

# Stock Price Overreaction to ESG Controversies\*

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## Abstract

There has been substantial growth in the incorporation of environmental, social and governance (ESG) issues into investment decisions, and this trend has been motivated by the societal benefits that are achieved when socially responsible firms have access to cheaper capital. While the benefits with ESG investing are apparent, we investigate the possible downside of the trend towards ESG by examining how this approach to investing might affect market efficiency. ESG is now a highly salient aspect of an investor's information set and, given cognitive limitations, investors might devote substantial resources to examining ESG characteristics to the detriment of other firm fundamentals. Consistent with salience theory, we report that this over-emphasis on ESG results in the market overreacting to news about ESG controversies. This over-reaction is more pronounced within smaller firms and stocks that were held by more transient investors before the announcement. Contrarian investors are likely able to profit from the unpopular strategy of buying stocks after bad ESG news is released.

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*Key Words:* ESG, investment management, over-reaction, news, institutional investors

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## 1. Introduction

Growing importance has been placed on incorporating environmental, social and governance (ESG) issues into the investment decision. Across the period from 2014 to 2018, the total value of responsible investment assets in the United States grew at a compound rate of 16% per annum to reach \$11.995 trillion (Global Sustainable Investment Alliance, 2018).<sup>1</sup> While significant attention has been paid to the positive externalities created by the growth in ESG investing<sup>2</sup>, a possible adverse outcome from this growth is that it may decrease market efficiency. ESG investors are argued to overweight information related to social performance relative to a firm's financial fundamentals, potentially resulting in the market becoming less efficient (Cao et al., 2019). Consistent with investors overreacting to ESG information, we report that negative ESG news releases are associated with a negative announcement return and a subsequent mean reversion. This overreaction is more pronounced across stocks with a high transient institutional investor ownership and high limits to arbitrage.

Despite the significant growth in institutional funds that incorporate ESG issues as part of their investment process, there is still no clear resolution to the question of whether socially responsible funds generate superior risk-adjusted returns compared with conventional funds. Chang and Witte (2010), Derwall and Koedijk (2009), Gil-Bazo, Ruiz-Verdú and Santos (2010), Henke (2016), and Lyn and Zychowicz (2010) all report some evidence of a positive relationship between socially responsible investing and abnormal returns. However, consistent with investors paying the price for social responsibility, Jegourel and Maveyraud (2010), Lee, Humphrey, Benson and Ahn (2010), and Renneboog, Ter Horst and Zhang (2008) all report a negative relationship between social responsibility and abnormal returns.

It is important to note that stocks that have higher ESG ratings have lower crash risk (Kim and Li, 2014) and are less likely to hoard bad information (Kim, Park and Wier, 2012). Therefore, if the crash risk represents a non-diversifiable risk, it is likely that the portfolios held by socially responsible funds have lower downside risk relative to conventional funds. The lower average returns of socially responsible mutual funds documented by many studies within the literature may be associated with investor aversion to crash risk. Nofsinger and Varma (2014) find that during two periods of market crisis (the tech-wreck and global financial crisis), compared to matched conventional mutual funds,

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<sup>1</sup> Global Sustainable Investment Alliance (2018) report that sustainable and responsible investing comprised 25.7% of all managed assets in 2018 compared with 17.9% in 2014.

<sup>2</sup> Investors that incorporate social responsibility as part of their utility function will, all else being equal, increase the utility from their investment portfolio by investing in stocks with superior ESG performance. There may also be benefits from the perspective of firm fundamentals, given stocks that pass CSR screens have been shown to have lower crash risk (Kim and Li, 2014), a lower cost of capital (El Ghoul, Guedhami, Kwok and Mishra, 2011), improved accounting and financial performance (Flammer, 2015) and managers of such firms are shown to be less likely to hoard bad information (Kim, Park and Weir, 2012).

socially responsible funds have lower returns statistically during non-crisis periods and statistically higher returns during crisis periods for both raw and risk-adjusted returns.

Given a firm's ESG activities are correlated with priced risk factors,<sup>3</sup> studies that examine the time-series of risk-adjusted returns generated by socially responsible funds are subject to a joint test problem. One way to mitigate this problem is to examine stock returns around ESG news announcements, given the market reaction to news should capture changes in both the expected future cash flows and the discount rate. Krueger (2015) and Capelle-Blancard and Petit (2019) report that the stock market reacts to ESG news in an asymmetric manner; there is a significant negative reaction to the bad ESG news but a little reaction to the good news. Aouadi and Marsat (2018) also report that ESG controversies have an impact on firm market value, but they report that this result is concentrated within high-attention firms in countries with greater press freedom and a higher level of analyst coverage. While these studies measure the announcement period returns around ESG news, to date, no study has examined the long-run post-announcement returns to investigate whether the market reacts efficiently to ESG news releases.

Our examination of the long-run announcements after ESG news announcements is motivated by recent literature that explores how institutional investors' preferences for ESG may affect market efficiency. Hartzmark and Sussman (2019) report evidence of inflows (outflows) to funds that have good (poor) fund-level social responsibility ratings. This relationship is likely to encourage institutional investors to focus on the ESG characteristics of stocks and pay less attention to fundamentals (Cao et al., 2019). Furthermore, Starks, Venkat, and Zhu (2017) report that socially responsible funds are less inclined to sell stocks with high ESG ratings, even after negative news or fundamentals are reported. Consistent with the argument that preferences for ESG may affect market efficiency, Cao et al. (2019) report that stocks with higher ESG scores also tend to rank more highly on the Stambaugh, Yu, and Yuan (2015) mispricing measure and that the mispricing of socially responsible stocks is more prominent among stocks with higher ownership by ESG funds. This result is consistent with evidence that shows institutional investment constraints can affect stock prices (Cao, Han, and Wang, 2017).

We argue that investors' preferences for ESG should manifest in investors overreacting to news announcements relating to ESG. Our argument is grounded in salience theory. Taylor and Thompson (1982) define salience as "the phenomenon that when one's attention is differentially directed to one portion on the environment rather than to others, the information contained in that portion will receive disproportionate weighing in subsequent judgments." The substantial increase in assets managed in a socially responsible manner indicates that ESG issues are a salient aspect of the information set of a firm. The salience of ESG news should be particularly accentuated in the eyes of mutual fund managers,

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<sup>3</sup> Kole and Verbeek (2006) report that crash risk is priced in the cross-section of stock returns.

given evidence that the sustainability of mutual funds is positively related to fund flows (Hartzmark and Sussman, 2019).

Bordalo, Gennaioli, and Shleifer (2012) argue that the limited attention and cognitive capacity of investors result in their attention being drawn to the most salient attributes of options that they face. These salient attributes are consequently overweighted in their decisions, and non-salient attributes are neglected. Bordalo, Gennaioli, and Shleifer (2013) apply salience theory to explain four asset pricing puzzles: the pricing of assets with skewed returns, the value-growth puzzle, investor preferences for low-risk assets and the countercyclical variation in aggregate stock market returns. We extend the work of Bordalo, Gennaioli, and Shleifer (2013) and argue that salience theory can also explain the returns around ESG news announcements. This model should particularly apply to ESG controversies, given bad news tends to be more salient than good news (Fiske, 1980). Given the salience of ESG information, when institutional investors observe a shock to the ESG attributes of the stock in the form of bad news they overweight the probability that similar shocks will be observed again in the future. This overweighting should result in an overreaction to ESG news and a subsequent mean reversion.

Given the relationship between social responsibility and fund flows dictates that ESG information is a more salient aspect of an institutional investor's information set compared with a retail investor. We show that the price reaction to ESG news events is more pronounced for firms with a higher institutional holding before the news release and that there is a statistically significant decrease in institutional holdings following the release of bad ESG news compared with the equivalent change following good news. This result supports that argument put forward by Edelen, Ince, and Kadlec (2016) that some mispricings are enhanced, as opposed to being corrected, by institutional investors. Furthermore, if the return patterns we observe around ESG news events can indeed be attributed to institutional investors' overreaction, then we expect both the announcement returns and subsequent mean reversion to be stronger when limits to arbitrage are more pronounced. Consistent with this argument, we show that the returns are indeed stronger for smaller stocks, which have higher idiosyncratic volatility and are harder to short sell. Furthermore, given the psychology literature document that negative phenomena attract more attention (Fiske, 1980), we also show that the overreaction is larger for the bad news.

Our paper contributes to the literature that examines institutional investors' preferences towards ESG and extends on that literature by demonstrating the impact those preferences can have on market prices. Nofsinger, Sulaeman, and Varma (2016) examine 13F filings to examine how institutional ownership is related to the corporate social responsibility ratings of the underlying firms. They report that firms with ESG concerns have lower levels of institutional ownership, although there is no relationship between ESG strengths and institutional holdings. Fernando, Sharfman, and Uysal (2009) investigate the institutional ownership of firms with strong environmental performance compared with those with environmental concerns. They argue that institutions are less likely to hold stocks with high

environmental risk exposures because those stocks have a higher level of systematic risk and lower valuations. Surprisingly, they also report that institutional investors also tend to under-invest in firms that have the strongest environmental performance. Dyck, Lins, Roth, and Wagner (2019) examine why institutional holdings tend to be positively associated with ESG scores. They report that causal evidence that shows institutions engage in shareholder activism to improve the social responsibility of the firms that they invest in.

This paper proceeds as follows. Section 2 provides a summary of the data and sample. An analysis of the market reaction to ESG news is provided in Section 3, while evidence relating to post-announcement returns and the potential drivers of market overreaction is provided in Section 4. Section 5 provides a summary.

## 2. Data and Sample

This study uses firms listed on the New York Stock Exchange (NYSE), NYSE MKT, National Association of Securities Dealers Automated Quotations (NASDAQ), and NYSE Arca that appear in the Center for Research in Security Prices (CRSP) and RavenPack News Analytics Database. We examine ESG news that is released between 2000 and 2018. Returns data is collected from CRSP, and firm fundamentals are collected from Compustat. To calculate changes in institutional holdings, we collect data from the Thomson Reuter 13F dataset.<sup>4</sup> To ensure that the sample of stocks examined is representative of the investable universe and that our results are not driven by illiquidity issues, we focus on the constituents of the S&P Composite 1500 Index.

The news about ESG events is obtained from RavenPack. RavenPack covers three versions of data: First, the Dow Jones Edition, which analyses news from Dow Jones Newswires, regional editions of the Wall Street Journal, Barron's and MarketWatch. Second, the Web Edition, which derives contents from publishers and web aggregators, including major industry and business publishers, national and local news, blog sites, government, and regulatory updates. Third, the PR Edition, which covers press releases and regulatory disclosures from a variety of newswires and press release distribution networks. We only focus on the Dow Jones Edition for two reasons. First, the Web Edition only starts from 2007, and the PR Edition starts from 2004 while the Dow Jones Edition covers back to 2000. Second, various incentives can motivate managers to strategically disclose or withhold firm-specific information, in the form of the press release. Hence, we restrict the sample to the study of the capital market impact of

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<sup>4</sup>Institutions with more than \$100 million in 13F securities' assets are required to report their long positions. 13F data includes ownership by mutual funds, hedge funds, insurance companies, banks, trusts, pension funds, and other entities.

media dissemination and the rebroadcasting of financial news, which is captured by the Dow Jones Edition.

RavenPack classifies news articles into news event categories according to the RavenPack taxonomy. To identify ESG related events, we can first refer to the TOPIC field in their taxonomy, which filters by five main themes: Business, Economy, Environment, Politics, and Society. These topics can then be subdivided into more granular areas to help identify those event types which are ESG related using the GROUP field as shown below: GROUP = 'Labor Issues,' 'Legal', 'War Conflict', 'Security', 'Natural Disasters', 'Pollution', 'Industrial Accidents', 'Civil Unrest', 'Corporate Responsibility', 'Crime', 'Health', 'Regulatory'.<sup>5</sup>

We focus on firm-relevant news by setting the news-relevance score (NRS) to be 100, which makes sure that the firm is truly the focus of the news. For the same event, RavenPack may cover several series of news articles. To have a clear understanding of the announcement effect, we include only news stories with Event Novelty Score (ENS) of 100, which means that no similar news about the same event for the same company has been reported in the past 24-hour window.<sup>6</sup> Moreover, to eliminate the impact of confounding news, we keep companies with only one ESG related news within an event date.<sup>7</sup> A 24-hour day can be divided into four sessions in terms of stock trading: regular trading hours (RTH) (09:30 a.m. to 4:00 p.m ET), after-hours trading (AHT) (4:00 p.m. to 8:00 p.m. ET), overnight (08:00 p.m. to 04:00 a.m. ET) and pre-market trading (PMT) (4:00 a.m. to 9:30 a.m. ET). The event date is defined as 4:00 p.m. ET to 4:00 p.m. ET, which is 24 hours between previous day's market close and next trading day's market close because any news released within this time frame will be incorporated into the stock price of previous trading day's close and next trading day's close price.

After RavenPack detects and categorizes the news, they construct the news sentiment score between 0 and 100 for each news article based on professional algorithms, which is determined by systematically matching stories typically categorized by financial experts as having a short-term positive or negative financial or economic impact. To facilitate our empirical analysis, we subtract 50 from the news

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<sup>5</sup>For example: for events related to environmental concerns, we could identify cases of climate change events by using the following filters as an example: TOPIC = "Environment" and (GROUP = "pollution" and TYPE = "water-contamination"). This will retrieve events related to places that have been affected by water contamination or entities that have been responsible for polluting water supply etc. Other events in which a company could potentially pose an environmental risk can be found, for example, under the GROUP = "industrial-accidents" for TYPE values such as "spill" or "pipeline -accident." For the social criteria, we could take a look, for example, at the company's business relationships by using the filters: GROUP = "partnerships". With regards to governance, we could filter for GROUP values such as "labor-issues" to see structural changes in a company and then filter for TYPE = "executive-appointment", "executive-compensation", "executive-firing", etc. For a greater understanding of the company's employee relations, once more under the GROUP = "labor-issues", one could also filter for TYPE = "hirings", "layoffs", "workers-strike," and so on.

<sup>6</sup> To alleviate the concerns that a sequence of news regarding the same event is published apart 24 hours of one another, we conduct robustness check by including only news with ENS\_SIMILARITY\_GAP of 100.00000 which means that the most similar story occurred 100 or more days in the past. The results still hold similarly.

<sup>7</sup> 77.17% of firms have one ESG news released.

sentiment scores and scale it by 50. After the adjustment, the adjusted sentiment scores fall in an interval between -1 and 1. The event is categorized as a negative (positive) event when the sentiment is below (above or equal to) 0.

Our final example consists of 82,435 firm-event observations spanning from January 2000 to December 2018. A summary of the new events we use for our analysis is provided in Table 1. As reported in this table, there is a fairly even distribution of news releases across the sample period. The most common categories of ESG news identified by RavenPack are labor, legal, and regulatory issues.

[INSERT TABLE 1 HERE]

### 3. Market Reactions to ESG News

We examine stock returns around ESG news announcements by using the event study methodology. To undertake this analysis, we calculate the cumulative abnormal return (CAR) 21 trading days around for each news release. The CAR is calculated as follows:

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \widehat{AR}_{i\tau} \quad (1)$$

Where  $r_{i\tau}$  is the return for stock  $i$  across day  $\tau$ ,  $r_{f\tau}$  and  $r_{M\tau}$  are the risk-free rate and return on the market portfolio across day  $\tau$ , beta loadings  $\hat{\beta}_{i1}, \hat{\beta}_{i2}, \hat{\beta}_{i3}$  are estimated using Carhart 4-factor model<sup>8</sup> for period  $t = -255$  days up to  $t = -46$  days from the event date with minimum 100 observations, as shown below

$$r_{it} - r_{ft} = \beta_{i1}(r_{Mt} - r_{ft}) + \beta_{i2} * SMB_t + \beta_{i3}HML_t + \beta_{i4}UMD_t + \varepsilon_{it} \quad (2)$$

Across all firms in our sample, the study found a statistically significant cumulative abnormal return at the 0.01 level for the event window  $-10$  to  $10$  of  $-0.773\%$  around bad news, while the average abnormal return of  $-0.004\%$  around good news is insignificant. This asymmetric reaction to the news is consistent with our argument that institutional investors are concerned about fund outflows when they hold stocks that are subject to ESG controversies. Given bad news is more salient than good news (Fiske, 1980), according to salience theory, investors should overweight the potential future ESG risks of the stock that is subject to bad news and discount the price more heavily than can be explained by any change in fundamentals.

To further explore the return patterns around ESG news announcements, we report the cumulative average abnormal return across the period from  $\tau=-10$  to  $\tau=10$  in Figure 1. The results are reported across six categories. First, we separate events into those labeled as good news and bad news by the

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<sup>8</sup> The results are also robust using market model or Fama-French 3 factor model.

RavenPack database. Second, we also category stocks on whether they are constituents of the S&P500 index, S&P MidCap 400 index, or the S&P SmallCap 600 index at the time of the news release. Reporting the results across different size groupings is important because smaller stocks tend to be subject to greater limits to arbitrage, therefore to be consistent with our behavioral-based explanation for ESG news announcement returns, we should observe returns that are larger in magnitude for smaller capitalisation stocks.

The results from the announcement period CAR are shown in Figure 1. In this figure, there is a clear negative abnormal announcement return when firms are subject to bad ESG news, but no clear announcement return to good ESG news. Announcement period returns are highly size-dependent. The negative announcement returns around bad news are substantially larger in magnitude for the smallest stocks in our sample. There is also some evidence of potential leakage of information before the event, as the CAR begins to trend downwards several days prior to the news release.

[INSERT FIGURE 1 HERE]

We further examine investor behaviour around ESG announcement returns by calculating the average abnormal trading volume across the period from ten days prior to the announcement to ten days after.<sup>9</sup> There is a clear increase in abnormal trading volume for bad ESG news announcements and only a small increase in abnormal trading volume when there is a good ESG news announcement. The increase in abnormal trading volume around bad ESG news events is also negatively correlated with firm size, further indicating that the reaction to ESG news is accentuated within smaller stocks. Corroborating previous evidence of potential leakages of information, there is an increase in the abnormal trading volume several days before the release of bad news.

[INSERT FIGURE 2 HERE]

To examine whether any category of ESG news drives our results, we report the average CAR across the period from  $\tau=-10$  to  $\tau=10$  across news subcategories. In Figure 3, we report the average CAR for each category conditional on the event being classified as bad news. There is a ubiquitous negative average return across the different news categories. The largest negative abnormal returns were related to corporate governance: force majeure (where a firm seeks to be excused from performing its part of a contract), discrimination defendant in which the company is a sued for discrimination, antitrust suit defendant in which the company is the defendant in a legal action for unfair business practices, and legal issues defendant in which the company is the defendant in a legal dispute. It is therefore clear that legal-based ESG concerns, which likely arise due to poor governance, have the largest announcement period returns.

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<sup>9</sup> The abnormal trading volume is calculated as ratio of trading volume at day  $\tau$  of the trading volume averaged between day  $t = -255$  to  $t = -46$ .

[INSERT FIGURE 3 HERE]

The average CAR for good ESG news events is reported in Figure 4. Two clear observations can be drawn from this figure. First, there is a fairly random distribution of positive and negative abnormal returns across the various news categories. This result is consistent with the observation that there is not a systematic positive react to good ESG news. Second, the categories of good ESG news that generate the largest returns also tend to relate to corporate governance and associated legal issues. When considered together, Figure 3 and Figure 4 tend to provide evidence that suggests that governance-related issues result in the biggest price changes across all categories of ESG.

[INSERT FIGURE 4 HERE]

According to salience theory, investors will overweight salient components of their information set. Given the flow of funds towards ESG-orientated institutions (Hartzmark and Sussman, 2019), ESG considerations are likely to be a salient aspect of the decision-making process of institutional investors. As investors have limited cognitive capacity, this focus on ESG issues will lead to a focus on ESG characteristics and fewer resources devoted to other aspects of firm fundamentals, resulting in an overreaction to ESG news. To test this proposition, we examine patterns in institutional investor holdings around ESG news releases. Institutional Ownership (IO) Level is calculated by adding up all shares for each security for each quarter, and IO Ratio is simply the IO Level divided by Total Shares Outstanding at quarter-end. Institutional Concentration (IOC) is captured by the Herfindahl-Hirschman Index that uses all institutional holdings of a particular security and conveys information about institutional ownership distribution. The results of this analysis are reported in Figure 5. Panel A shows the proportion of free-float shares held by institutional investors across the period from two quarters before the news announcement to two quarters after the news announcement. To properly account for omitted variables, such as changes in aggregate institutional ownership across time, we compare the changes in institutional holdings between stocks that have good and bad ESG news released. As shown in this figure, there is a decrease in institutional holdings around the announcement of bad ESG news relative to the change in institutional holdings of good ESG news. Consistent with evidence reported above that shows an announcement return that is more pronounced in smaller capitalisation stocks, the change in institutional ownership is also noticeably larger for small and midcap stocks. Within the smallest stocks included in our sample, average institutional ownership has statistically significant changes from 77.76% at the end of the quarter before bad news releases to 76.91% at the end of the quarter after the release of bad news. In contrast, average institutional ownership amongst equivalent stocks that are subject to good ESG news increases from 78.95% to 79.19% across the same horizon significantly. The difference in the change in average institutional holdings following good and bad ESG news within the largest subset of stocks is small in magnitude and not statistically significant. This result may be attributed to the large concentration of index funds within the universe of S&P500

constituent institutional holdings. Furthermore, managers that are concerned with tracking error risk may be less inclined to sell a large capitalisation stock that encounters bad ESG news compared with this inclination to sell smaller capitalisation stocks.

It is possible that the results reported in Panel A do not fully reflect institutional trading around ESG news announcements, as that analysis only measures the net result of institutional trades with other investor classes. To account for possible trading amongst institutional investors, we also examine the changes in institutional ownership concentration and report the results in Panel B. Across all three groups of stocks, institutional ownership becomes more concentrated after the announcement of bad news relative to the announcement of good news. This figure provides further evidence to support the argument that there is a subset of institutional investors that sell their holdings in stocks following ESG controversies, and that this selling contributes to the significant negative announcement returns that are observed.

[INSERT FIGURE 5 HERE]

#### **4. Evidence of overreaction to ESG News**

Where investors overweight ESG risk after news announcements, the market reaction may not fully reflect the change in fundamentals associated with the news. In this section, we examine the post-announcement abnormal returns that are observed subsequent to the negative returns around ESG controversies. Long-run positive (negative) abnormal returns would be observed when markets over (under) react to ESG news. The long-run post-announcement returns are reported in Figure 6. In this figure, there is evidence of positive abnormal returns in the period after bad ESG news announcements; however, there is no long-term trend in the CAR following positive news announcements. The magnitude of the long-run reversal is also proportionate to the announcement return; the return is larger in magnitude for smaller capitalisation stocks. The abnormal returns reported in this figure are consistent with the proposition that markets overreact to ESG controversies.

[INSERT FIGURE 6 HERE]

The results reported above examine the univariate relationship between ESG announcements and returns. However, there may be other firm characteristics that are correlated with stock returns around ESG announcements. We, therefore, formalise our analysis by undertaking a multivariate analysis that examines the determinants of both ESG announcement returns and long-run post-announcement returns. We further examine whether overreactions are accentuated in small stocks and firms with a large proportion of the outstanding equity held by transient institutional investors. The regression models that we estimate are as follows:

$$CAR_{\tau_1, \tau_2} = \alpha + \beta_1 Sentiment_i + \delta Z_i + \varepsilon \quad (3)$$

$$CAR_{\tau_1, \tau_2} = \alpha + \beta_1 Sentiment_i + \beta_2 Ln(MV)_i + \beta_3 Sentiment_i \times Ln(MV)_i + \delta Z_i + \varepsilon \quad (4)$$

$$CAR_{\tau_1, \tau_2} = \alpha + \beta_1 Sentiment_i + \beta_2 Transient_i + \beta_3 Sentiment_i \times Transient_i + \delta Z_i + \varepsilon \quad (5)$$

where  $CAR_{\tau_1, \tau_2}$  is the cumulative average return across the period from day  $\tau = \tau_1$  to  $\tau = \tau_2$ ,  $Sentiment_i$  is a dummy variable that takes the value of one for negative news and zero otherwise for firm  $i$ ,  $Ln(MV)_i$  is the natural logarithm of the market capitalisation of firm  $i$ ,  $Transient_i$  is the proportion of transient investors holding stocks in firm  $i$  and  $Z_i$  is a vector of control variables. The control variables are return on assets ( $ROA$ ), total institutional ownership ( $IOR$ ), Tobin's Q ( $Q$ ), debt-to-asset ratio ( $D/A$ ), the natural logarithm of firm age ( $Ln(Age)$ ), the firm's stock returns over the last three months ( $Cret$ ) and the natural logarithm of the number of analysts that cover the firm ( $Ln(Analyst)$ ). To examine the determinants of both the announcement return and post-announcement returns, we estimate Equations (2) to (4) where the dependent variable is both  $CAR_{-1,1}$  and  $CAR_{2,90}$ . All regressions are estimated with stock and year fixed effects.

The results from our regression analysis are reported in Table 2. Panel A provides the results for announcement period abnormal returns. The coefficient on the *Sentiment* variable is negative and significant, which provides evidence to show that the abnormal returns around bad ESG news are more negative compared with returns around good ESG news. The interaction between *Sentiment* and *Size* is positive and significant, indicating that the negative abnormal returns when bad ESG news is released are larger in magnitude for smaller firms. Similarly, the interaction between *Sentiment* and *Transient* is negative and significant, indicating that the negative abnormal returns when bad ESG news is released are larger in magnitude for firms with a greater proportion of transient investors. These results further demonstrate that the returns around ESG news announcements can, at least in part, be explained by the trading of transient institutional investors who overweight the probability of ESG risks being subsequently realised again in the future.

Regressions that examine the determinants of long-run post-announcement returns are reported in Panel B. Consistent with investors overreacting to ESG news, the post-announcement returns are more positive following bad ESG news. The interactions between *Sentiment* and both *Size* and *Transient* demonstrate that these post-event reversals are larger in magnitude for small firms and firms with a greater proportion of transient investors.

[INSERT TABLE 2 HERE]

## 5 Summary

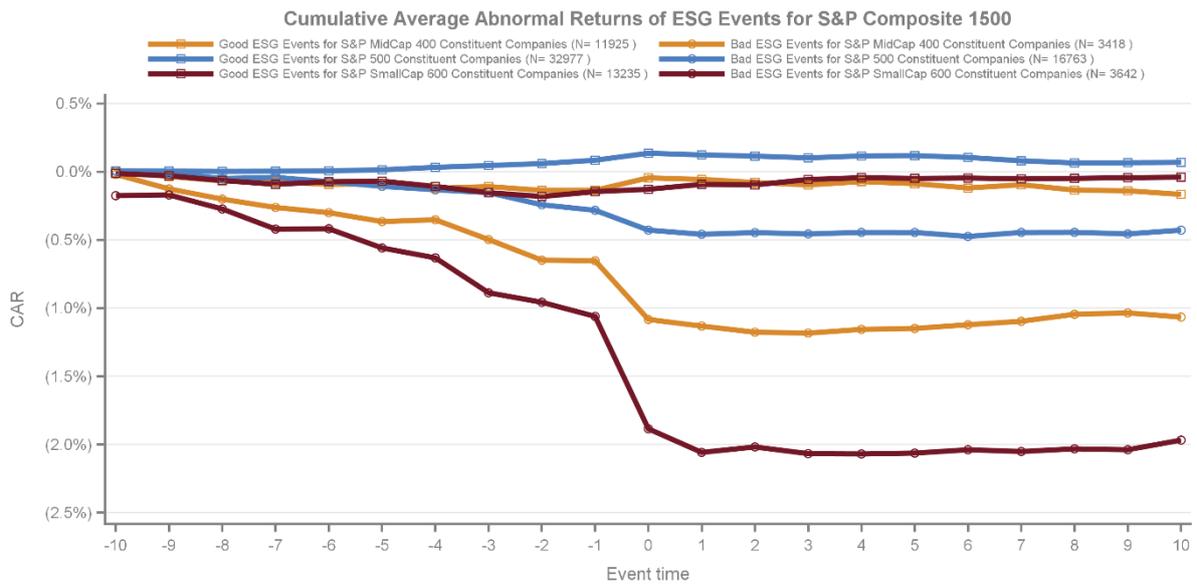
Saliency theory suggests that investors overweight the extreme probabilities associated with salient events. When news about an ESG controversy is released, investors overweight the probability that this event will be repeated in the future and therefore overreact to the news. Consistent with this overreaction, we report that there is a negative announcement effect when news about ESG controversies is released, but these returns mean-revert over the subsequent 90 days. The impact of both announcement returns and subsequent reversals are stronger for smaller capitalisation stocks and those stocks held by more transient investors before the news release. Our research has two important implications. First, we contribute to the literature on saliency theory and demonstrate that an extension of this theory can be applied to investor reactions to ESG news releases. This result is important because while there is an extensive literature documenting the benefits of ESG investing, we demonstrate that the biases induced by the growing focus on ESG information may also have some adverse implications. Second, our study indicates that institutional investors that incorporate ESG as part of their information set need to carefully condition their trading activities around ESG news released to avoid losses that might be incurred by overreacting to the news by not appropriately taking into account the impact such news may have on firm fundamentals. Given the observed overreaction to ESG news, there may be potential for ESG contrarians to buy stocks after the release of news about ESG controversies and profit from the subsequent mean reversion.

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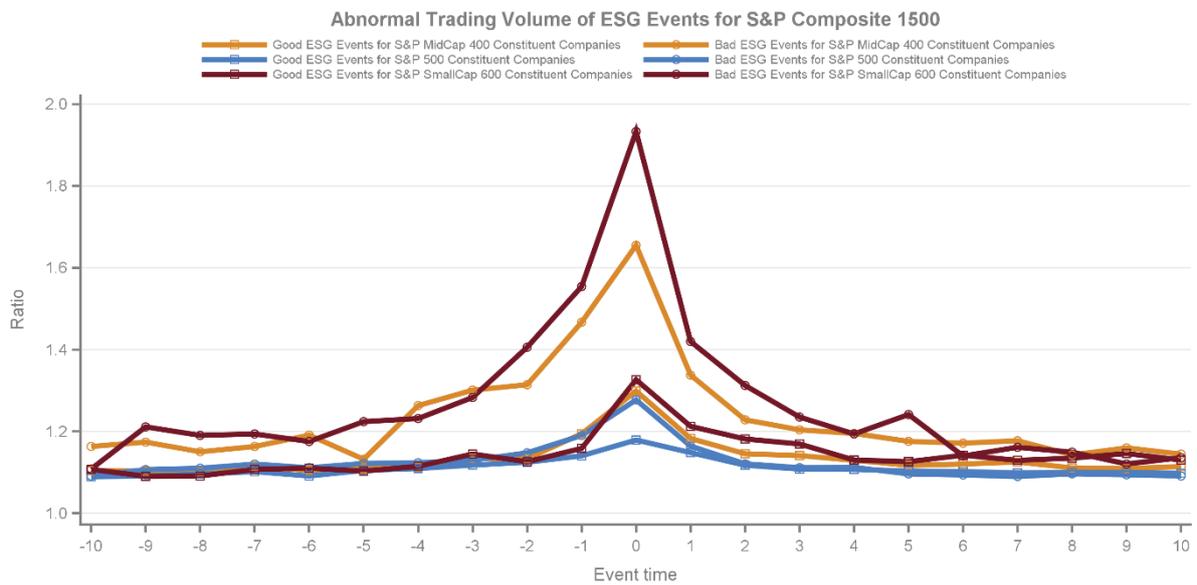
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**Figure 1: Announcement Period Cumulative Average Abnormal Returns**



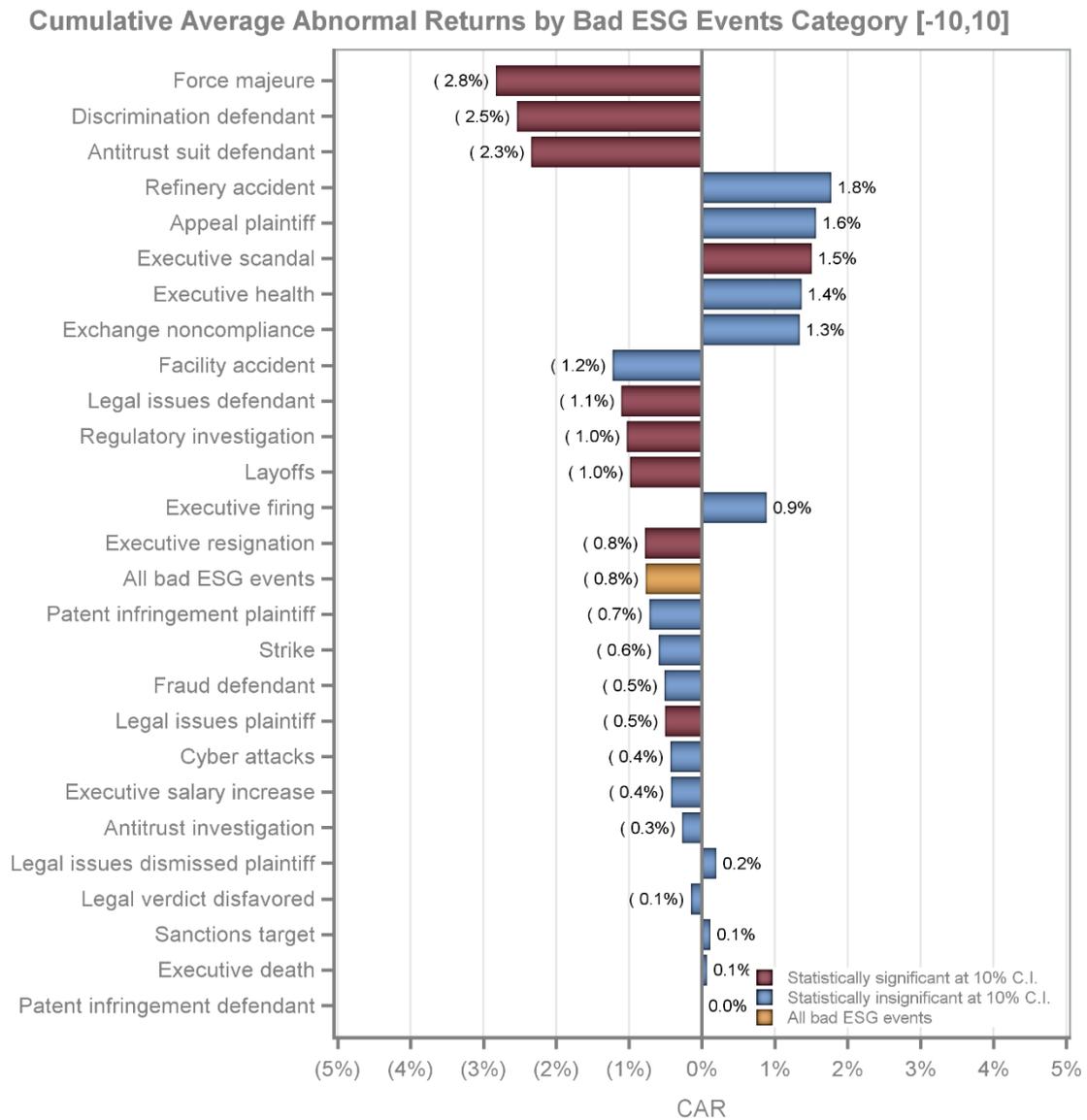
This figure reports the cumulative average abnormal returns across the period from  $\tau = -10$  to  $\tau = 10$  around ESG news announcements. The figures are organised into good and bad ESG news, and the average returns are also calculated separately for stocks based on three categories of firm size: the largest 500 stocks (blue), the next 400 stocks (orange), and the smallest 600 stocks (red).

**Figure 2: Announcement Period Abnormal Trading Volume**



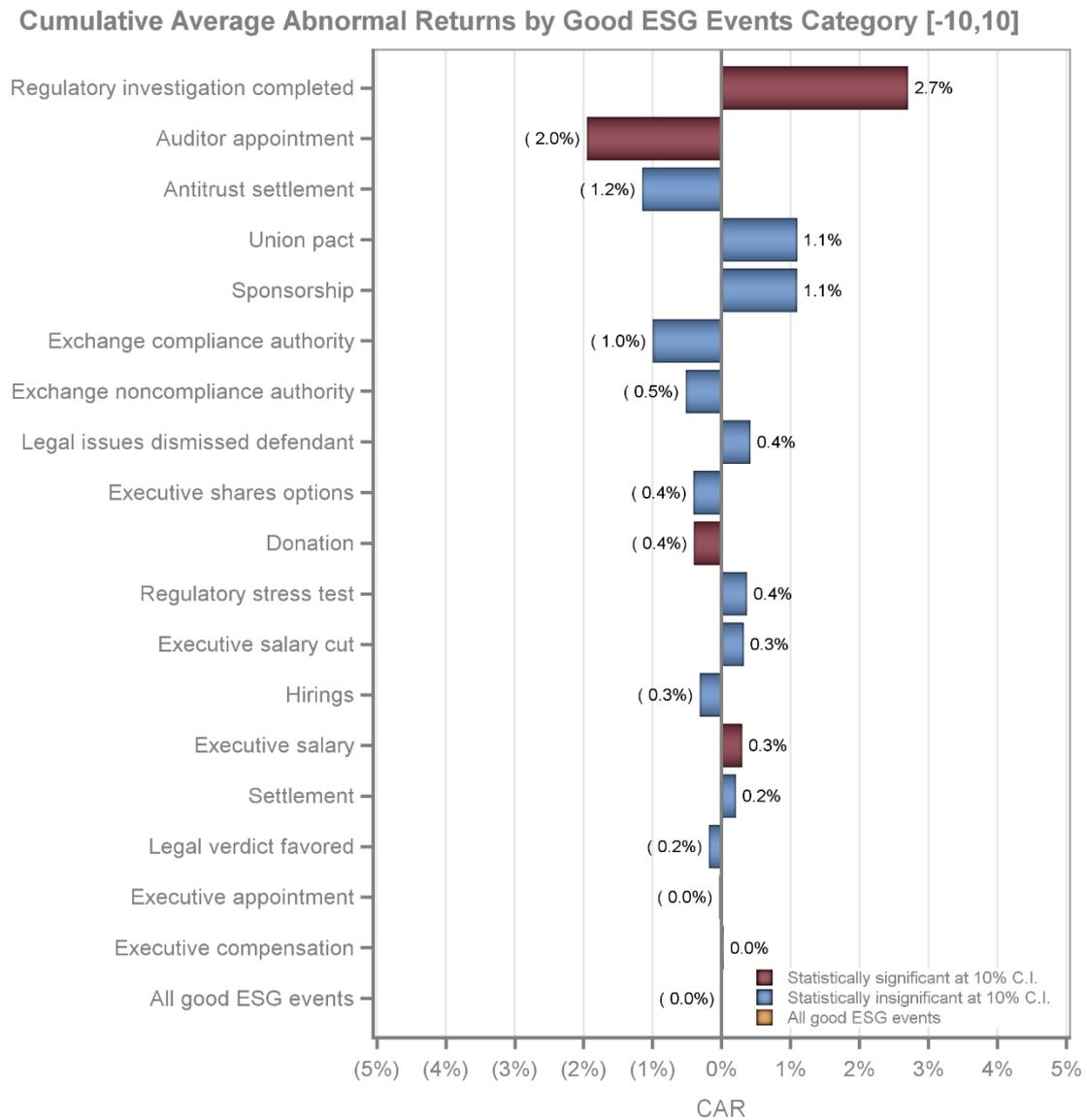
This figure reports the average abnormal trading volume across the period from  $\tau = -10$  to  $\tau = 10$  around ESG news announcements. The abnormal trading volume is calculated as the ratio of trading volume at day  $\tau$  of the trading volume averaged between day  $t = -255$  to  $t = -46$ . The figures are organised into good and bad ESG news, and the average trading volumes are also calculated separately for stocks based on three categories of firm size: the largest 500 stocks (blue), the next 400 stocks (orange), and the smallest 600 stocks (red).

**Figure 3: Reaction to Bad ESG News by Category**



This table reports the average CAR across the period from  $\tau = -10$  to  $\tau = 10$  for bad ESG news announcements across each ESG category. The returns are sorted by magnitude. A red bar and a yellow bar represent average abnormal returns that are statistically significantly different from zero at the 10% confidence level, and the blue bars represent average abnormal returns that are not significantly different from zero.

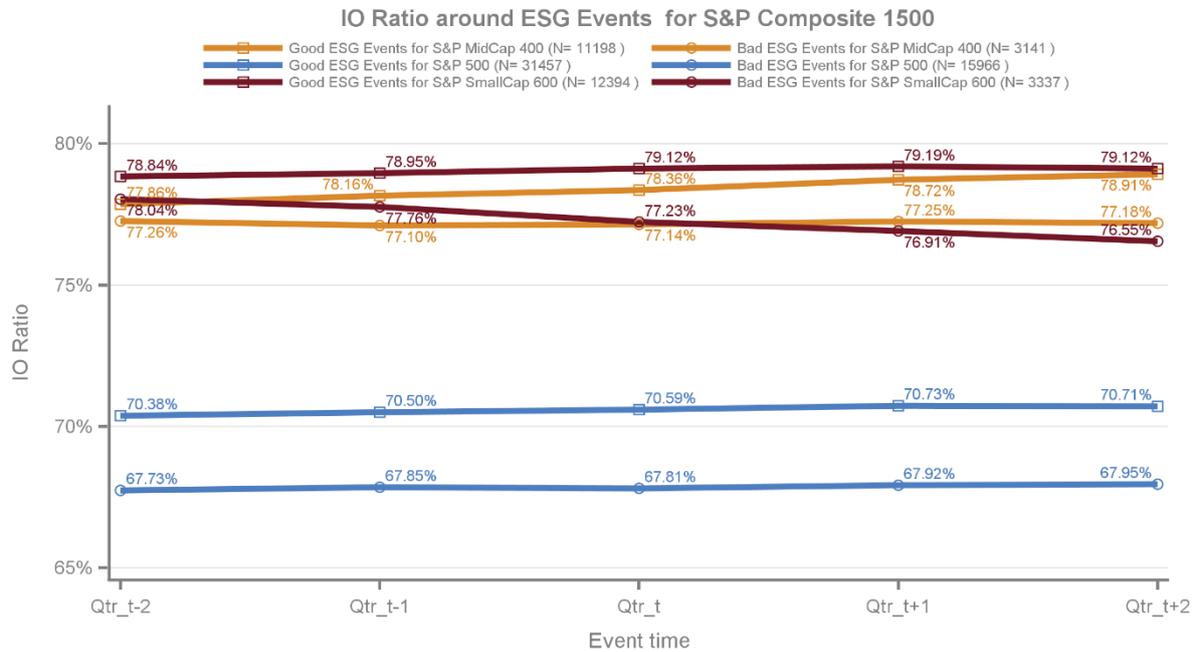
**Figure 4: Reaction to Good ESG News by Category**



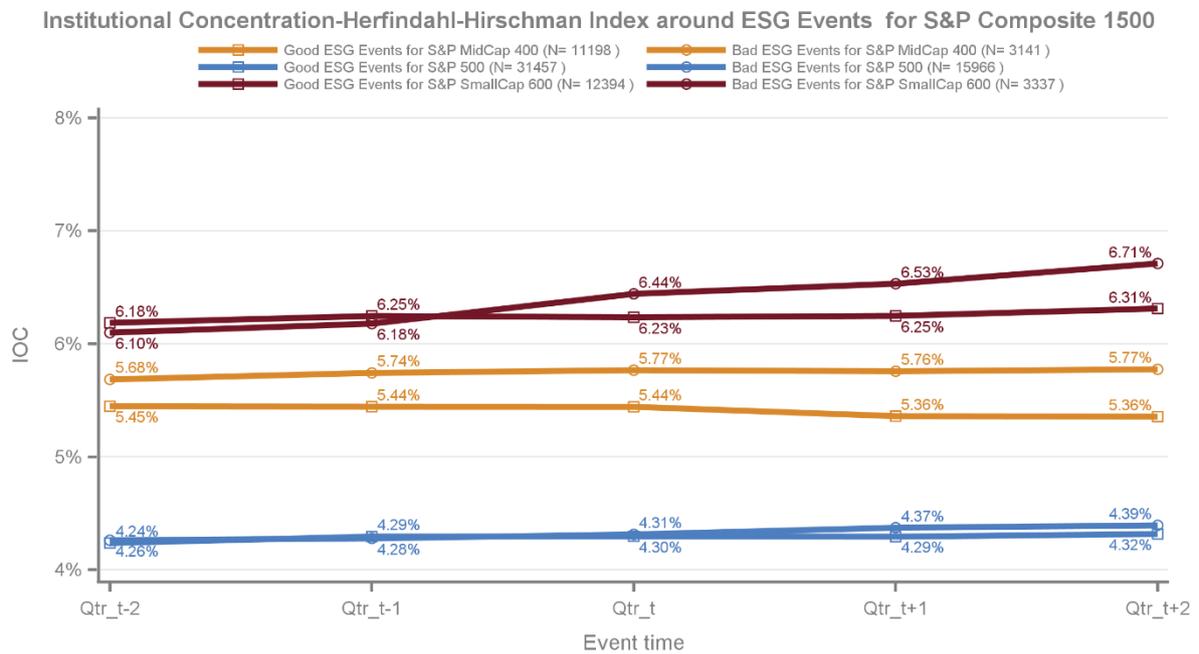
This table reports the average CAR across the period from  $\tau = -10$  to  $\tau = 10$  for good ESG news announcements across each ESG category. The returns are sorted by magnitude. A red bar represents average abnormal returns that are statistically significantly different from zero at the 10% confidence level, and the blue bars and yellow bar represent average abnormal returns that are not significantly different from zero.

**Figure 5: Institutional Trading Patterns Around ESG News Events**

**Panel A: Institutional Ownership Ratio around ESG News**

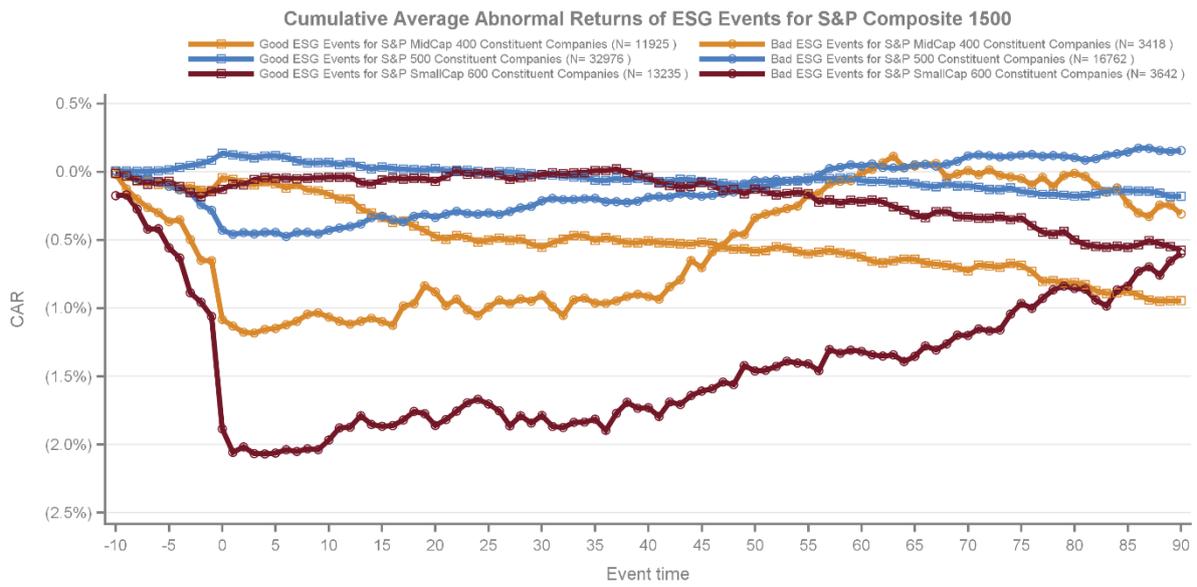


**Panel B: Institutional Ownership Concentration around ESG Events**



This figure documents changes in institutional investor holdings for stocks around ESG news events. The results are reported quarterly beginning two quarters before the announcement and ending two quarters after the announcement. In Panel A, data is reported for the proportion of free-floating shares that are held by institutional investors. In Panel B, data is reported for the Herfindahl-Hirschman Index of the concentration of holdings held by institutions. The circles represent values for bad ESG news events, and the squares represent value for good ESG news events.

**Figure 6: Long-Run Post Announcement Returns**



This figure reports the long-run cumulative average abnormal returns across the period from  $\tau = -10$  to  $\tau = 90$  around ESG news announcements to examine the post-announcement mean reversion in returns. The figures are organised into good and bad ESG news, and the average returns are also calculated separately for stocks based on three categories of firm size: the largest 500 stocks (blue), the next 400 stocks (orange), and the smallest 600 stocks (red).

**Table 1: Summary Statistics**

Panel A. The Number of ESG related news events for each year										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number	3,952	4,547	4,702	4,720	5,247	5,340	5,469	5,318	4,958	4,044
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Number	3,656	3,748	3,507	3,237	3,437	4,542	4,720	3,663	3,538	

Panel B. The Number of Negative ESG related news events for each year										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number	1,169	1,657	1,644	1,615	1,604	1,522	1,479	1,432	1,564	1,364
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Number	1,001	1,016	954	862	891	863	970	1,176	1,153	

Panel C. The Number of Positive ESG related news events for each year										
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number	2,783	2,890	3,058	3,105	3,643	3,818	3,990	3,886	3,394	2,680
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Number	2,655	2,732	2,553	2,375	2,546	3,679	3,750	2,487	2,385	

Panel D. The Number of ESG related news events for ESG newsgroup										
Group	Civil Unrest	Corporate Responsible	Crime	Industrial accidents	Labor issue	Legal	Pollution	Regulatory	Security	War Conflict
Number	38	802	40	261	65,638	12,676	1	2,688	131	70

Panel E. The Number of Bad ESG related news events for ESG news group										
Group	Civil Unrest	Corporate Responsible	Crime	Industrial accidents	Labor issue	Legal	Pollution	Regulatory	Security	War Conflict
Number	20	802	-	11	53,039	3,870	1	616	23	27

Panel F. The Number of Good ESG related news events for ESG news group										
Group	Civil Unrest	Corporate Responsible	Crime	Industrial accidents	Labor issue	Legal	Pollution	Regulatory	Security	War Conflict
Number	18	-	-	40	250	12,599	8,806	2,072	108	43

The tables present summary statistics of our sample for the ESG news for the US market from 2000 to 2018. The sample selection process is described in Section 2.

**Table 2: Multivariate determinants of the announcement and post-announcement period returns**

VARIABLES	Panel A: Announcement Period Returns			Panel B: Post-Announcement Returns		
	CAR[-1,1]	CAR[-1,1]	CAR[-1,1]	CAR[2,90]	CAR[2,90]	CAR[2,90]
Sentiment*Ln(MV)		0.001*** (4.256)			-0.004*** (-2.677)	
Sentiment*Transient			-0.007*** (-3.304)			0.041* (1.896)
Sentiment	-0.001*** (-5.704)	-0.007*** (-4.913)	0.000 (0.275)	0.011*** (5.044)	0.047*** (3.221)	0.002 (0.390)
Ln(MV)	-0.003*** (-6.263)	-0.003*** (-6.629)	-0.003*** (-6.228)	-0.165*** (-20.778)	-0.163*** (-21.133)	-0.164*** (-21.088)
Transient		-0.011*** (-7.883)	-0.009*** (-6.602)		-0.220*** (-10.188)	-0.231*** (-10.926)
Roa	-0.001 (-0.356)	-0.001 (-0.239)	-0.001 (-0.210)	0.095** (2.036)	0.106** (2.289)	0.105** (2.278)
IOR	-0.003*** (-3.077)	-0.002** (-2.480)	-0.002** (-2.503)	-0.069*** (-4.500)	-0.059*** (-3.861)	-0.059*** (-3.841)
Q	-0.000 (-0.146)	-0.000 (-0.051)	-0.000 (-0.013)	-0.002 (-0.671)	-0.002 (-0.599)	-0.002 (-0.611)
D/A	-0.000 (-0.172)	-0.000 (-0.109)	-0.000 (-0.111)	-0.023 (-0.968)	-0.022 (-0.949)	-0.022 (-0.948)
Ln(Age)	0.002** (2.391)	0.001 (1.407)	0.001 (1.472)	0.022* (1.765)	0.008 (0.641)	0.007 (0.611)
Cret	0.729*** (64.528)	0.729*** (64.507)	0.729*** (64.546)	-0.189*** (-7.013)	-0.185*** (-6.879)	-0.186*** (-6.918)
Ln(Analyst)	0.001*** (3.300)	0.001*** (3.137)	0.001*** (3.143)	0.044*** (8.413)	0.042*** (8.215)	0.042*** (8.216)
Constant	0.017*** (4.373)	0.023*** (5.747)	0.021*** (5.181)	1.332*** (16.988)	1.398*** (18.315)	1.414*** (18.407)
Observations	74,141	74,141	74,141	74,141	74,141	74,141
Adjusted R-squared	0.715	0.716	0.716	0.150	0.155	0.155
ESG Events	All	All	All	All	All	All
Stock and Year FE	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the results from regressions that examine the determinants of cumulative abnormal returns across the three days around announcement returns (CAR[-1,1]) and for the period from two days until 90 days after the announcement (CAR[2,90]). The independent variables in the regressions are a dummy variable that takes the value of one for negative news and zero otherwise  $Sentiment_i$ , the natural logarithm of the market capitalisation ( $Ln(MV)_i$ ), the proportion of transient investors holding shares in a stock ( $Transient_i$ ), return on assets (ROA), total institutional ownership (IOR), Tobin's Q (Q), debt-to-asset ratio (D/A), the natural logarithm of firm age ( $Ln(Age)$ ), the firm's stock returns over the last three months (Cret) and the natural logarithm of the number of analysts that cover the firm ( $Ln(Analyst)$ ). The regressions are estimated with firm and year fixed effects, and t-statistics are reported in parentheses under their associated coefficients. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% confidence levels.