)	(0.009)	(0.018)
Consumer_Cyclicals	1.455***	0.506	2.431***	1.402***	0.430	2.459***
	(0.522)	(0.493)	(0.924)	(0.531)	(0.502)	(0.937)
Consumer_Services	0.646	−0.571	1.920*	0.644	−0.735	2.137**
	(0.596)	(0.561)	(1.055)	(0.606)	(0.572)	(1.069)
Energy	0.359	−1.112*	1.934*	0.304	−1.386**	2.138*
	(0.624)	(0.585)	(1.112)	(0.634)	(0.595)	(1.126)
Healthcare	0.656	−0.143	1.552*	0.561	−0.344	1.618*
	(0.511)	(0.482)	(0.905)	(0.518)	(0.489)	(0.916)
Technology	1.528***	0.912*	2.115**	1.414***	0.617	2.197**
	(0.512)	(0.482)	(0.909)	(0.520)	(0.491)	(0.922)
Momentum	−0.006**	−0.007**	−0.005	−0.006**	−0.006**	−0.007
	(0.003)	(0.003)	(0.005)	(0.003)	(0.003)	(0.005)
Observations	30,276	15,144	15,132	29,588	14,782	14,806
R^2	0.003	0.003	0.005	0.004	0.004	0.006
Time Periods (months)	24	12	12	24	12	12

Table A.8: Effect from ESG Buzz and ESG Controversies on Stock Returns Controlling by Specific Economic Sectors using Fixed Effects Model

This table presents the results for the regressions utilizing fixed effects model on samples controlled by RBICS Industry types. We utilize this results to check our results obtained in the Robust Check section where we run OLS on Industry-controlled (RBICS) samples in Table 6. We find some heterogeneity in between industries regarding the significance of some variables.

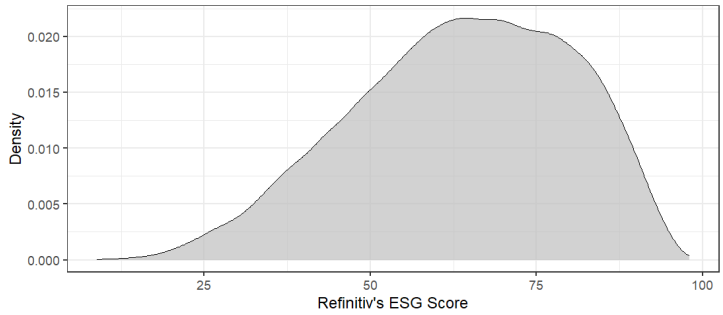
	Dependent Variable: Return$_{i,t}$											
	Technology	*Non Energy Materials*	*Consumer Non Cyclical*	*Industry*	*Utilities*	*Consumer Cyclicals*	*Healthcare*	*Consumer Service*	*Finance*	*Energy*	*Telecomm*	*Business Services*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Social_MediaBuzz$_{i,t}$	−0.004*	−0.097***	0.003	−0.024**	−0.042*	0.001	0.0002	−0.006	0.001	0.027	−0.025	0.015
	(0.002)	(0.028)	(0.005)	(0.011)	(0.023)	(0.009)	(0.006)	(0.011)	(0.007)	(0.049)	(0.028)	(0.047)
News_Buzz$_{i,t}$	0.003**	0.020**	0.006***	−0.0003	0.003	0.005	0.003	0.007	0.003	−0.005	0.010	0.007
	(0.001)	(0.009)	(0.002)	(0.002)	(0.005)	(0.005)	(0.002)	(0.007)	(0.002)	(0.012)	(0.010)	(0.007)
News_Headlines_Buzz$_{i,t}$	−0.063**	−0.185*	−0.149***	0.007	−0.253***	−0.093	−0.086*	−0.065	0.039	−0.193	0.016	−0.070
	(0.030)	(0.097)	(0.048)	(0.030)	(0.078)	(0.072)	(0.051)	(0.110)	(0.034)	(0.213)	(0.141)	(0.048)
Mentions$_{i,t}$	0.009	0.166**	−0.005	0.065**	0.073	0.023	−0.002	0.021	0.008	0.097	0.034	0.012
	(0.006)	(0.069)	(0.011)	(0.028)	(0.052)	(0.026)	(0.013)	(0.025)	(0.014)	(0.136)	(0.069)	(0.091)
ESG_Controversies$_{i,t}$	−0.036	−0.056**	−0.082***	−0.076***	−0.009	−0.134***	0.016	−0.101*	−0.012	−0.074	−0.003	−0.042
	(0.029)	(0.028)	(0.028)	(0.024)	(0.022)	(0.038)	(0.020)	(0.058)	(0.013)	(0.093)	(0.070)	(0.039)
Refinitv ESG_Score$_{i,t}$	−0.064*	0.003	0.009	0.005	0.001	0.039	−0.039	0.002	−0.006	−0.018	−0.138	0.037
	(0.036)	(0.040)	(0.041)	(0.030)	(0.031)	(0.054)	(0.031)	(0.062)	(0.020)	(0.113)	(0.088)	(0.061)
Momentum	−0.025***	−0.029**	−0.053***	−0.027**	−0.077***	−0.014	−0.041***	−0.034	−0.042***	−0.064	−0.031	−0.028
	(0.009)	(0.013)	(0.013)	(0.011)	(0.019)	(0.011)	(0.009)	(0.025)	(0.010)	(0.063)	(0.028)	(0.021)
Observations	3,279	2,302	2,260	3,820	1,101	2,679	3,343	1,256	7,100	1,093	379	976
R^2	0.008	0.013	0.018	0.008	0.033	0.011	0.008	0.007	0.005	0.025	0.036	0.008
Time Periods (months)	24	24	24	24	24	24	24	24	24	24	24	24

Table A.9: Effect from ESG Buzz and ESG Controversies for Specific Sectors

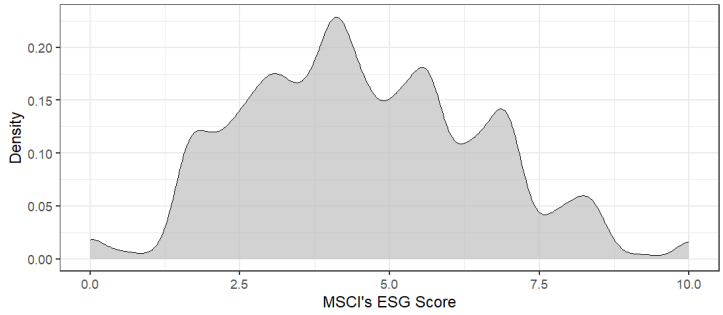
This table presents the results for the regressions utilizing OLS on samples controlled by RBICS Industry types. We find some heterogeneity in between industries regarding the significance of some variables. Here we find industries with no or little effect on our variables of interest.

	Dependent Variable: Return$_{i,t}$					
	Non Energy Materials	*Consumer Cyclicals*	*Healthcare*	*Consumer Service*	*Finance*	*Energy*
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	3.194**	6.757***	6.757***	0.828	2.521	1.888
	(1.322)	(1.640)	(2.480)	(0.559)	(3.958)	(1.976)
$Social\_MediaBuzz_{i,t}$	−0.019	0.001	−0.003	0.002	0.027	0.012
	(0.017)	(0.008)	(0.009)	(0.006)	(0.040)	(0.043)
$News\_Buzz_{i,t}$	0.006	0.005	0.004	0.002	0.003	0.005
	(0.008)	(0.004)	(0.006)	(0.002)	(0.011)	(0.006)
$News\_Headlines\_Buzz_{i,t}$	−0.101	−0.091	−0.071	0.037	−0.226	−0.022
	(0.091)	(0.066)	(0.102)	(0.032)	(0.201)	(0.030)
$Mentions_{i,t}$	0.042	0.018	0.018	−0.002	0.040	−0.001
	(0.053)	(0.021)	(0.020)	(0.011)	(0.111)	(0.075)
$ESG\_Controversies_{i,t}$	−0.019	−0.026	−0.013	−0.004	0.025	−0.025
	(0.017)	(0.021)	(0.031)	(0.007)	(0.049)	(0.022)
$Refinitv\ ESG\_Score_{i,t}$	0.005	−0.028	−0.048	0.014	−0.031	0.010
	(0.021)	(0.026)	(0.036)	(0.009)	(0.057)	(0.032)
Momentum	−0.014	−0.002	−0.013	−0.015**	−0.032	−0.006
	(0.010)	(0.009)	(0.018)	(0.007)	(0.038)	(0.016)
Observations	2,302	2,679	1,256	7,100	1,093	976
R^2	0.003	0.007	0.006	0.002	0.018	0.005
Time Periods (months)	24	24	24	24	24	24

B Appendix B



Panel (a): Refinitiv's ESG Score Distribution



Panel (b): MSCI's Industry-adjusted ESG Score Distribution

Figure B.1: Utilized ESG Scores' Distribution

Note: This figure depicts Refinitiv's and MSCI's ESG Score Distribution

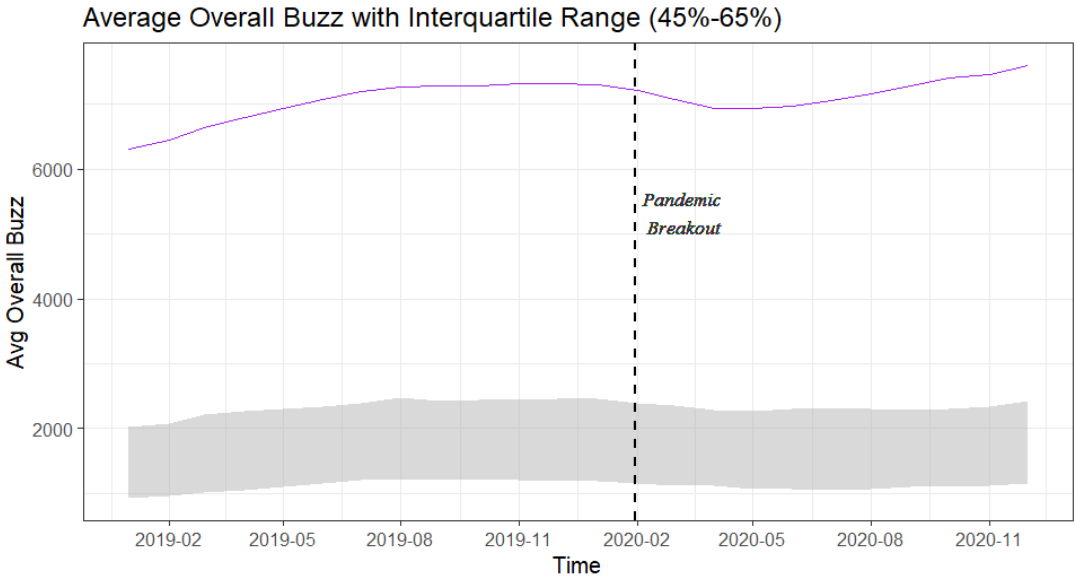


Figure B.2: Overall Buzz across time
Note: This figure depicts *Overall Buzz* over time

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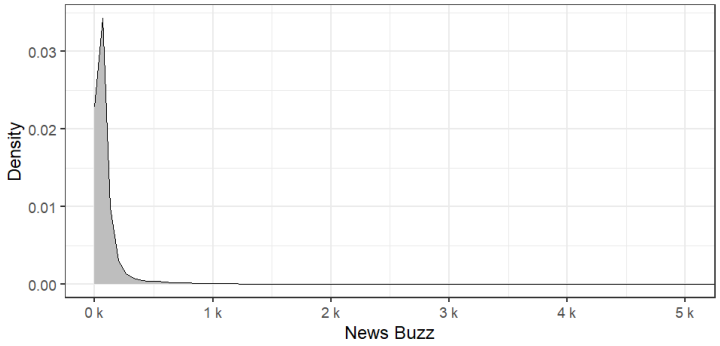
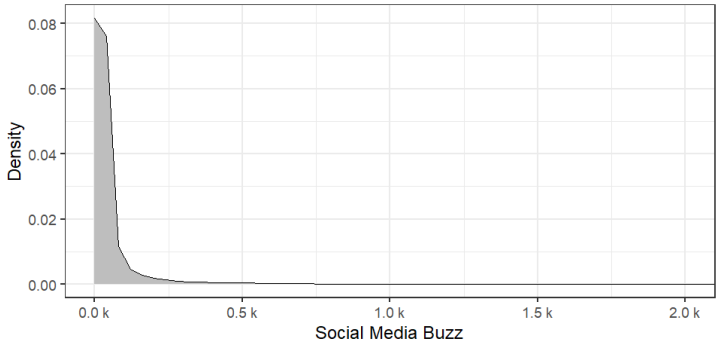
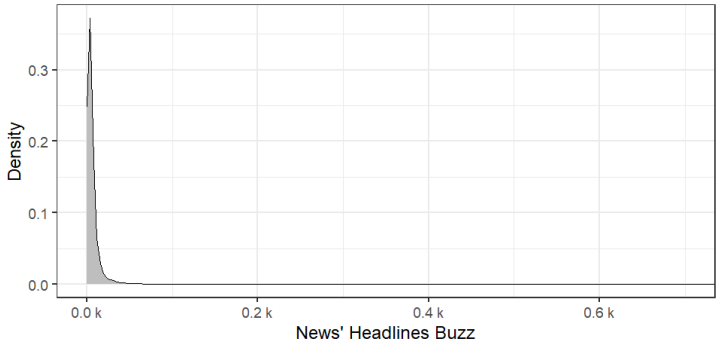
We clustered standard errors by ticker to account for the obvious serial correlation in daily firm returns and prevent spurious significance from the panel structure. The



Panel (a): Firm's News Buzz Distribution



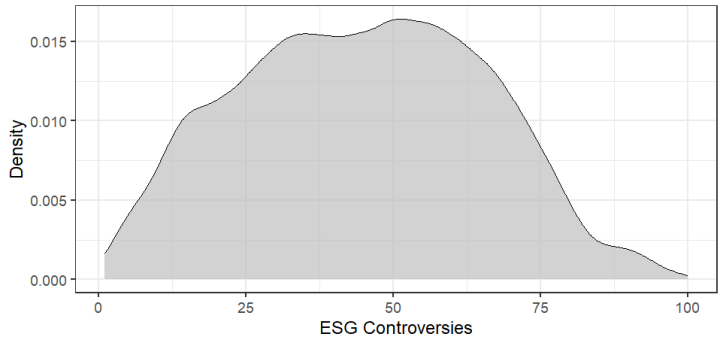
Panel (b): Firm's Social Media Buzz Distribution



Panel (c): Firm's News Headlines Buzz Distribution

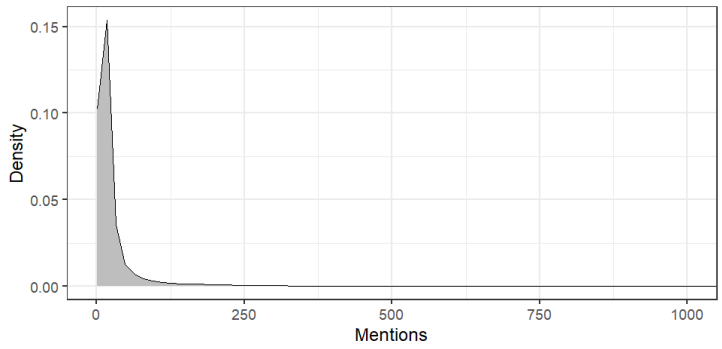
Figure B.3: Specific Media Channels' Buzz

Note: This figure illustrates the distribution of Media Specific *Buzz* Values. Panel (a) presents the distribution of values in News' body texts, Panel (b) showcases the distribution for Social Media and Panel (c) for News Headlines. We can see that the distribution follows the same shape as *Overall Buzz*



Panel (a): Firm's ESG Controversies Distribution

This figure illustrates *ESG Controversies*'s distribution, which resembles a normal curve.



Panel (b): Mentions' Distribution

Figure B.4: ESG Controversies and Mentions Distribution

Note: This figure illustrates the distribution of ESG Controversies and Mentions. ESG distribution appears resemble to a normal distribution while Mentions' is a highly right skewed asymmetrical distribution, with a strong right tail, similarly to Overall Buzz.

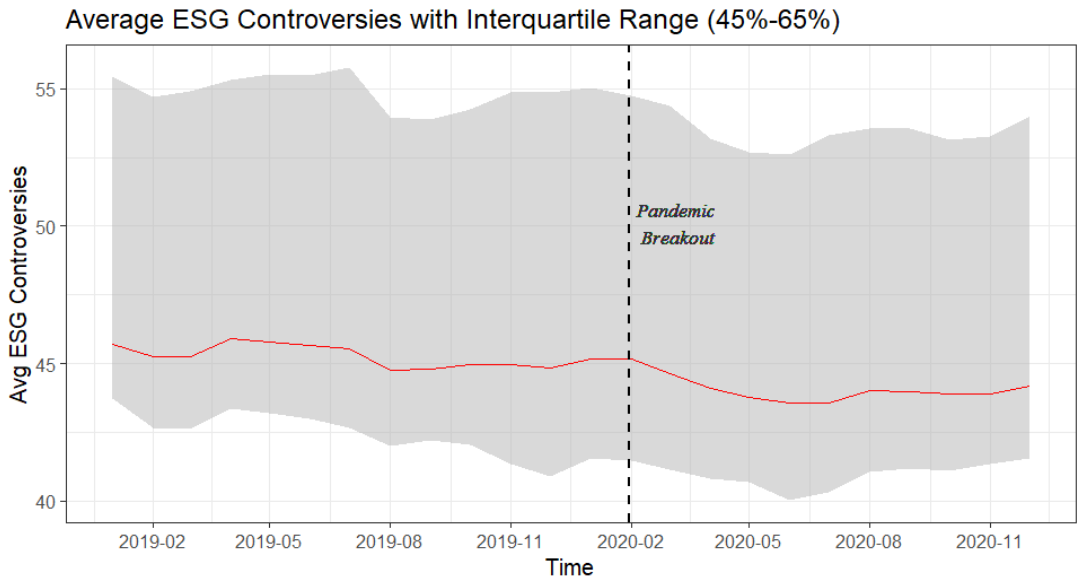


Figure B.5: ESG Controversies across time

Note: This figure depicts ESG Controversies the average value and 45% quartile to 65% quartile range across time.

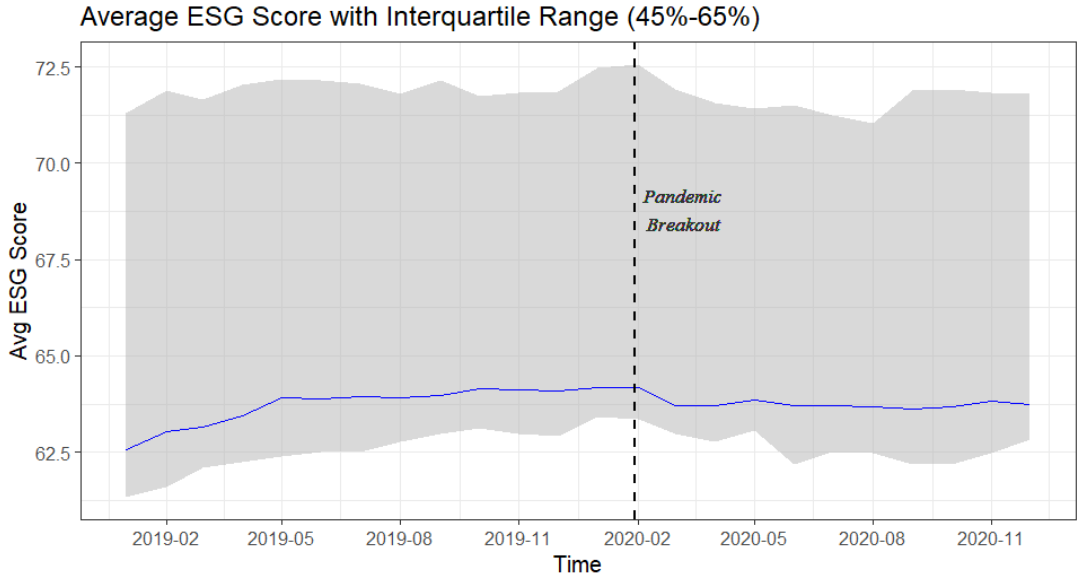


Figure B.6: Refinitv's ESG Score across time

Note: This figure depicts Refinitiv's ESG Score the average value and 45% quartile to 65% quartile range across time.

Two-Way Fixed Effects (Firm & Month) were necessary to control for time-invariant unobserved heterogeneity (firm DNA) and common time shocks (like the COVID crash), ensuring we are identifying off the within-firm variation rather than cross-sectional differences.