The Impact of Misleading Corporate Communication on Stock Performance

Lewei He*[1,2], Harald Lohre[1,2], Ingmar Nolte[1], and Chelsea Yao[1]

[1]Department of Accounting and Finance,
Lancaster University Management School, Lancaster University
[2]Robeco

ABSTRACT

The rise of sustainable investing puts companies under pressure to align with ESG criteria to meet investor expectations. Consequently, there is a heightened incentive for companies to engage in ESG-related misleading corporate communication that overstates their sustainability profile. However, such ESG washing pose a significant reputation risk if exposed, potentially impacting stock prices once materialized. Indeed, we observe a stark increase in the number of misleading communication incidents among all US-listed companies, rising from 18 in 2007 to 690 in 2022. Notably, governance washing incidents consistently led to significant negative abnormal returns, while the negative impact of greenwashing incidents became apparent after 2015. Social washing-related incidents lack significance over the sample period. The impact of misleading communication incidents is typically immediate upon disclosure but tends to dissipate within two weeks thereafter.

JEL classification: G14, G40, Q51, Q56.

Keywords: Misleading Communication; Environmental, Social and Governance (ESG); ESG incidents; Greenwashing; Event Studies; Market Efficiency; Behavioral Finance.

*Corresponding author: l.he6@lancaster.ac.uk.

1. Introduction

Given the surge in sustainable investing, evaluating corporate responsibility has become a pivotal aspect of investors' asset selection processes. This emphasis on goodwill not only incentivizes companies to align profitability with positive societal impact but also raises concerns about firms exaggerating their actual contributions to the broader stakeholder community. In essence, there is a growing trend where corporations are not only inclined to engage in "misleading communication" in their marketing efforts for products and services but are also increasingly prone to overstate their commitment to environmental, social, and governance (ESG) practices as Wu et al. (2020) discuss. These actions pose significant reputation risks to the company and its investors. Once such reputation risks materialize, particularly when the company's involvement in misleading communication practices is exposed, market penalties are expected. This research aims at understanding the impact of such misleading communication incidents on the stock price performance.

The most prevalent type of misleading communication in the past decade is greenwashing, characterized by the United Nations as "misleading the public to believe that a company or other entity is doing more to protect the environment than it is, promoting false solutions to the climate crisis that distract from and delay concrete and credible action."[1] This definition clearly underscores the deceptive nature of greenwashing - misleading the public about environmental efforts. This concept can be further deconstructed into two components: "misleading" and "environment". Consequently, misleading communication can be considered as an overarching term, with environment as one aspect. To better understand the mechanism, our research focuses on the overall misleading communication.

In the literature review of Lyon and Montgomery (2015), eleven varieties of misleading communications were delineated, among them: *Means/End decoupling*, as identified by Bromley and Powell (2012), denotes a disconnect between an organization's actions and its

[1] Greenwashing - the deceptive tactics behind environmental claims `https://www.un.org/en/climatechange/science/climate-issues/greenwashing`

stated goals; *Symbolic management*, elucidated by Ramus and Montiel (2005), entails a disparity between promises made and actions taken; *Astroturf lobbying*, described by Lyon and Maxwell (2004), involves financing a "front group" to advocate a position more credibly than the actual sponsor; *Pooling*, recognized by Delmas and Burbano (2011), refers to mimicking the actions of a more capable entity to appear comparable; *Selective disclosure*, as articulated by Lyon and Maxwell (2011), involves divulging positive information while concealing negative aspects. Furthermore, Lyon and Maxwell outline six additional types of misleading communication. These instances underscore the diverse strategies employed in misleading communication practices across various industries and contexts.

To uncover such instances of misleading communication, our study employs RepRisk's Risk Incidents database. This database scans through a vast array of over 100,000 public sources every day, spanning print media, online platforms, social media channels, blogs, governmental bodies, regulatory agencies, think tanks, newsletters, and various online outlets. These sources encompass a spectrum from international to regional, national, and local levels. Documents sourced from these outlets undergo thorough analysis for relevance, sentiment scoring, entity detection, and issue classification, aiding in the identification of pertinent risk incidents. Detailed description regarding the data structure can be found in 2.1.

This RepRisk's Risk Incidents database is widely utilised on a diverse range of topics related to ESG. Lin et al. (2023) delve into the realm of supply chain ESG risk and portfolio performance, scrutinizing the prevalence of ESG incidents linked to company suppliers. Their study reveals that portfolios featuring minimal exposure to supply chain ESG risk consistently outperformed those with heightened exposure, suggesting a potential avenue for generating alpha. Derrien et al. (2022) explore the aftermath of ESG incidents on earnings forecasts, discovering a tendency among analysts to downwardly revise forecasts post-incident. This adjustment primarily stems from the anticipation of reduced company revenues following such occurrences. Gantchev et al. (2022) scrutinize the behavior of investors, particularly those with heightened awareness of environmental and social (E&S)

concerns, following ESG incidents. Their findings underscores that E&S-conscious investors exhibits a heightened propensity for reacting to such events, often resulting in pronounced sell-offs, particularly in companies with a substantial E&S-conscious investor base.

Among these studies, some leverage the event study methodology to comprehend the impact of incidents on market sentiment towards the company. Gantchev et al. (2022) observe significant negative abnormal stock returns over three- and five-day periods surrounding ESG incidents recorded in the RepRisk's Risk Incidents database. Delving into options markets, Orpiszewski et al. (2023) noted a tendency for implied volatility to surge when companies encounter significant ESG risk incidents.

The research most closely related to our study is conducted by Akyildirim et al. (2023). The authors investigate market reactions to any greenwashing incidents and find that companies frequently face penalties in the form of negative abnormal stock returns for deceptive environmental claims. Examining any greenwashing incidents on a country-by-country basis, they identify regional disparities in the outcomes, with a more pronounced investor response observed in Canada, Germany, Italy, and the US.

In our research, we focus on all US-listed companies with an exposure to misleading communication incidents as RepRisk recorded. We categorize misleading communication incidents obtained from the the RepRisk's Risk Incidents database into four distinct groups: green and social washing, only greenwashing, only social washing, and only governance washing. This classification follows the literature and RepRisk's definition, and allows for a comprehensive understanding of these distinct events. Our analysis reveals a consistent upward trend in the number of misleading communication incidents over the period from 2007 to 2022. Specifically, the total number has increased from 18 in 2007 to 690 in 2022. Breaking down these figures, instances of green and social washing increased from 1 to 212, greenwashing incidents from 8 to 181, social washing incidents from 0 to 144, and governance washing incidents from 9 to 153. These findings underscore the escalating attention given to such misleading communication issues by the press and hence the general public.

We carry out an event study that reveals the impact of these different types of misleading communication incidents. Governance washing incidents, for instance, exhibit a significant negative abnormal return on the event day with at least 7.8 basis points in the most conservative scenario we investigate. This effect is particularly pronounced for more severe incidents with higher reach, and this impact has intensified in the more recent period, with at least 73 basis points on the event day. Similarly, greenwashing incidents begin to elicit more negative sentiment in the post-2015 period, following the signing of the Paris Agreement. Again, the impact is amplified in incidents of higher severity and reach, with abnormal return of at least 51.3 basis points on the immediate trading day after the event day. Our findings reflect changing investor preferences over the long term, as risks associated with governance washing and greenwashing are increasingly recognized and have clearer pathways to materialization. This finding resonates with the research conducted by Mackey et al. (2007), which suggests that publicly traded firms may engage in socially responsible activities that do not necessarily optimize future cash flows. Instead, these activities may align with investor preferences, ultimately maximizing the market value of the firm.

Moreover, an examination of various event windows reveals that the effects of misleading communication incidents are most pronounced immediately following an incident, underscoring the market's efficiency in processing such news. In contrast, none of the scenarios studied demonstrate statistically significant results on longer horizons over one month following an incident, suggesting that, on average, misleading communication incidents do not precipitate a paradigm shift in the pricing of the company's stock. Indeed, this observation aligns with the shift in investor sentiment in the short term, wherein the materialization of reputation risk tends to increase volatility shortly thereafter. However, since these incidents typically do not impact the daily operation of a firm, the effect of such abrupt events diminishes quickly afterwards. This finding aligns with the conclusions drawn by Da et al. (2015), which indicate that investor sentiment can predict short-term returns but lack of statistical or economical significance in the long-term.

The key differences in this research compared to Akyildirim et al. (2023) are as follows: First, while Akyildirim et al. (2023) focus solely on greenwashing incidents, this research has a broader scope, investigating more types of incidents, including green and social washing and greenwashing, social washing and governance washing. This provides a more exhaustive insight into all types of misleading communication incidents. Second, instead of relying on a single model for estimating the expected return in the event study, we utilize three models including the market model, Fama and French (1993) three factors model, and the Carhart (1997) model. By adopting a joint test with Holm-Bonferroni method introduced by Holm (1979) in determining whether a (cumulative) abnormal return is significantly different from zero, it mitigates the bias inherent in using a single model which could potentially be misspecified. Third, our analysis introduces additional restrictions on the severity and reach of an incident. Moreover, we change the time period under consideration to focus on more prominent incidents and study the temporal dynamics of their influence. These methodological refinements contribute to a more comprehensive understanding of the impact of misleading communication incidents on stock performance.

The remainder of this paper is organized as follows: Section 2 outlines the data and methodology employed. In Section 3, the analysis of the data and event study results are presented. Section 4 concludes the paper.

2. Data and Methodology

2.1. Data

The data pertaining to misleading communication of US-listed companies is sourced from RepRisk, for the period from 2007 to 2022. RepRisk's Risk Incidents database utilizes a hierarchical labelling system, categorizing incidents into four overarching domains: Environmental, Social, Governance, and Cross-cutting. These four domains further branch into twenty-eight distinct ESG issues. Among these, misleading communication is identified as

a governance issue, encompassing instances where a company distorts facts to present itself in a positive light, but contradicts this image through subsequent actions, or by deceiving consumers about its products and services. The definition of misleading communication employed by RepRisk aligns with what the literature suggests.

RepRisk's 2022 report[2] on greenwashing introduces a specific definition for greenwashing incidents, as misleading communication incidents with an environmental aspect. Similarly, their 2023 report[3] on greenwashing and social washing provides an equivalent definition for social washing incidents. Consequently, misleading communication incidents can be categorized into four mutually exclusive groups: both green and social washing, only greenwashing (greenwashing hereafter), only social washing (social washing hereafter), and only misleading communication (governance washing hereafter, following an analogous definition as the other types).

Henceforth, RepRisk employs a comprehensive assessment framework for risk incidents, considering Severity, Reach, and Novelty. Severity evaluates the intensity of criticism or negative impact associated with an incident; Reach gauges the influence of the information source; and Novelty measures the newness of the incident for the company. Each dimension is classified into three levels: high, medium, and low, providing a nuanced understanding of the complexity associated with each reported incident.

To provide an intuitive impression on the four types of misleading communication with high reach, below are example incidents for each type recorded in the RepRisk's Risk Incidents database:

1. *Green and Social washing:* On 14 September, 2022, Guardian[4] reported that, yoga teachers and students worldwide are calling out lululemon for its reliance on coal-powered factories, which contradicts its ethical branding. Despite its motto empha-

[2]See 'Spotting greenwashing with ESG data' `https://www.reprisk.com/news-research/reports/spotting-greenwashing-with-esg-data`.

[3]See 'On the rise: Navigating the wave of greenwashing and social washing' `https://www.reprisk.com/news-research/reports/on-the-rise-navigating-the-wave-of-greenwashing-and-social-washing`.

[4]See 'Hundreds of yoga teachers call out lululemon over coal-powered factories' `www.theguardian.com/environment/2022/sep/14/hundreds-of-yoga-teachers-call-out-lululemon-over-coal-powered-factories`.

sizing harmony with the planet, internal documents reveal that almost half of the energy powering lululemon factories comes from coal. The company's emissions target includes reducing greenhouse gas emissions by 60% by 2030, but concerns persist regarding its massive Scope 3 emissions, largely from its supply chain. Moreover, Good on You, an organization that rates clothing brands, has criticized lululemon's policies and practices as inadequate, citing previous allegations of worker mistreatment.

2. *Greenwashing:* On 5 October 2020, Bloomberg[5] reprted that, Exxon Mobil Corp. has internally projected a significant increase in its carbon dioxide emissions, aligning with plans to expand fossil fuel production. Internal documents indicate a 17% rise in emissions by 2025, amid a $210 billion investment strategy. These projections do not include measures to mitigate emissions fully.
3. *Social Washing:* On 10 June 2022, ABC News[6] reported that, Federal prosecutors in Manhattan have launched a criminal investigation into Wells Fargo's hiring practices following reports that employees were instructed to conduct interviews with women and people of color, despite decisions already being made.
4. *Governance Washing:* On 29 September 2022, ABC News[7] reported that, victims of the Highland Park shooting in Illinois, which left several dead and many injured, are filing lawsuits against Smith & Wesson, the manufacturer of the firearm used in the attack. Allegations include irresponsible and unlawful marketing practices by the gun-maker, along with claims against online distributor Bud's Gun Shop and Illinois retailer Red Dot Arms for allegedly selling the weapon in violation of assault weapons bans.

Daily return data for companies is sourced from CRSP, while the common factor controls, returns, and risk-free rateare obtained from Kenneth French's website [8].

[5]See 'Exxon's Plan for Surging Carbon Emissions Revealed in Leaked Documents' `www.bloomberg.com/news/articles/2020-10-05/exxon-carbon-emissions-and-climate-leaked-plans-reveal-rising-co2-output`.

[6]See 'Wells Fargo under criminal investigation for hiring practices, source says' `www.abcnews.go.com/Business/wells-fargo-criminal-investigation-hiring-practices-source/story?id=85296669`.

[7]See 'Highland Park shooting victims file lawsuits against gun-maker over advertising practices' `www.abcnews.go.com/US/highland-park-shooting-victims-file-lawsuits-gun-maker/story?id=90630705`.

[8]See `https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html`.

2.2. Methodology

For assessing the impact of misleading communication incidents on corporate stock performance, we adopt an event study design, rooted in the notion of market rationality, wherein the effects of an event are promptly incorporated into security prices. Consequently, a gauge of the event's economic ramifications can be formulated by analyzing security prices observed over a relatively concise time frame. The event study design allows us to capture the immediate market response to misleading communication incidents, leveraging stock returns as indicators of investors' aggregate reactions. By examining abnormal returns and cumulative abnormal returns around the event date, we can discern the extent to which these incidents influence stock performance. This approach provides valuable insights into the financial repercussions of misleading communication incidents on the companies involved, shedding light on the efficiency of the market in processing and pricing such information.

In accordance with MacKinlay (1997), we define the event as the disclosure of misleading communication incidents. To comprehensively capture the market response surrounding this event, we employ a range of event windows:

1. *Front Run Identification:* Event windows such as [-5,-1], [-3,-1], and [-1] are utilized to detect potential front-running behavior occurring one week, half a week, and one day before the event, respectively. These windows facilitate the assessment of any anticipatory reactions in security prices leading up to the disclosure of misleading communication incidents.
2. *Event Day and Immediate Aftermath:* The event day itself, represented as [0], is pivotal for evaluating the immediate impact of disclosure. Additionally, we examine the subsequent trading day, [1], to discern any lingering effects or abrupt reversals following the event. It's important to note two special scenarios that, in cases where an incident occurs on a non-trading day we treat the immediate following trading day as [0], and since we do not have the exact timestamp of the news release, if the event occurs after normal trading hours, we still treat the trading day that has finished as [0].

3. *Short-Term Effects:* Event windows such as [1,3] and [1,5], corresponding to half a week and one week after the event, respectively, allow us to investigate short-term fluctuations in security prices. These windows capture the market's response in the days immediately following the disclosure, offering insights into any persistent trends or abrupt adjustments.
4. *Medium-Term Effects:* For an extended assessment, event windows like [1,10] and [1,21] are considered, covering two weeks and one month after the event, respectively. These windows provide a medium-term perspective, enabling us to identify sustained impacts on stock performance stemming from the misleading communication incidents. Note that we refrain from extending the analysis beyond one month after the event, considering the limitations of cumulative abnormal return computation over longer periods and the potential for shifts in stock exposure to factors over time, see Oler et al. (2007).

In each event window, for an event related specific firm i on day t, the abnormal return $AR_{i,t}$ is calculated as:

$$AR_{i,t} = R_{i,t} - E[R_{i,t}|\mathcal{F}_t],$$

where $R_{i,t}$ is the actual ex post return of the event-specific firm security$i$ on day t, and $E[R_{i,t}|\mathcal{F}_t]$ is the expected return of the security for firm i on day t, conditioned on the information $\mathcal{F}_t$ based on the estimation model. With the actual returns available, expected "normal" returns are estimated using three factor models. First the Market Model: The conditioning information $\mathcal{F}_t$ is defined as the market return minus the risk-free rate:

$$E[R_{i,t}|\mathcal{F}_t] = \alpha + \beta(R_{m,t} - R_{f,t}),$$

where $R_{m,t}$ is the return of the market index on day t, and $R_{f,t}$ is the risk-free rate on day t, so $(R_{m,t} - R_{f,t})$ is the excess return of the market portfolio.

Second, Fama and French (1993) extend the market model with two additional factors,

so the conditioning information $\mathcal{F}_t$ comprises the excess return of the market portfolio, as well as size (small minus big), and value (high minus low) factors:

$$E[R_{i,t}|\mathcal{F}_t] = \alpha + \beta_1(R_{m,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t,$$

where SMB_t is the size factor on day t, and HML_t is the value factor on day t.

Third, Carhart (1997) model extends on the Fama-French three factor model by a momentum factor:

$$E[R_{i,t}|\mathcal{F}_t] = \alpha + \beta_1(R_{m,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t,$$

where MOM_t is the 12M-1M momentum factor return on day t.

Irrespective of the choice of factor model, the estimation window is selected to span over eleven months, starting from twelve months prior to the actual event date and ending one month before the actual event date. The month immediately preceding the event day is dropped, to avoid a potential bias from the event. We further require at least 210 observations in the estimation window, ensuring a sufficient number of observations of daily returns for each event. Hence, the factor model parameters are estimated over the eleven-month estimation, and serve as the basis for calculating the expected returns and hence abnormal returns. Moreover, if one event happens in another event's estimation window, the latter is dropped to avoid bias from the previous event in estimation.

With the daily abnormal returns, the cumulative abnormal return for each event window can be obtained by summing over the abnormal returns in the event window:

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{i,t}$$

where $CAR_i(T_1, T_2)$ is the cumulative abnormal return of stock i during the event window starting from day T_1 to day T_2.

When assessing the impact of events on the market's perception of a company, a starting assumption is that if an event has no influence on the market's perspective, the cumulative abnormal return during the event window would be zero. Hence, we establish the following null and alternative hypothesis:

$$H_0 : E(CAR(T_1, T_2)) = 0, \qquad H_A : E(CAR(T_1, T_2)) \neq 0.$$

Instead of using the standard t-test, to test for the null hypothesis, we utilise the z-test proposed by Patell (1976) is utilised, accounting for the variance of the stock price during the estimation period, robust to the idiosyncratic volatility of the stock return. More specifically, instead of testing the cumulative abnormal return, the Patell z-test inspects the scaled cumulative abnormal return:

$$SCAR_i(T_1, T_2) = \frac{CAR_i(T_1, T_2)}{s_i\sqrt{T_2 - T_1}},$$

where $SCAR_i(T_1, T_2)$ is the scaled cumulative abnormal return of stock i during the event window starting from day T_1 to day T_2, and s_i is the regression residual standard deviation after estimating the models on the estimation window.

Consequently, the null and alternative hypothesis needs to be reformulated as:

$$H_0 : E(SCAR(T_1, T_2)) = 0, \qquad H_A : E(SCAR(T_1, T_2)) \neq 0.$$

The corresponding normalised z-statistics is then given by:

$$z_{Patell}(T_1, T_2) = \frac{\sum_{i=1}^{N} SCAR_i(T_1, T_2)}{(\sum_{j=1}^{N} \frac{K_i - 2}{K_i - 4})^{\frac{1}{2}}},$$

where N is the number of relevant events, and K_i is the number of non-missing return observations in the estimation period of stock i.

Based on the results obtained from the models, we apply the Holm-Bonferroni method developed by Holm (1979). This method involves sorting the m p-values obtained from

lowest to highest, $p_1, ..., p_m$. For each p-value, p_k, we test whether:

$$p_k < \frac{\alpha}{m + 1 - k},$$

where α represents the pre-specified significance level. If all the tested hypotheses can be rejected according to the Holm-Bonferroni method, it indicates that they are jointly significant at the specified significance level of α.

In our analysis, we have a total of $m = 3$ pairs of hypotheses. To assess joint significance at the 5% level, we calculate the significance level for rejection of each hypothesis after ranking as follows: 1.66%, 2.5%, and 5%, corresponding to critical z-values of 2.40, 2.24, and 1.96, respectively. If the absolute values of the z-statistics obtained from our analysis are higher than these critical values, we can reject the null hypothesis that the standardized cumulative abnormal return equals zero.

3. Empirical Results

In this section, we present the results of the empirical analysis. Section 3.1. begins with a descriptive analysis of incidents, covering their distribution across years, types, and their severity, reach, and novelty. Section 3.2. presents the outcomes of the event study analysis.

3.1. Descriptive Analysis

In accordance with RepRisk's definitions of greenwashing and social washing, Figure 1 illustrates the trends in the number of greenwashing and social washing incidents involving US-listed companies throughout the sample period.

As depicted in Figure 1, there is a discernible upward trajectory in the number of both greenwashing and social washing incidents, in spite of intermittent declines in 2013 and during 2016–2018. This suggests increasing scrutiny from the public on these events. Notably, the trends for greenwashing and social washing not only exhibit a high degree of correlation

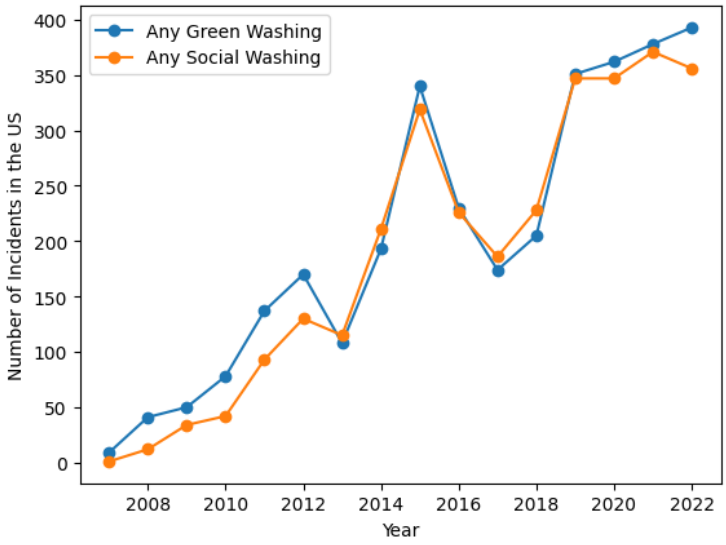

Fig. 1. **Number of any greenwashing and any social washing incidents.** This figure shows the number of greenwashing (blue) and social washing (orange) incidents in US listed companies across the sample period from 2007 to 2022.

but also close numerical proximity in terms of incidents per year. This implies the presence of a potential common factor influencing the occurrence of these incidents.

To unravel this phenomenon, both greenwashing and social washing are further categorized into two mutually exclusive components: green and social washing and only green (social) washing. To provide a comprehensive overview of misleading communication incidents, we also introduce incidents categorized as governance washing. This yields four distinct and collectively exhaustive types of misleading communication incidents. The criteria for all types of incidents used are summarized in Table 1.

Table 1. Types of Misleading Communication Incidents. This table shows the definition of all types of misleading communication incidents, with 'T' as true, and 'F' as false.

Type of Incidents	Environment	Social	Misleading Communication (Governance)
All Misleading Communication	T/F	T/F	T
Any Greenwashing	T	T/F	T
Any Social Washing	T/F	T	T
Green and Social Washing	T	T	T
Greenwashing	T	F	T
Social Washing	F	T	T
Governance Washing	F	F	T

With this breakdown of event types, Figure 2 visually presents the trends in the number of the different types of incidents, along with the overall misleading communication incidents involving US-listed companies from 2007 to 2022.

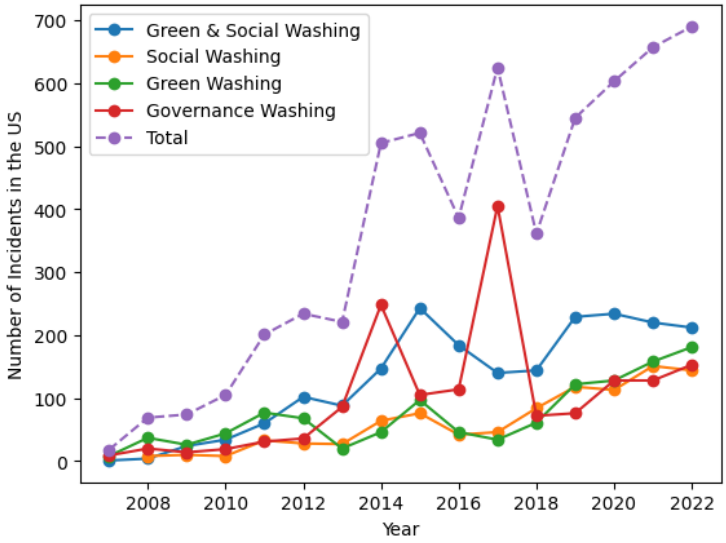

Fig. 2. **Number of distinct types of misleading communication incidents.** This figure shows the number of green & social washing (blue), social washing (orange), greenwashing (green), governance washing (red), and the total misleading communication (dashed) incidents in US-listed companies across the sample period from 2007 to 2022.

Similar to Figure 1, a general increasing trend is observed for all types of incidents, along with the rise in the overall numbers of misleading communication incidents. From 2012 onwards, the frequency of green and social washing incidents consistently surpasses that of greenwashing or social washing incidents, explaining the closely correlated trends between overall greenwashing and social washing incidents in Figure 1 as a common factor. Across the sample period, none of the four series exhibit negligible numbers. Notably, the trend of governance washing incidents differs slightly from the other three, marked by two spikes in 2014 and 2017. This suggests the importance of investigating these four incident types individually, given their distinct nature and non-negligible occurrence numbers.

With the number breakdown, we present the yearly averages of the three dimensions - severity, reach, and novelty - measuring incidents related to all misleading communication incidents concerning US-listed companies from 2007 to 2022, as illustrated in Figure 3.

Fig. 3. **Average characteristics for misleading communication incidents.** This figure shows the yearly average of severity (blue), reach (orange), and novelty (green) of misleading communication incidents related to US-listed companies across the sample period from 2007 to 2022.

As depicted in Figure 3, the yearly averages of severity and reach exhibit fluctuations around the level of 1.5, lower than the numerical average of 2. Notably, there appears to be a negative correlation between average severity and reach; years characterized by lower average severity tend to correspond to higher average reach in that same year, and vice versa. Regarding novelty, the yearly averages consistently hover around or above the 1.5 level, indicating a prevalence of first-time incidents over repeat occurrences to the same company or project.

The three dimensions can be further broken down into our four types of incidents, as depicted in Figure 4. It is evident that green and social washing incidents consistently exhibit high severity, low reach, and high novelty across the years. Social washing incidents display high severity, high reach, and high novelty. Conversely, greenwashing incidents are characterized by low severity, low reach, and low novelty, while governance washing incidents demonstrate low severity, high reach, and low novelty, with greater fluctuations compared to the other three types.

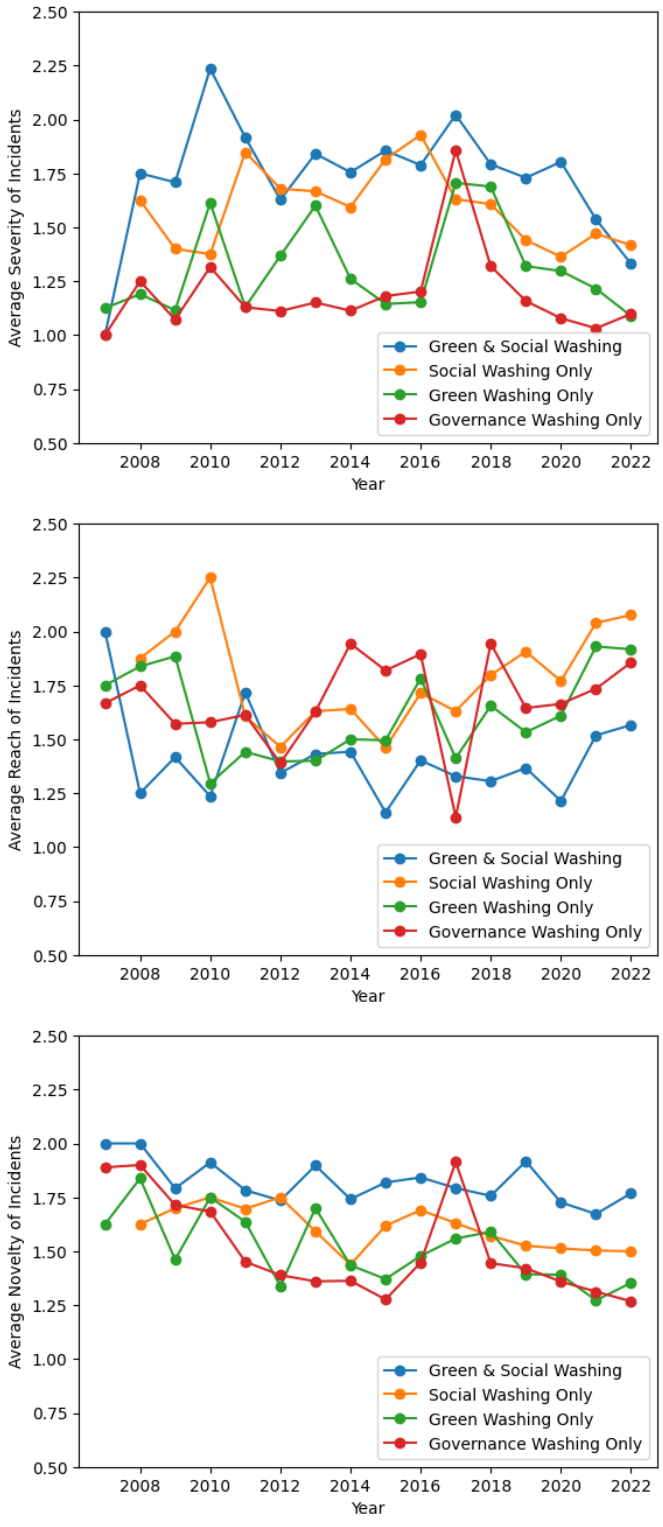

Fig. 4. **Severity, Reach, and Novelty across different incident types.** This figure shows the number of green and social washing (blue), social washing (orange), greenwashing (green), and governance washing (red) across the sample period from 2007 to 2022.

3.2. Event Study

In this section, the cumulative abnormal returns are calculated alongside the corresponding Patell z-statistic for each type of incident across the set of event windows. In the results tables, instances where the joint test for the three null hypotheses that can be rejected at 10% significance level are highlighted for indication. More specifically, the significance level for rejection of each hypothesis after ranking would be: 3.33%, 5%, and 10%, corresponding to critical z-statistics of 2.13, 1.96, and 1.65, respectively. However, the following analysis focuses on scenarios where the joint significance level surpasses 5%, signifying greater significance.

In Table 2, all misleading communication incidents involving US-listed companies from 2007 to 2022 are considered. Scenarios exhibiting a 5% confidence level in rejecting the null hypothesis include: the immediate day following a green and social washing incident in Panel B with the cumulative abnormal return less than -0.084%; and half a week before a social washing incident in Panel D, with the cumulative abnormal return less than and -0.188%. This indicates an immediate reaction to a green and social washing incident, as well as anticipation and front run preceding a social washing incident.

Note that the total number of events from Panel B to Panel E sums up to 6002, which exceeds the count of 5847 events in Panel A. This variation arises because our methodology prohibits events from overlapping across estimation windows. For instance, if a company experiences a greenwashing event within a year before a governance washing event, the latter event is excluded when examining all misleading communication incidents, whereas it remains included when analyzing the individual types separately. Consequently, the count of events in Panel A will consistently be less than or equal to the combined count across Panel B to Panel E in all subsequent tables.

Table 2. Cumulative abnormal return around misleading communication incidents: 2007 to 2022. N is the number of incidents for each type, and the cumulative abnormal return is displayed with its Patell z-statistic for each event window and estimation model. Results with the z statistic from all three models jointly significant at 10% level are highlighted.

Panel A. All Misleading Communication Incidents									
N=5847	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.028%	-0.036%	-0.043%	-0.039%	-0.042%	-0.035%	-0.027%	-0.142%	-0.183%
Patell Z	-0.71	-0.16	-1.16	-1.28	-0.98	-0.67	-0.13	-1.83	-1.51
Fama-French Three Factor	-0.118%	-0.098%	-0.065%	-0.035%	-0.072%	-0.022%	-0.026%	-0.162%	-0.324%
Patell Z	-1.35	-1.25	-1.97	-0.73	-1.73	-0.14	0.15	-2.14	-2.48
Fama-French Momentum	-0.076%	-0.058%	-0.044%	-0.036%	-0.062%	-0.047%	-0.027%	-0.111%	-0.206%
Patell Z	-0.59	-0.34	-1.22	-0.86	-1.45	-0.64	0.22	-1.64	-1.60

Panel B. Green and Social Washing									
N=2116	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.143%	0.093%	-0.039%	-0.002%	**-0.084%**	-0.065%	-0.081%	-0.110%	-0.130%
Patell Z	0.89	2.42	0.04	-0.04	**-2.23**	-1.98	-1.86	-0.80	-0.99
Fama-French Three Factor	-0.006%	-0.034%	-0.091%	-0.001%	**-0.116%**	0.008%	0.000%	-0.031%	-0.375%
Patell Z	0.15	0.35	-1.53	-0.17	**-2.86**	-0.85	-0.25	0.19	-1.66
Fama-French Momentum	0.048%	0.015%	-0.063%	0.001%	**-0.113%**	-0.064%	-0.055%	0.028%	-0.237%
Patell Z	0.64	1.02	-0.98	-0.31	**-3.00**	-1.72	-0.89	-0.03	-1.60

Panel C. Greenwashing									
N=1203	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.037%	0.021%	0.003%	-0.013%	-0.051%	-0.059%	-0.034%	-0.067%	-0.055%
Patell Z	-0.93	-0.54	-0.64	0.73	-0.46	0.27	0.91	-0.78	-0.77
Fama-French Three Factor	-0.051%	-0.015%	-0.003%	-0.009%	-0.057%	-0.063%	-0.090%	-0.221%	-0.276%
Patell Z	-0.34	-0.16	-0.14	1.37	-0.20	0.96	0.66	-1.65	-1.34
Fama-French Momentum	0.004%	0.023%	0.012%	-0.019%	-0.050%	-0.074%	-0.092%	-0.214%	-0.183%
Patell Z	0.28	0.34	0.54	1.10	0.09	0.68	0.70	-1.54	-0.89

Panel D. Social Washing									
N=988	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.131%	**-0.188%**	-0.067%	-0.050%	0.017%	0.055%	0.213%	0.091%	0.042%
Patell Z	-1.28	**-2.20**	-1.63	-1.03	-0.03	0.31	1.50	0.28	0.76
Fama-French Three Factor	-0.310%	**-0.260%**	-0.061%	-0.073%	-0.025%	0.018%	0.153%	0.013%	-0.137%
Patell Z	-2.36	**-2.74**	-1.57	-1.20	-0.18	0.02	1.20	-0.07	0.22
Fama-French Momentum	-0.294%	**-0.231%**	-0.063%	-0.065%	-0.028%	0.014%	0.204%	0.028%	-0.018%
Patell Z	-2.58	**-2.72**	-1.82	-1.05	-0.22	0.03	1.77	0.21	0.81

Panel E. Governance Washing									
N=1695	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.147%	-0.125%	-0.073%	-0.109%	-0.024%	-0.014%	-0.093%	-0.324%	-0.419%
Patell Z	-0.26	-0.78	-0.80	-2.53	0.53	0.56	-0.10	-2.04	-1.66
Fama-French Three Factor	-0.174%	-0.130%	-0.098%	-0.078%	-0.053%	-0.035%	-0.097%	-0.338%	-0.343%
Patell Z	-0.42	-0.56	-1.45	-1.64	-0.06	-0.04	-0.59	-2.55	-1.75
Fama-French Momentum	-0.140%	-0.089%	-0.062%	-0.083%	-0.026%	-0.025%	-0.056%	-0.242%	-0.221%
Patell Z	0.13	0.10	-0.74	-1.66	0.46	0.22	-0.09	-1.54	-0.83

Given the measurement dimensions of a risk incident, events characterized by minimal consequences, small impact, and accidental causes (low severity), or those reported by sources such as local media, local governmental bodies, and social media (low reach) may not be as salient to the market compared to incidents with higher severity and reach. Therefore, to study the market impact of events with greater significance, we narrow our focus to misleading communication incidents with at least medium severity and medium reach, which is similar to the choice by Groen-Xu and Zeume (2021), where they restrict to high severity high reach due to the wider scope of all ESG incidents they investigate. This refined scope enables us to analyze events that are more likely to have noticeable effects on market dynamics. As in Table 3, scenarios significant at 5% confidence level include: the immediate day following a greenwashing incident in Panel C, with the daily abnormal return lower than -0.386%; and the event day of governance washing event in Panel E, with the daily abnormal return lower than -0.510%. Both are statistically and economically significant.

Comparing the results presented in Table 2 and Table 3 reveals that there are no overlapping results. The only scenario showcasing some significance in both tables is the event day of governance washing events, which is only significant at 20% level for the whole sample but significant at 5% level in the medium severity and medium reach setting. This suggests that the effects observed for green and social washing events, as well as social washing events, are primarily driven by incidents with low severity or low reach which are less observable to investors. However, for greenwashing incidents, the negative impact becomes evident only after restricting the analysis to events with at least medium severity and medium reach. This highlights the importance of considering the severity and reach of incidents when assessing their impact on market dynamics.

Table 3. Cumulative abnormal return around misleading communication incidents: At least medium severity and medium reach from 2007 to 2022. N is the number of incidents for each type, and the cumulative abnormal return is displayed with its Patell z-statistic for each event window and estimation model. Results with the z statistic from all three models jointly significant at 10% level are highlighted.

Panel A. All Misleading Communication Incidents									
N=928	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.011%	-0.059%	0.007%	-0.084%	-0.022%	-0.038%	0.067%	-0.192%	-0.151%
Patell Z	-0.44	-0.48	0.60	-1.49	-1.06	-0.30	0.77	-0.70	0.15
Fama-French Three Factor	-0.089%	-0.013%	0.027%	-0.106%	-0.042%	-0.070%	0.046%	-0.113%	-0.264%
Patell Z	-0.69	0.09	0.33	-1.55	-0.86	-0.27	1.15	0.17	0.39
Fama-French Momentum	-0.031%	0.027%	0.013%	-0.109%	-0.080%	-0.117%	0.062%	-0.050%	-0.074%
Patell Z	-0.52	0.30	0.22	-1.86	-1.44	-0.45	1.60	0.69	1.08

Panel B. Green and Social Washing									
N=468	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.108%	-0.188%	-0.107%	-0.130%	0.021%	0.104%	0.305%	-0.122%	0.226%
Patell Z	-0.28	0.13	-0.30	-1.49	-0.66	0.34	0.96	-0.40	0.90
Fama-French Three Factor	-0.112%	-0.051%	-0.033%	-0.113%	0.001%	0.125%	0.286%	0.100%	0.033%
Patell Z	0.35	1.18	-0.30	-1.23	-0.15	1.05	1.61	1.07	1.14
Fama-French Momentum	0.015%	0.053%	-0.020%	-0.108%	-0.052%	0.019%	0.255%	0.155%	0.275%
Patell Z	0.86	1.73	0.07	-1.44	-0.84	0.53	1.65	1.28	1.66

Panel C. Greenwashing									
N=110	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.041%	0.296%	0.356%	-0.062%	**-0.386%**	**-0.532%**	-0.573%	-0.678%	0.559%
Patell Z	-0.59	0.29	1.94	0.12	**-2.59**	**-1.73**	-0.83	-0.71	0.14
Fama-French Three Factor	-0.355%	0.154%	0.240%	-0.153%	**-0.388%**	**-0.698%**	-0.566%	-0.890%	0.252%
Patell Z	-1.67	-0.21	1.40	0.02	**-2.68**	**-1.99**	-0.47	-0.77	0.50
Fama-French Momentum	-0.396%	0.112%	0.217%	-0.169%	**-0.386%**	**-0.705%**	-0.477%	-0.795%	0.295%
Patell Z	-1.92	-0.55	1.06	-0.20	**-2.71**	**-2.13**	-0.18	-0.69	0.30

Panel D. Social Washing									
N=259	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.188%	0.010%	-0.006%	0.111%	-0.022%	0.006%	0.079%	0.016%	-0.673%
Patell Z	0.17	-0.63	-0.87	0.51	-0.49	0.07	0.85	0.25	-0.44
Fama-French Three Factor	-0.009%	-0.036%	-0.017%	0.058%	-0.027%	-0.025%	0.034%	0.006%	-0.642%
Patell Z	-0.37	-0.76	-0.74	0.22	-0.28	-0.09	0.73	0.09	-0.68
Fama-French Momentum	-0.030%	-0.075%	-0.072%	0.053%	-0.054%	0.000%	0.084%	0.018%	-0.478%
Patell Z	-0.56	-0.81	-1.17	0.19	-0.35	0.16	1.07	0.32	-0.26

Panel E. Governance Washing									
N=97	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.127%	-0.047%	0.142%	**-0.510%**	0.193%	-0.257%	-0.394%	-0.568%	-1.360%
Patell Z	-0.22	-1.02	1.62	**-3.19**	1.80	0.09	-0.25	-1.13	-0.94
Fama-French Three Factor	0.157%	0.012%	0.142%	**-0.572%**	0.126%	-0.361%	-0.364%	-0.625%	-1.240%
Patell Z	-0.37	-0.94	1.12	**-3.51**	1.11	-0.71	-0.61	-1.36	-0.71
Fama-French Momentum	0.201%	0.040%	0.120%	**-0.591%**	0.084%	-0.380%	-0.320%	-0.438%	-1.120%
Patell Z	-0.41	-1.04	1.00	**-3.75**	0.95	-0.52	-0.29	-0.73	-0.30

Furthermore, given the growing attention to misleading communication incidents as depicted in Figure 1 and Figure 2, and the signing of the Paris Agreement on climate change in 2015, public focus on ESG issues, particularly the environmental aspect, has intensified compared to previous periods. Consequently, it is valuable to examine the temporal dynamics of the market's reaction to these incidents. To this end, a new sample is constructed by limiting observations to the period from 2015 to 2022, instead of the original sample starting from 2007. The results are presented in Table 4. The only scenario significant at the 5% level is two weeks after a greenwashing incident in Panel C, with the cumulative abnormal return less than -0.248%.

Comparing the outcomes between the full sample presented in Table 2 and the more recent sample showcased inTable 4, the sole scenario displaying significance at a 20% level remains the governance washing incident on the event day, exhibiting heightened statistical and economic significance for the more recent timeframe. Furthermore, the influence of green and social washing, as well as social washing incidents, vanishes in the recent sample, implying that the observations in Table 2 were predominantly influenced by the period preceding 2015. Conversely, for greenwashing incidents, across all event windows from the immediate day after to two weeks following the event, the significance level notably increases for the recent sample, indicative of the amplified attention towards greenwashing post-2015.

Table 4. Cumulative abnormal return around misleading communication incidents: 2015 to 2022. N is the number of incidents for each type, and the cumulative abnormal return is displayed with its Patell z-statistic for each event window and estimation model. Results with the z statistic from all three models jointly significant at 10% level are highlighted.

Panel A. All Misleading Communication Incidents									
N=4422	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.024%	0.002%	-0.039%	-0.045%	**-0.047%**	-0.057%	-0.053%	**-0.171%**	-0.112%
Patell Z	0.56	0.61	-1.12	-1.57	**-1.76**	-1.63	-1.15	**-2.29**	-0.65
Fama-French Three Factor	-0.103%	-0.090%	-0.066%	-0.040%	**-0.081%**	-0.022%	-0.033%	**-0.174%**	-0.255%
Patell Z	-0.38	-0.95	-1.89	-0.88	**-2.36**	-0.65	-0.45	**-2.29**	-1.44
Fama-French Momentum	-0.056%	-0.044%	-0.043%	-0.040%	**-0.074%**	-0.063%	-0.048%	**-0.122%**	-0.126%
Patell Z	0.30	-0.04	-1.21	-0.69	**-2.09**	-1.34	-0.55	**-1.81**	-0.57

Panel B. Green and Social Washing									
N=1648	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.261%	0.173%	-0.014%	0.040%	-0.067%	-0.086%	-0.072%	-0.127%	-0.251%
Patell Z	2.02	2.95	0.56	0.99	-1.58	-1.89	-1.37	-0.53	-0.74
Fama-French Three Factor	0.065%	0.010%	-0.074%	0.039%	-0.099%	0.022%	0.042%	-0.022%	-0.547%
Patell Z	1.08	0.64	-0.85	0.92	-2.07	-0.54	0.42	0.45	-1.68
Fama-French Momentum	0.123%	0.060%	-0.042%	0.045%	-0.100%	-0.083%	-0.059%	0.005%	-0.430%
Patell Z	1.57	1.33	-0.24	1.01	-2.28	-1.68	-0.56	-0.07	-1.93

Panel C. Greenwashing									
N=873	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.005%	0.093%	0.003%	-0.072%	-0.108%	-0.168%	-0.218%	**-0.248%**	0.046%
Patell Z	-0.80	-0.03	-1.15	-0.24	-2.27	-1.68	-1.62	**-2.84**	-0.95
Fama-French Three Factor	-0.019%	0.033%	-0.002%	-0.055%	-0.115%	-0.165%	-0.264%	**-0.411%**	-0.186%
Patell Z	-0.27	0.21	-0.62	0.61	-1.75	-0.69	-1.55	**-3.36**	-1.31
Fama-French Momentum	0.023%	0.067%	0.004%	-0.059%	-0.117%	-0.192%	-0.268%	**-0.369%**	-0.022%
Patell Z	0.15	0.63	-0.13	0.67	-1.53	-1.03	-1.42	**-2.87**	-0.30

Panel D. Social Washing									
N=806	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.028%	-0.106%	-0.018%	-0.086%	0.012%	0.081%	0.193%	0.055%	0.162%
Patell Z	-0.23	-0.89	-0.58	-1.74	-0.18	0.41	1.23	0.00	0.96
Fama-French Three Factor	-0.264%	-0.220%	-0.031%	-0.115%	-0.038%	0.044%	0.116%	-0.031%	0.001%
Patell Z	-1.53	-1.74	-0.77	-1.94	-0.34	0.17	0.91	-0.36	0.70
Fama-French Momentum	-0.242%	-0.184%	-0.031%	-0.109%	-0.038%	0.033%	0.160%	-0.025%	0.129%
Patell Z	-1.78	-1.74	-1.00	-1.75	-0.28	0.11	1.31	-0.15	1.30

Panel E. Governance Washing									
N=1230	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	-0.216%	-0.184%	-0.123%	**-0.133%**	-0.024%	-0.003%	-0.072%	-0.267%	-0.184%
Patell Z	-0.15	-1.27	-1.72	**-3.03**	0.00	0.19	-0.41	-1.38	-0.47
Fama-French Three Factor	-0.260%	-0.206%	-0.147%	**-0.095%**	-0.054%	0.004%	-0.042%	-0.246%	-0.021%
Patell Z	-0.39	-1.31	-2.29	**-2.05**	-0.47	0.01	-0.52	-1.62	-0.25
Fama-French Momentum	-0.210%	-0.147%	-0.102%	**-0.104%**	-0.023%	0.015%	0.013%	-0.124%	0.119%
Patell Z	0.18	-0.59	-1.61	**-2.10**	0.06	0.26	0.05	-0.58	0.59

Similar to the analysis conducted in previous sections, the more recent sample can also be refined to include only incidents with at least medium severity and medium reach. As shown in Table 5, scenarios with at least a 5% significance level and exhibiting negative values include: the event day of a general misleading communication incident, with the abnormal return being at least -0.167%; the immediate day and half a week after a greenwashing event, with the (cumulative) abnormal return being at least -0.513% and -0.731% respectively; and the day of a misleading communication event, with the abnormal return being at least -0.730%.

In comparing the sample presented in Table 5, which focuses on incidents with at least medium severity and medium reach in the recent period, with Table 3, encompassing the full sample period, and Table 4, which includes no restrictions on severity and reach, several observations can be made: both green and social washing and social washing incidents appear to be insignificant regardless of the time period or the restriction; the impact of greenwashing incidents intensifies from the immediate day after the event until two weeks afterward; and the disclosure of governance washing incidents consistently demonstrates statistically significant impact and are of higher economic significance in the recent period, particularly when considering incidents with at least medium severity and medium reach.

The findings regarding the impact of the four distinct types of misleading communication incidents can be summarized as follows: (1) Incidents categorized as governance washing, exhibit some significant negative effect on companies' stock performance across all studied scenarios on the event day. Moreover, this influence is heightened in more recent periods and when the incident severity and recognition are more pronounced. (2) Greenwashing incidents have garnered increased attention post-2015, with incidents of medium severity and reach notably yielding more significant impacts compared to less severe occurrences. (3) Conversely, attention towards incidents categorized as green and social washing, as well as those categorized as social washing, remains weak and shows no improvement in more recent periods or with higher severity and reach. These trends can be attributed to the phenomenon

Table 5. Cumulative abnormal return around misleading communication incidents: At least medium severity and medium reach from 2015 to 2022. N is the number of incidents for each type, and the cumulative abnormal return is displayed with its Patell z-statistic for each event window and estimation model. Results with the z statistic from all three models jointly significant at 10% level are highlighted.

Panel A. All Misleading Communication Incidents									
N=652	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,20]
Market Model	0.280%	0.015%	0.033%	**-0.170%**	0.007%	-0.094%	0.052%	-0.207%	-0.087%
Patell Z	1.94	1.05	1.20	**-2.79**	-1.00	-0.94	0.30	-0.76	0.74
Fama-French Three Factor	0.104%	0.035%	0.066%	**-0.177%**	0.002%	-0.089%	0.069%	-0.033%	-0.204%
Patell Z	1.32	1.26	1.25	**-2.46**	-0.17	-0.55	0.92	0.46	0.88
Fama-French Momentum	0.191%	0.093%	0.048%	**-0.167%**	-0.045%	-0.165%	0.052%	0.008%	0.001%
Patell Z	1.64	1.59	1.14	**-2.50**	-0.71	-0.99	1.04	0.73	1.43

Panel B. Green and Social Washing									
N=324	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	**0.220%**	-0.120%	-0.060%	-0.248%	0.052%	-0.025%	0.282%	-0.088%	0.311%
Patell Z	**1.82**	1.08	0.50	-2.41	-0.63	-0.69	0.57	-0.15	1.64
Fama-French Three Factor	**0.141%**	0.011%	0.063%	-0.193%	0.056%	0.082%	0.350%	0.305%	0.082%
Patell Z	**2.04**	1.83	1.04	-1.84	0.40	0.34	1.50	1.56	1.57
Fama-French Momentum	**0.320%**	0.165%	0.075%	-0.166%	-0.004%	-0.060%	0.279%	0.341%	0.361%
Patell Z	**2.67**	2.49	1.34	-1.75	-0.23	-0.25	1.45	1.73	2.03

Panel C. Greenwashing									
N=77	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.341%	0.240%	0.256%	-0.284%	**-0.527%**	**-0.731%**	-1.120%	-1.430%	0.541%
Patell Z	-0.76	-0.43	1.03	-1.13	**-3.26**	**-2.22**	-2.34	-2.00	-0.32
Fama-French Three Factor	-0.120%	0.094%	0.114%	-0.366%	**-0.513%**	**-0.960%**	-1.090%	-1.630%	0.291%
Patell Z	-1.95	-0.89	0.45	-1.01	**-2.97**	**-2.46**	-1.83	-1.79	0.39
Fama-French Momentum	-0.120%	0.091%	0.112%	-0.379%	**-0.532%**	**-1.020%**	-1.050%	-1.570%	0.234%
Patell Z	-2.04	-1.01	0.36	-1.15	**-3.05**	**-2.76**	-1.73	-1.84	0.12

Panel D. Social Washing									
N=205	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.422%	0.196%	0.067%	0.091%	-0.014%	0.061%	0.182%	0.103%	-0.947%
Patell Z	1.35	0.96	0.33	0.01	-0.20	0.47	1.27	0.46	-0.54
Fama-French Three Factor	0.162%	0.110%	0.033%	0.034%	-0.021%	0.015%	0.110%	0.111%	-0.861%
Patell Z	0.76	0.71	0.26	-0.19	-0.02	0.22	1.01	0.31	-0.74
Fama-French Momentum	0.120%	0.037%	-0.036%	0.036%	-0.045%	0.045%	0.139%	0.094%	-0.689%
Patell Z	0.47	0.49	-0.21	-0.13	0.00	0.39	1.13	0.35	-0.39

Panel E. Governance Washing									
N=52	[-5,-1]	[-3,-1]	[-1]	[0]	[1]	[1,3]	[1,5]	[1,10]	[1,21]
Market Model	0.065%	-0.232%	0.057%	**-0.730%**	**0.606%**	-0.142%	-0.182%	-0.448%	0.095%
Patell Z	0.83	-0.30	0.76	**-3.74**	**2.52**	0.18	-0.07	-1.08	0.06
Fama-French Three Factor	0.044%	-0.279%	0.060%	**-0.826%**	**0.553%**	-0.176%	-0.105%	-0.457%	0.078%
Patell Z	0.65	-0.56	0.39	**-3.94**	**2.21**	-0.02	-0.19	-1.01	0.26
Fama-French Momentum	0.181%	-0.216%	0.024%	**-0.860%**	**0.460%**	-0.319%	-0.101%	-0.207%	0.245%
Patell Z	0.85	-0.45	0.28	**-4.24**	**1.88**	-0.30	-0.16	-0.56	0.60

of changing investor preferences over the long term as studied in behavioural finance such as in Mackey et al. (2007). The governance factor, as a fundamental aspect of company operations, has historically been incorporated into stock values, leading to immediate reactions to governance washing incidents upon disclosure. On the other hand, environmental considerations have gained prominence with initiatives like the Paris Agreement, EU taxonomy, and carbon-related policies worldwide, making greenwashing incidents more conspicuous in recent years. However, the social factor, while widely discussed, proves challenging to quantify and lacks enforcement mechanisms to materialize impacts, resulting in weaker market reactions to incidents related to social washing.

Furthermore, examining different event windows reveals limited evidence of front running, with the majority of significant impacts occurring immediately after the incident. This effect extends to at most two weeks thereafter. Notably, none of the results for the period one month after an incident are statistically significant at the 5% level, indicating that none of the types of misleading communication incidents exert a medium-term impact on stock performance. This observation aligns with the phenomenon of short term shift in investor sentiment in behavioral finance similar to what Da et al. (2015) studied, suggesting that investors tend to react impulsively to the disclosure of companies' misleading communication incidents, but these incidents generally do not disrupt fundamental operations, resulting in a diminishing impact after one month.

4. Conclusion

In this study, we investigate the impact of misleading communication incidents on companies' stock returns. Building upon existing literature such as Akyildirim et al. (2023), instead of focusing solely on greenwashing incidents, we examine all types of misleading communication incidents (including green and social washing, greenwashing, social washing, and governance washing). To ensure robustness to different modeling approaches, we adopt a joint significance test using the Holm-Bonferroni method by Holm (1979) in estimating the (cumulative) abnormal return. Additionally, we analyze different sample periods and a subsample of incidents with higher severity and reach, providing multiple perspectives on the effects of misleading communication incidents.

Consistent with expectations and findings in the literature, our analysis reveals an indisputable increasing trend in the number of misleading communication incidents over the sample period. This trend is also evident across all four distinct subtypes, with the overall number rising from 18 in 2007 to 690 in 2022.

Our event study results reveal distinctive patterns across different types of misleading communication incidents. Specifically, governance washing only incidents consistently lead to some significant negative abnormal return on the event day with at least 7.8 basis points at the most conservative scenario. This impact is notably stronger in the more recent period and when incidents are of at least medium severity and reach, with negative abnormal return of at least 73 basis points on the event day. In contrast, the significance of greenwashing incidents becomes more pronounced after 2015, coinciding with the signing of the Paris Agreement. Furthermore, the impact is more substantial both statistically and economically for incidents with higher severity and wider reach, with negative abnormal return of at least 51.3 basis points. However, social-related misleading communication incidents do not exhibit a consistent significant impact on stock prices across investigated scenarios.

Furthermore, when examining the event window, our analysis reveals that the majority of significant abnormal returns occur immediately after a misleading communication incident,

persisting for up to two weeks thereafter. This suggests that the market efficiently integrates the information into pricing. However, no significant results are observed for the first month following an incident, indicating that these events do not fundamentally alter underlying pricing dynamics.

Our findings can be elucidated through two phenomena investigated in the behavioral finance literature: First, changing investor preferences in the long run; governance aspects have historically been integrated into the fundamental analysis of firms, leading to significant impacts observed in governance washing incidents. Conversely, environmental concerns have garnered increasing attention from both the public and regulators, resulting in the establishment of more legislation and regulations. As a result, the materialization of related risks has become clearer, influencing investor preferences and contributing to the significant impact observed in greenwashing incidents. Second, shift in investor sentiment in the short run; market reactions to negative incidents are prompt upon disclosure. However, once it becomes apparent that the fundamental operations of the firm remain unaffected, the negative impact diminishes rapidly.

As a result, our study demonstrates with the rise of sustainable investing and the intensified discourse surrounding greenwashing and misleading communication in broader contexts, the repercussions for companies implicated in such practices are becoming increasingly apparent. However, it's noteworthy that while the reputation risk materializes around the event day, it is not consistently priced into the stock market in the long term, on average.

References

Akyildirim, E., Corbet, S., Ongena, S., and Oxley, L. (2023). Greenwashing: Do Investors, Markets and Boards Really Care? Working Paper.

Bromley, P. and Powell, W. W. (2012). From Smoke and Mirrors to Walking the Talk: Decoupling in the Contemporary World. *The Academy of Management Annals*, 6(1):483–530.

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance*, 52(1):57–82.

Da, Z., Engelberg, J., and Gao, P. (2015). The Sum of All FEARS Investor Sentiment and Asset Prices. *The Review of Financial Studies*, 28(1):1–32.

Delmas, M. A. and Burbano, V. C. (2011). The Drivers of Greenwashing. *California Management Review*, 54(1):64–87.

Derrien, F., Krueger, P., Landier, A., and Yao, T. (2022). ESG News, Future Cash Flows, and Firm Value. Working Paper.

Fama, E. F. and French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1):3–56.

Gantchev, N., Giannetti, M., and Li, R. (2022). Does Money Talk? Divestitures and Corporate Environmental and Social Policies. *Review of Finance*, 26(6):1469–1508.

Groen-Xu, M. and Zeume, S. (2021). The ESG Home Bias. Working Paper.

Holm, S. (1979). A Simple Sequentially Rejective Multiple Test Procedure. *Scandinavian Journal of Statistics*, 6(2):65–70.

Lin, X., She, G., Yoon, A., and Zhu, H. (2023). Shareholder value implications of supply chain ESG: Evidence from negative incidents. Working Paper.

Lyon, T. P. and Maxwell, J. W. (2004). Astroturf: Interest Group Lobbying and Corporate Strategy. *Journal of Economics & Management Strategy*, 13(4):561–597.

Lyon, T. P. and Maxwell, J. W. (2011). Greenwash: Corporate Environmental Disclosure under Threat of Audit. *Journal of Economics & Management Strategy*, 20(1):3–41.

Lyon, T. P. and Montgomery, A. W. (2015). The Means and End of Greenwash. *Organization & Environment*, 28(2):223–249.

Mackey, A., Mackey, T. B., and Barney, J. B. (2007). Corporate Social Responsibility and Firm Performance: Investor Preferences and Corporate Strategies. *The Academy of Management Review*, 32(3):817–835.

MacKinlay, A. C. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1):13–39.

Oler, D., Harrison, J. S., and Allen, M. R. (2007). Over-Interpretation of Short-Window Event Study Findings in Management Research: An Empirical Illustration. Working Paper.

Orpiszewski, T., Thompson, M., and Schwendner, P. (2023). The Stock and Option Market Response to Negative ESG News. Working Paper.

Ramus, C. A. and Montiel, I. (2005). When Are Corporate Environmental Policies a Form of Greenwashing? *Business & Society*, 44(4):377–414.

Wu, Y., Zhang, K., and Xie, J. (2020). Bad Greenwashing, Good Greenwashing: Corporate Social Responsibility and Information Transparency. *Management Science*, 66(7):3095–3112.