Which Corporate ESG News does the Market React to?

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Abstract

Using 111,020 firm–day observations for 3,126 companies that classify ESG news as positive and negative, we examine how prices react to ESG news and whether the news can be predicted. We find that prices react only to issues identified as financially material sustainability accounting standards for a given industry, and the reaction is larger for news that is positive, receive more attention, and related to social-capital issues. We also find that firm specific ESG performance score predicts future ESG news. Using the prediction model which is based on preexisting ESG performance score, we separate ESG news into expected and unexpected components. We find that most of the market reaction comes from unexpected news, which suggests that investors incorporate into stock prices the future expectations about ESG-related news captured in ESG performance scores.

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INTRODUCTION

Every day, environmental, social, and governance (ESG) related news can be found for hundreds of companies as events unfold, and as the media, analysts, regulators, and other stakeholders uncover information. In this paper, we use a unique dataset that tracks daily ESG news across thousands of companies and examine whether and how investors react to the release of different ESG-related information. This question is an important one as more investors are integrating ESG information in their portfolio management and as ESG news can have a major impact on companies. For example, Bank of America Merrill Lynch examined 24 major ESG controversies of S&P 500 companies during 2014-2019 and found that the total market cap loss amounted to $534 billion.[1] As a result, more companies are investing resources in improving their performance on ESG issues and regulators are placing an increasing emphasis on understanding how ESG information flows to the market, seeking to learn how capital-market participants react to this information.

Prior literature examined the market reaction to ESG regulations, eco-friendly initiatives, and engagements (e.g., Flammer 2013; Dimson, Karkas, and Li 2015; Hoepner, Grewal, Riedl and Serafeim 2019; Naughton, Wang, and Yeung 2019; Oikonomou, Sautner, Starks, and Zhou 2019). In addition, some papers examined *whether* market reacts to ESG news by classifying the news into positive and negative news. For example, Krüger (2015) examined 2,000+ firm-days between 2001 and 2007 and found the market reacts negatively to both positive and negative ESG news. Capelle-Blancard and Petit (2019) found negative market reaction only to negative news of 100 firms between 2002 and 2010.

In this paper, we extend the prior literature by providing new evidence on *which* ESG news the market reacts to and why. We examine this question because we do not know much about to which ESG news the market would react to other than to positive and negative news (see Krüger 2015; Capelle-Blancard and Petit 2019) and it is ex-ante unclear whether the results from these prior papers would be generalizable in recent years for the following reasons. First, prior research conducted small sample

[1] Bank of America Merrill Lynch: "10 Reasons You Should Care about ESG." Sep 23, 2019.

analyses on periods when capital markets did not pay nearly as much attention to ESG issues or viewed such issues through an agency-cost lens (Krüger 2015, Ioannou and Serafeim 2015). Indicatively, investment associations such as the United Nations Principles for Responsible Investment (UN PRI) was set up in 2006 and at the time of initiation UN PRI signatories only had a few hundred billion dollars in assets under management in the first few years, but by 2020 the assets under management had reached $110 trillion. Therefore, investor awareness around ESG issues was very limited during the sample period of prior work. Second, past research did not differentiate between news on ESG issues that are likely to be financially material for a given industry. Third, given the existence of ESG ratings not all news might surprise investors giving rise to stock price reactions. Fourth, the samples analyzed in most of prior work were events identified by human analysts and more limited in range. We overcome this limitation using recent technological developments in natural language processing, which allows us with a much larger set of companies and events.

We examine whether and how investors react to different types of ESG news using much more recent sample that is orders-of-magnitude larger than those used in prior studies, separate the sample using materiality classifications from the Sustainability Accounting Standards Board, and model the relation between ESG performance scores and future ESG news to isolate the unexpected component of ESG news. Our total sample includes 111,020 unique firm–day observations for 3,126 companies with ESG news between January 2010 and June 2018. The data from TruValue Labs (TVL) track ESG-related information every day across thousands of companies, classify news to positive or negative, and provide insights on how positive or negative the news is. This dataset includes information from a wide variety of sources—including reports by analysts, media, advocacy groups, and government regulators—and emphasizes that the measures focus on vetted, reputable, and credible sources that are likely to generate new information and insights for investors.

Our primary research design is on a firm-day panel where the dependent variable is the daily market-adjusted stock return and our key independent variables of interest are indicator variables for positive and negative news on that day. In addition, we consider the industry-adjusted return as an

alternative dependent variable. This daily structure allows us to implement an event-study research design, measuring short-term price reactions to ESG news every day, which helps alleviate reverse-causality concerns and other confounding events unlike the studies that examine long-term returns and corporate performance.[2]

We split the sample according to the Sustainability Accounting Standards Board (SASB)'s industry-specific materiality classification to test whether investors react more strongly to news that is likely to provide financially material information. The literature has proposed multiple explanations on why investors might react to ESG news. One explanation is that investors react because of their own reputational or nonpecuniary reasons (Jones, Jones, and Little 2000; Wether and Chandler 2005; Baker, Bergstresser, Serafeim, and Wurgler 2018). Under this explanation, ESG information is value irrelevant and therefore financially immaterial. In such a case, we expect the reaction to be significant for any ESG issue regardless of its financial materiality. On the other hand, some papers argued that ESG news convey value-relevant information about a firm's future growth, risk, and competitive positioning (Khan, Serafeim, and Yoon 2016; Grewal, Riedl, Serafeim 2019). In such a case, investors may react to ESG news that could convey financially material information.

Our first set of analyses shows that not all events are associated with significant price reactions. We find significant market reaction only to news classified as financially material based on a company's industry membership. Specifically, when we examine the firm-dates with at least three news articles, we find significant and positive price reactions for positive ESG news only for the sample classified as financially material ESG issues according to SASB standards.[3] On average, the price reaction is 60 basis points on the day of the news and 75 basis points during the two-day window from the day prior to the day of the news.

[2] To assess the robustness of our findings, we also present results for calendar-time portfolios, buying daily the firms with positive or negative news, and estimating six-factor models that control for the value, size, market, momentum, investment, and profitability factors (Novy-Marx 2013, Fama and French 2016). This approach allows us both to control for exposure to different factors that might be correlated with returns and to account for potential inflation of statistical significance in panel regressions due to cross-correlation of errors within days and across companies.
[3] According to TVL, sentiment analysis requires at least three articles to be accurate.

Our results increase in economic significance when we restrict the sample to material news that receive more attention (e.g., having more than five ESG articles on that day). We now find that negative news is accompanied by negative price reactions. For example, the market reaction to positive news increases to 210 basis points and the market reaction to negative news increases to 70 basis points. In contrast, we find no price reaction for the sample of ESG issues that are not classified as material according to SASB standards regardless of how we restrict our sample. We find even stronger results when using the industry-adjusted return as a dependent variable. Overall, our results are supportive of the view that investors differentiate in their reactions based on whether the news is likely to affect a company's fundamentals, and therefore their reactions are motivated by a financial rather than a nonpecuniary motive.[4]

Despite significant research efforts have been devoted to analyzing a firm's ESG activities, the literature has not yet examined how investors react to ESG news after accounting for the existing expectations about a firm's ESG activities. As a result, we examine whether ESG scores that rate a firm's ESG performance are associated with future ESG news. Ex-ante, we view that it is unclear whether ESG scores will predict future ESG news because ESG scores may be ignored by investors. This is plausible given the evidence in the literature which casts doubt on the accuracy and validity of ESG scores (Chatterji, Durand, Levine, and Touboul 2016; Berg, Koelbel and Rigobon 2019). On the other hand, there is a possibility for a positive relationship if the ESG performance scores reasonably capture a firm's activities and strategies to limit negative ESG events and promote positive ESG events.

To operationalize the above, we use MSCI ESG scores, the most comprehensive ESG performance scores to the TVL data, to proxy for investor expectations about future ESG news and examine its association with future ESG news. We find a strong positive relation between a firm's ESG performance score of day t-1 and ESG news of day t. We find that the strength of this relationship increases for news

[4] Given the lack of results for the sample not classified as material according to SASB, we focus on further analyzing the sample classified as material in the remainder of the paper. However, in the Appendix we present results for the rest of the news observations, which are classified as immaterial.

that receives more attention, suggesting that news that receives more attention is more in line with what one would expect based on a firm's ESG performance score.

Then, we examine whether stock prices only react to unexpected news or also to news predicted by a firm's ESG score. If the former is true, then investors expect future news to be in line with a firm's ESG score and impound future news in prices. If the latter is true, either investors do not fully impound future news (which is in line with a firm's ESG score) in prices, as future news might play a confirmatory role, or investors do not view ESG scores as predictive of future news. Specifically, we use the above prediction model to separate positive and negative news into predicted and residual components as a function of a firm's ESG performance score. We find that investors react to both components of positive news, but much more saliently to the unexpected component. We also find a significant investor reaction to negative unexpected news. Specifically, market reaction to predicted positive news is 45 basis points. On the other hand, market reaction to unexpected positive news and negative news are 133 and 60 basis points, respectively. Across all specifications, the magnitude of the reaction to positive news is larger than that to negative news. Taken together with the results from the prediction model, this set of results suggest that ESG performance scores have predictive ability about future ESG news, and that investors incorporate the predictive component into prices.

We add to the prior literature in the following ways. First and foremost, we add to papers that examined whether market reacts to ESG news (see Krüger 2015; Capelle-Blancard and Petit 2019). Unlike the two papers, we show that investors react positively to positive news and that the reaction is much stronger for positive rather than negative news even when we look at news with more attention. We note that our overall results paint a different picture about how investors react to ESG news and believe the difference in findings could be multifold. First, we examine a period that is more recent and when ESG became more prevalent than the prior studies. Second, we rely on technological advancements that systematically measure ESG news using natural language processing which is an improvement in measurement quality and selection bias compared to papers that relied on a human analyst subjectively

codifying ESG news. Third, and related to the above, we show that investors react very differently to different ESG news.

In addition to the above differences, our research approach allows us to control for investor expectations about future news based on a firm's preexisting ESG performance score. We separate the predicted and residual component of ESG news by modeling future news based on a firm's ESG performance score. The former is the information content that one would expect based on the firm's ESG performance score, and the latter is the unexpected component of news. The predictive power of ESG performance scores about future ESG news provides new insights into the usefulness of these scores for market participants. To the best of our knowledge, we are the first to provide evidence on whether ESG performance scores have predictive power over future ESG news and document additional evidence on which news the market reacts to. We believe this is an innovation relative to prior studies that assumed all information is new to investors.

Finally, our paper adds to the literature that examined market reaction to ESG news by showing that most of investor reaction happens on the actual day of the news and that the market reaction is driven mostly by news that are classified as financially material. Similar in spirit to the recent stream of literature that examined financial materiality of different ESG investments (e.g., Khan, Serafeim, and Yoon 2016), our results suggest that some ESG news contain more value-relevant information than other news and that this information can be utilized by market participants.

The remainder of the paper is organized as follows. The next section provides the motivation and background. Section 3 presents a description of the data and sample. Section 4 presents the research design and results. Section 5 concludes.

LITERATURE REVIEW AND MOTIVATION

Environmental, social, and governance (ESG) issues in business has been a fast-growing phenomenon and much attention has been paid by companies in recent years. For example, there were fewer than 20 publicly listed companies that issued reports that included ESG data in the early 1990s. By 2014, this number had

increased to nearly 6,000 (Serafeim 2014). This growing salience of ESG is not unique just to companies but also prevalent in the asset management industry. For example, UN PRI signatories only had a few hundred billion dollars in AUM in the first few years starting in 2006, but the AUM reached $80 trillion by 2019. Forbes pointed out such massive inflow of capital into ESG "remarkable" and the Wall Street Journal pointed out that more companies are investing resources in better communicating their ESG efforts and regulators are placing an increasing emphasis on understanding how ESG information flows to the market, seeking to learn how capital-market participants react to this information.[5,6]

Numerous academic papers examined how market reacts to ESG related information and events. For example, Grewal, Riedl, and Serafeim (2019) examined the impact of ESG disclosure mandate in the European Union and documented less negative market reaction for firms that have high ESG disclosure. Naughton, Wang, and Yeung (2019) found that announcements of CSR activities generate positive abnormal returns during periods when investors place a valuation premium on CSR performance, Flammer (2013) found that market reacts positively to the announcement of eco-friendly initiatives, and Dimson, Karkas, and Li (2015) found positive abnormal returns to successful ESG engagements by investors. More closely related to our paper, Capelle-Blancard and Petit (2019) found negative market reaction to negative ESG news, and Krüger (2015) found that the market reacts negatively to both positive and negative ESG news.

There are multiple viewpoints that may lead to different predictions as to how the market would react to ESG news. The first viewpoint is that a firm's ESG efforts are mainly associated with agency costs. In such a case, ESG would mainly enhance managers' reputation at the expense of shareholders (Cheng, Hong, and Shue 2013). This would lead to a rise in a firm's costs which would also be a disadvantage in a competitive market (Friedman 1970; Jensen 2002). This stream of argument would be consistent with Krüger (2015) that documented a negative market reaction to even to positive ESG news.

[5] Forbes. The Remarkable Rise of ESG. Jul 11, 2018.
[6] WSJ. ESG Funds Draw SEC Scrutiny. Dec 16, 2019.

The second viewpoint suggests that ESG information may be related to shareholder value. The argument is that better sustainability performance can not only lead to better resources (Cochran and Wood 1984; Waddock and Graves 1997), higher-quality employees (Turban and Greening 1997), and marketing success (Moskowitz 1972; Fombrun 1996), but also mitigate the likelihood of stock price crash risk (Kim, Li, and Li 2014; Hoepner, Oikonomou, Sautner, Starks, and Zhou 2019) and enhance firm reputation (Fombrun and Shanley 1990; Fombrun 2005; Freeman, Harrison, and Wicks 2007). Eccles, Ioannou, and Serafeim (2014) found evidence that supports this stream of thought. They identified a set of firms that adopted corporate policies related to environmental and social issues before the adoption of such policies became widespread and found that these firms exhibited higher future stock returns and accounting performance.

The third viewpoint suggests that there may be no reaction to ESG news. For example, investors might only care about ESG because of reputational or nonpecuniary reasons (Jones, Jones, and Little 2000; Wether and Chandler 2005; Baker, Bergstresser, Serafeim, and Wurgler 2018). Under such circumstances, ESG information would be value irrelevant and therefore financially immaterial. There would also be no reaction if investors do not update their beliefs post ESG news because much is already known through already existing channels (Griffin and Sun 2013). In such a case, ESG news may not lead to any price reactions.

However, it is likely that market reaction to ESG news could vary depending on the type of news. For example, Khan, Serafeim, and Yoon (2016) found only a small subset of ESG issues in each industry, as identified by sustainability accounting standard setters, are associated with future stock returns and accounting performance. This suggests a possibility that different ESG news in different industries may convey more value-relevant information about a firm's future growth, risk, and competitive positioning than other information. In another stream of literature, Mitchell, Agle, and Wood (1997) suggested that different stakeholders may have varying salience to company operations and Agle, Mitchell, and Sonnenfeld (1999) found that primary stakeholders, such as employees and customers transacting directly with the firm, are more salient to shareholders than more distant stakeholders, such as the natural

environment or local communities. In such a scenario, we may expect stronger market reactions to social capital and human capital related news relative to natural capital news.

DATA AND SAMPLE

ESG News Data

We use TVL data that tracks ESG-related information every day across thousands of companies and classify that news as positive or negative. TVL is used by some of the largest asset managers (e.g., State Street) and asset owners (e.g., Global Pension Investment Fund of Japan) and employs big data and artificial intelligence to capture and analyze unstructured data (Serafeim 2020). Every day, TVL uses artificial-intelligence algorithms to find ESG-relevant articles for each company categorized by ESG-specific issue. SASB has issued industry-specific disclosure standards identifying, for 79 industries, which ESG issues are financially material. In doing so, SASB has identified evidence of interest and financial impact from emerging regulations, disruptions in the physical environment, changes in consumer preferences, and supply-chain pressures that might generate effects on costs, revenues, assets, liabilities, or costs of financing. TVL uses this SASB classification of 30 ESG issues to determine whether the news is material or not.

TVL does not source news that is coming directly from the company, such as press releases or company reports. Rather, TVL sources news from outside the organization including a wide variety of sources such as analyst reports, various pmedia, advocacy groups, and government regulators. TVL emphasizes that its measures focus on vetted, reputable, and credible sources that are likely to generate new information and therefore insights for investors. To increase transparency and validate the data, the TVL platform allows a user to track the original source of the articles and events that inform the sentiment analysis for each specific issue. The platform aggregates unstructured data from over 100,000 sources into a continuous stream of ESG data for monitored companies. The cognitive computing system uses natural language processing (NLP) to interpret semantic content and generate analytics scoring data points on performance, using a scale of 0 to 100. A *News Score* of 50 represents a neutral impact. Scores above 50

indicate positive sentiment, and scores below 50 reflect negative sentiment. For example, Ingersoll Land had positive sentiment following news on the firm's investments to improve waste and hazardous-materials management, materials sourcing, and product safety. In contrast, Facebook had negative sentiment following news on the firm's data-privacy issues, concerns about regulatory pressure, and user rights.

The analysis performed by TVL is capable of codifying not only positive versus negative in a binary way, but also degrees of positivity or negativity. For example, the algorithms assign a more negative score to a catastrophic oil spill affecting several workers and communities and a less negative score to a workplace incident that leads to a minor injury for one worker. The algorithms assign such scores in a consistent manner based on the semantic content across data points, so that if there is hypothetically an identical event such as the catastrophic oil spill and an identical discussion of the event in a textual document, the sentiment-based score for such an event would be the same.

ESG Performance Data

Data on firms' daily ESG performance comes from MSCI ESG Ratings. MSCI aggregates the issue data to an overall score, where each issue is weighted according to its assessed materiality in each industry. MSCI ESG Ratings are based on 37 key issues, which correspond to one of ten macro themes that MSCI identifies as concerns to investors. The ten macro themes are climate change, natural capital, pollution and waste, environmental opportunities, human capital, product liability, stakeholder opposition, social opportunities, corporate governance, and corporate behavior. Key issues are annually selected for each of the 156 GICS Subindustries and weighted according to MSCI's materiality-mapping framework. Each key-issue score consists of a risk-exposure component—a company's exposure to a key issue—and risk-management component—the company's management of each material issue. For a given key-issue score, the required risk-management-component score is conditional on the risk exposure faced by the company; a company with greater risk exposure would be required to have strong risk-management practices in place. Conversely, a company with minimal management strategies for a low-risk-exposure issue would not be penalized. For key issues that measure opportunity (e.g., opportunities in green building, opportunities in

renewable energy, opportunities in nutrition and health, access to healthcare), exposure indicates the relevance of this opportunity to a given company based on its current business and geographic segments.

MSCI measures the risk and opportunity exposure of each company by combining company-specific operations data with key-issue-relevant macro-level data relating to the company's geography of operations and business segment. Company-operations data are sourced from corporate reporting, such as annual reports, investor presentations, and financial and regulatory filings, with macro-level data being sourced from a wide variety of academic, government, and NGO databases. Similarly, risk and opportunity management–related data come from corporate documents, government data, news media, relevant organizations and professionals, and an assortment of popular, trade, and academic journals. As part of its data-verification process, MSCI engages in direct communication with companies and invites companies to participate in a data-review process, which includes commenting on the accuracy of company data for all MSCI ESG research reports.

We use this MSCI ESG rating as a proxy for the market's view of ESG performance because it is the most widely used by the investment community. Of the 50 largest asset managers, ranked by assets under management, 46 use the MSCI performance score, with the total number of clients being 1,200+ investment firms. MSCI defines the purpose of its ratings as follows: "to help investors to understand ESG risks and opportunities and integrate these factors into their portfolio construction and management process." The MSCI-coverage universe is based on major MSCI indices (e.g., the MSCI World Index, the MSCI Emerging Markets Index, MSCI country-specific Investible Market Indices), which include the world's largest and most liquid stocks.

Other Data

We use Compustat and CRSP to construct the following variables. We consider the following dates with respect to the news: 1) t-5 to 5-2, 2) t-1, 3) t, 4) t+1, and 5) t+2 to t+5. This approach enables us to understand when the market reaction occurs—and to detect whether there is any leakage of information during the days preceding the news or any under- or overreaction during the days following it. *MA Return*

is the market-adjusted return during the days relative to the date of the news. For example, *MA Return -5, -2* is the cumulative market return between five and two days before the news minus the cumulative value-weighted market returns during the same period. *MA Return -1* is the cumulative market return during the day before the news minus the cumulative value-weighted market return during the same day. *Market Capitalization* is the beginning-of-day market capitalization for a firm on the day the news article is published. *MTB* is the firm's market-to-book equity ratio. *Size* is the logarithm of total assets. We obtain the six risk factors from Kenneth French's website.

Sample

Table 1 Panel A presents the summary statistics for all observations with at least three news articles from TVL. Our total sample includes 111,020 unique firm–day observations with ESG news between January 2010 and June 2018. Average *MA Return -5, -2, MA Return -1, MA Return 0, MA Return +1,* and *MA Return +2, +5* are 0.035%, 0.035%, 0.086%, -0.010%, and -0.004%, respectively. Average *News Score, Article Volume, Market Cap, Size,* and *MTB* are 58, 5, $70 billion, 17.04, and 4.16, respectively. Average *ESG Score* is 4.84, and average *Environmental Score*, *Social Score*, and *Governance Score* are 5.89, 4.36, and 5.16, respectively.

Panel B presents the summary statistics for observations with at least three news articles from TVL and classified as material for their respective industry by SASB. Our sample includes 46,430 unique firm–day observations. Average *MA Return -5, -2, MA Return -1, MA Return 0, MA Return +1,* and *MA Return +2, +5* are 0.045%, 0.040%, 0.140%, -0.011%, and -0.005%, respectively, showing that the market reactions are larger for material issues. Average *News Score, Article Volume, Market Cap, Size,* and *MTB* are 57, 5, $84 billion, 17.23, and 4.06, respectively. Average *ESG Score* is 4.82, and average *Environmental Score*, *Social Score*, and *Governance Score* are 5.94, 4.32, and 5.09, respectively.

Table 2 presents the frequency table for all observations with at least three news articles from TVL. Panel A presents the table by year. There are 6,257, 7,176, 7,473, 8,621, 11,002, 17,883, 18,988, 22,176, and 11,444 observations for years 2010 through 2018, respectively. As for material observations, there are

2,478, 2,739, 2,859, 3,391, 4,450, 7,737, 8,064, 9,527, and 5,187 observations for years 2010 through 2018, respectively.[7] In addition, we provide the observation breakdown by ESG theme as defined by the SASB: 1) social capital, 2) human capital, 3) natural capital, 4) sustainability leadership and governance, and 5) business model and social innovation. Overall, there generally is an increasing trend in the number of observations, and there are 17,176, 6,243, 5,623, 7,292, and 6,171 observations in social capital, human capital, natural capital, sustainability leadership and governance, and business model and social innovation, respectively.

Panel B presents the breakdown of observations by industry. We use two-digit GICS industry code to define the industry, and there are 6,557, 6,329, 11,099, 18,008, 10,820, 19,102, 7,567, 18,771, 8,493, 3,678, and 596 observations for energy, materials, industrials, consumer discretionary, consumer staples, health care, financials, information technology, communication services, utilities, and real estate, respectively.

RESEARCH DESIGN AND RESULTS

Market Reaction to ESG News

To examine the market's reaction to ESG news, we estimate the following firm–day panel:

$$MA\ Return_{i,t} = \beta_0 + \beta_1 Negative\ News_{i,t} + \beta_2 Positive\ News_{i,t} + Date\ FE + Industry\ FE \quad (1)$$

The dependent variable is daily market-adjusted stock return relative to the news. We consider five separate dependent variables. *MA Return -5, -2* is the cumulative firm stock returns between five and two days before the news minus the cumulative value-weighted market returns during those days. *MA Return -1* is the cumulative firm stock returns the day before the news minus the cumulative value-weighted market returns on that day. *MA Return 0* is the cumulative firm stock returns on the day of the news minus the cumulative value-weighted market returns on that date. *MA Return +1* is the cumulative firm stock returns during the day after the news minus the cumulative value-weighted market returns on that date. *MA Return +2, +5* is

[7] Note that as mentioned in the previous section, the number of observations for 2018 is smaller than that for the previous years because our data are through June 2018.

the cumulative firm stock returns between two and five days after the news minus the cumulative value-weighted market returns during those days. We use four-digit GICS codes to create *Industry Fixed Effects*.[8] Our key independent variables of interest are *Positive News*, which indicates the firm date with *News Score* above 75, and *Negative News*, which indicates the firm date with *News Score* below 25. We choose these thresholds as they represent the top and bottom quartiles of scoring in the TVL method.

Table 3 presents the results from equation 1 above. We first consider all observations with at least three news articles from TVL. We use this threshold to ensure that there is a minimum number of articles, because the algorithm used in TVL's sentiment analysis requires at least a few articles to be accurate.[9] In Panel A, we find that not all events are associated with a significant price reaction. Specifically, we find significant positive price reactions for positive ESG news. On average, the price reaction to positive news is 32 basis points on day zero and 39 basis points during the two-day window between the day prior to the news and the day of. However, we do not find significant price reactions for negative ESG news.

Panel B includes observations classified as material by the SASB and with at least three news articles from TVL. We also find significant positive price reactions for positive ESG news, but the economic magnitude of the reactions is much larger than for those presented in Panel A. On average, the price reaction to positive news is 60 basis points on day zero and 75 basis points during the two-day window between the day prior to the news and the day of. We do not find significant price reactions for negative ESG news, as in Panel A.

In Panel C, we take the observations from Panel A but exclude the firm–dates in Panel B that are classified as material by SASB. We find little to no market reaction. On average the price reaction to positive news is insignificant on day zero and only 6 basis points during the two-day window between the day prior to and the day of the news. Also, there are no significant price reactions to negative ESG news. Overall, the evidence in Table 3 shows that the market reaction is strongest for material issues. Note that this set of results in Table 3 is different from Capelle-Blancard and Petit (2019), which found a negative

[8] In unreported results we also used six-digit codes, and all our results remained unchanged.
[9] We present results using higher volume thresholds in the robustness section. We find stronger results.

reaction only to negative news, and Krüger (2015), which found a negative reaction to both positive and negative news.

In Table 4, we restrict the sample to firm–dates with at least five ESG articles (instead of the three articles in Table 3) that are classified as material by the SASB. We find a much stronger market reaction than in the previous results, presented in Table 3 Panel B. In the first five columns, we assign equal weights to each observation. On average, the price reaction to positive news is 218 basis points on day zero and 245 basis points during the two-day window between the day prior to and the day of the news. In addition, we find a market reaction to negative news: the price reaction to negative news is minus 70 basis points on day zero. It is interesting to note that the magnitude of reaction on negative news (i.e., 70 basis points) is significantly greater than the 27 basis points presented in Capelle-Blancard and Petit (2019), which may be due to the growing saliency of ESG information in the recent years in addition to much our larger sample size. In the last five columns, we weigh each observation by its beginning of date market capitalization. On average, the price reaction to positive news is 318 basis points on day zero. Also, the price reaction to negative news is minus 25 basis points on day zero. Overall, we confirm the phenomenon from Table 3 and observe that negative news tends to trigger significant negative reactions for firms that receive more attention (i.e., measured as a higher ESG article volume on that day).

Robustness Tests on the Market Reaction to ESG News

In Appendix Table 1, we further restrict our sample to only include the firm–date observations with more than seven material ESG articles. Not surprisingly, our results are even stronger than those presented in Table 4. When we assign equal weights to each observation, we find that positive news generates one-day market-adjusted reactions of 340 basis points. We find that negative news generates a market reaction of minus 138 basis points, but it is not statistically significant (t-stat: -1.61). When we value-weigh each observation using the beginning-of-day market cap, we find that positive news generates one-day market-adjusted reactions of 48 basis points and that negative news generates one-day reactions of minus 45 basis points.

In Appendix Table 2, we also conduct an additional robustness test and present evidence on calendar-time portfolios, buying daily the firms with positive or negative news and estimating six-factor models. The aim of this exercise is not to document a presence of a trading strategy, as this would require predicting future ESG news, but rather to quantify the economic effect of ESG news on the market. This alternative estimation strategy allows us both to control for exposure to different factors that might be correlated with returns and to account for potential inflation of statistical significance in panel regressions due to cross-company correlation of errors. Panel A presents the results using firm–date observations with at least three ESG articles on material issues. The daily abnormal return from positive news is 47 basis points when we equal-weigh the portfolio and 31 basis points when we value-weigh the portfolio. Panel B restricts the sample to firm–date observations with at least five articles. The daily abnormal return from positive news is 62 basis points when we equal-weigh the portfolio and 48 basis points when we value-weigh the portfolio. We also find market reactions to negative news in this restricted sample. The daily abnormal return from negative news is minus 13 basis points when we equal-weigh the portfolio and minus 11 basis points when we value-weigh the portfolio.[10]

For further robustness, we also use industry-adjusted returns as the dependent variable. Specifically, we consider the following specification:

$$Ind\ Adj\ Return_{i,t} = \beta_0 + \beta_1 Negative\ News_{i,t} + \beta_2 Positive\ News_{i,t} + Date\ FE \qquad (2)$$

The dependent variable is the daily industry-adjusted stock return relative to the news. As in equation 1, we consider five separate dependent variables. *Ind Adj Return -5, -2* is the cumulative firm stock returns between five and two days before the news minus the value-weighted industry, defined as GICS4, returns during those days. *Ind Adj Return -1* is the cumulative firm stock returns during the day before the news minus the cumulative value-weighted industry return on that day. *Ind Adj Return 0* is the cumulative firm stock returns on the day of the news minus the cumulative value-weighted industry return on that day. *Ind Adj Return +1* is the cumulative firm stock returns during the day after the news minus the value-weighted

[10] In untabulated results, we conduct additional robustness tests on calendar-time portfolios and holding the portfolio for 11 days (t-5 to t+5). We also find a positive market reaction to positive news.

industry returns on that day. *Ind Adj Return +2, +5* is the cumulative firm stock returns between two and five days after the news minus the value-weighted industry returns during those days. The difference from equation (1) is that this specification excludes industry fixed effects and adjusts the return directly.

In Appendix Table 3 Panel A, we consider all observations with at least three news articles and use industry-adjusted returns as the dependent variable. Like Table 3, we find significant positive price reactions for positive ESG news. On average, the price reaction to positive news is 35 basis points on day zero and 45 basis points in the two-day window comprising the previous day and day zero. However, we do not find significant price reactions for negative ESG news. Panel B includes observations classified as material by the SASB. We also find significant positive price reactions for positive ESG news, but the economic magnitude of the reactions is much larger than that in Panel A. On average, the price reaction to positive news is 67 basis points on day zero and 86 basis points during the two-day window between the day prior to and the day of the news. In Panel C, we take observations from Panel A, excluding the firm dates that are classified as material by SASB, and we find little to no market reaction. On average the price reaction to positive news is 10 basis points on day zero and 18 basis points during the two-day window between the day prior to and the day of the news.

In Appendix Table 4, we restrict the sample to firm–date observations with five ESG articles (instead of three articles) that are classified as material by SASB. We find a much stronger market reaction than in the results presented in Table 4. In the first five columns, we assign equal weights to each observation. On average the price reaction to positive news is 225 basis points on day zero and 260 basis points during the two-day window between the day prior to and the day of the news. In addition, we find a market reaction to negative news: the price reaction to negative news is minus 67 basis points on day zero. In the last five columns, we weigh each observation by its beginning-of-date market capitalization. On average, the price reaction to positive news is 382 basis points on day zero and 398 basis points during the two-day window between the day prior to and the day of the news. The price reaction to negative news is minus 19 basis points on day zero. Overall, the above results corroborate significant market reactions to ESG news. Given the lack of results for the sample not classified as material according to SASB, we focus

the remaining main analyses on the sample classified as material and present the results for the immaterial sample in the Appendix.

Prediction of News Based on ESG Scores

In this section, we examine whether ESG scores that rate a firm's ESG performance are predictive of future ESG news. We estimate the following:

$$News\ Score_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 MTB_{i,t-1} + \beta_3 ESG\ Score_{i,t-1} + Date\ FE + Industry\ FE \quad (3)$$

News Score is the news score by TVL on day t, *Size* is the logarithm of total assets, *MTB* is the firm's market-to-book equity ratio on the previous day, and *ESG Score* is the firm's outstanding ESG performance score by MSCI on day t-1. In Table 5 Panel A, we consider observations with at least three articles. In the first two columns, we give each observation equal weights. The coefficient estimate on *ESG Score* is 1.95 (t-stat: 6.12). We decompose the previous day's ESG score into three pillar scores provided by the MSCI: *Environmental Score*, *Social Score*, and *Governance Score*. The coefficient estimates for the three scores are 0.63 (t-stat: 2.83), 1.00 (t-stat: 4.21), and 0.30 (t-stat: 1.85), respectively. In the next two columns, we value-weigh each observation using the beginning-of-day market capitalization. The coefficient estimate on *ESG Score* is 1.69 (t-stat: 4.07). When we decompose the score, the coefficient estimates on *Environmental Score*, *Social Score*, and *Governance Score* are 0.56 (t-stat: 2.17), 0.90 (t-stat: 3.08), and 0.55 (t-stat: 0.34), respectively. Overall, there is a strong positive relation between a firm's ESG performance score of t-1 and the ESG news of t, with the environmental and social components of the scores being highly associated with the news.

In Panel B, we restrict the sample to having at least five articles. Our results are stronger than those presented in Panel A. In the first two columns, we give each observation equal weights. The coefficient estimate on *ESG Score* is 2.17 (t-stat: 5.35), and when we decompose ESG score into three pillar scores, the coefficient estimates on *Environmental Score*, *Social Score*, and *Governance Score* are 0.82 (t-stat: 2.64), 1.08 (t-stat: 3.68), and 0.26 (t-stat: 1.07), respectively. In the next two columns, we value-weigh each

observation using its beginning-of-day market capitalization. The coefficient estimate on *ESG Score* is 2.08 (t-stat: 3.78), and when we decompose ESG score, the coefficient estimates on *Environmental Score*, *Social Score*, and *Governance Score* are 0.71 (t-stat: 2.42), 0.90 (t-stat: 2.80), and 0.14 (t-stat: 0.83), respectively. In both panels, we find a negative and significant coefficient on *Size*, which suggests that large firms have more negative news. As for *MTB*, while we observe negative coefficients in Panel A, we do not observe a meaningful relationship in Panel B. Overall, the relationship between ESG performance score and ESG news strengthens as the news receives more attention.

Market Reaction to Expected and Unexpected News

We separate the positive and negative news into predicted and residual components as a function of a firm's previous-day ESG performance score, and we examine the association to the market reaction. Specifically, we estimate separately for every day in our sample the following cross-sectional model as the first stage:

$$News\ Score_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 MTB_{i,t-1} + \beta_3 ESG\ Score_{i,t-1} + Industry\ FE \quad (4)$$

Then, we take the predicted and residual components of positive and negative news and estimate the following second-stage model:

$$MA\ Return_{i,t} = \beta_0 + \beta_1 Positive\ News\ Predicted_{i,t} + \beta_2 Positive\ News\ Residual_{i,t} + \beta_3 Negative\ News\ Predicted_{i,t} + \beta_4 Negative\ News\ Residual_{i,t} + Date\ FE + Industry\ FE \quad (5)$$

Positive News Predicted takes the value of one for a firm–date if the news relates to positive ESG news and if the predicted news score from equation 4 is at in top quartile. *Positive News Residual* takes the value of one for a firm–date if the news relates to positive ESG news and if the residual news score from equation 4 is in the top quartile. As for the negative scores, *Negative News Predicted* takes the value of one for a firm–date if the news relates to negative ESG news and the predicted news score from equation 4 is in the bottom quartile, and *Negative News Residual* takes the value of one for a firm–date if the news relates to negative ESG news and the residual news score from the same equation is in the bottom quartile.

Tables 6 and 7 present the results from equation 5. Table 6 considers firm–date observations with at least three news articles on material issues. We find that unexpected positive news generates one-day market-adjusted reactions of 41 basis points. The results are much stronger when we restrict the sample to firm–date observations with at least five news articles on material issues. We report the findings in Table 7; we find that investors react primarily to the unexpected component of both positive and negative news and that the magnitude of the reaction to positive news is larger than the reaction to negative news across all specifications. In the first five columns, we assign equal weights to each observation. We find that unexpected (expected) positive news generates one-day market-adjusted reactions of 133 (45) basis points. In addition, unexpected negative news generates one-day market adjusted reactions of minus 60 basis points. In the last five columns, we value-weigh each observation using its beginning-of-day market capitalization. We also find similar, but weaker, results. Unexpected (expected) positive news generates one-day market-adjusted reactions of 33 (26) basis points, and unexpected negative news generates one-day market adjusted reactions of minus 27 basis points.

In Table 5 of the Appendix, we also consider the relation between ESG scores and news for issues that are not material according to SASB. We find a significant association with market reaction for this set of issues, but the relationship is not nearly as large as with the material issues. For the equal-weighted (value-weighted) results, the coefficient on *ESG Score* declines from 1.95 to 1.55 (from 1.70 to 0.88). This suggests that ESG scores are more likely to predict news on material issues. Table 6 in the Appendix shows the association between positive and negative predicted and residual news and stock returns for issues that are not material. Consistent with what we find in Table 3 Panel C, there is not a significant association between ESG news and stock returns.

Market Reaction to ESG News by ESG Theme

In Table 7, we segment the sample by ESG theme (i.e., social capital, human capital, natural capital, sustainability governance and leadership, and business model and social innovation) as defined by SASB and estimate our main specification (equation 1) for each theme separately. We find that the largest

reactions are generated by news related to social-capital issues. Specifically, positive social-capital news generates one-day market-adjusted reactions of 186 basis points and 219 basis points during the two-day window between the day prior to and the day of the news. On the other hand, negative social-capital news generates a one-day reaction of minus 107 basis points. For positive human-capital issues, we find aggregate positive reactions of 50 basis points during one day before to one day after the news event. We do not find a significant market reaction to negative human-capital issues. For natural-capital issues, negative news generates negative one-day reactions of 55 basis points on average, while positive news does not generate any market reaction. For positive news on business model and social innovation, we find one-day market-adjusted reactions of 35 basis points, but we do not find any market reactions to negative news. Reactions to news related to sustainability governance and leadership are insignificant.[11]

Next, we examine whether a firm's ESG performance is predictive of future ESG news by theme. We consider observations with at least three articles, as in Table 5, estimate equation 3, give equal weights to each observation, and present our findings in Appendix Table 9. For social capital, natural capital, and sustainability leadership and governance, we find a strong positive relation between a firm's ESG performance score on t-1 and ESG news of t. Specifically, the coefficient estimates on *ESG Score* are 2.12 (t-stat: 4.46), 1.26 (t-stat: 2.01), and 1.45 (t-stat: 2.67). On the other hand, we do not find any relationship for human capital and for business model and social innovation.

Finally, we take the three themes where we found a positive relationship between ESG performance score and news, separate the positive and negative news into predicted and residual components, and examine the association to market reaction. In Appendix Table 10 Panel A, we present the results for the social-capital theme. We find that unexpected positive news generates one-day market-adjusted reactions of 134 basis points and reactions 190 basis points during the two-day window between the day prior to and the day of the news. We find that unexpected negative news generates one-day market-adjusted reactions

[11] Our results are confirmed when we use calendar-time portfolios estimating six factor models for each theme (see Appendix Table 8).

of minus 112 basis points and that expected negative news generates minus 33 points during the day prior to the news. In Panel B, we present the results for natural capital but do not find a meaningful market reaction to any news. We find that unexpected positive (negative) news generates one-day market-adjusted reactions of minus 21 (minus 34) basis points. In Panel C, we present results on sustainability leadership and governance but do not find any meaningful market reaction to news. Overall, investors' incorporation into prices of future expectations about ESG-related news captured by the ESG performance score is the strongest for social-capital issues.

CONCLUSION

In this paper, we examine stock-price reactions to ESG news and whether the news can be predicted by firm-specific ESG performance scores. This is an important question because more investors are integrating ESG information in their portfolio, more companies are investing resources in improving their performance on ESG issues, and regulators are placing an increasing emphasis on understanding how ESG information is flowing to the market and seeking evidence to understand how capital-market participants react to this information. To answer this question, we use a unique dataset from TVL that tracks ESG-related information every day across thousands of companies, and we classify news as positive or negative.

This dataset provides us with the following advantages over important recent literature. First, the recent technological advancements that systematically measure ESG-related news allow us to mitigate concerns about measurement quality and selection bias. Second, we can implement an event-study research design, measuring short-term price reactions to ESG news every day, which helps us to mitigate reverse-causality concerns and other confounding events. Third, our sample is orders-of-magnitude larger in size compared to prior studies, increasing the generalizability of our results. Fourth, we conduct our analyses during a recent time period, which helps generalize our results.

Our findings can be summarized as follows. First, stock prices only react to the news on ESG issues that is classified as financially material for a given industry by the SASB, suggesting that investors respond selectively to news. This price reaction is larger for ESG news that is positive, receives more attention, and

relates to social-capital issues relative to natural- or human-capital issues. Next, we find that a firm's ESG performance score has predictive power over future ESG news. Lastly, when we separate the news into expected and unexpected components based on firms' preexisting ESG scores, we find that unexpected news is associated with significant stock-price reactions and that this phenomenon is driven mostly by social-capital issues.

Future research could examine several important questions. How do the results we document here vary around the world? Do country institutions shape how markets react to ESG news? What is the relationship between firm disclosures and ESG news? How do firms respond in the presence of significant ESG news? These and other questions are likely to generate useful insights.

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Table 1: Summary Statistics

Panel A: Summary Statistics for All Observations

	N	Average	St. Dev	p25	p75
MA Return -5, -2	111,020	0.035%	4.556%	-1.541%	1.509%
MA Return -1	111,020	0.035%	3.005%	-0.726%	0.709%
MA Return 0	111,020	0.086%	4.158%	-0.733%	0.739%
MA Return +1	111,020	-0.010%	2.461%	-0.735%	0.701%
MA Return +2, +5	111,020	-0.004%	4.154%	-1.559%	1.473%
News Score	111,020	58	14	49	67
Article Volume	111,020	6	6	3	6
Market Cap	111,020	69,900,000	112,000,000	3,822,478	93,400,000
Size	108,966	17.039	2.328	15.678	18.682
MTB	108,966	4.155	205.508	1.014	4.487
ESG Score	92,778	4.835	1.247	4.000	5.600
Environmental Score	92,778	5.890	2.085	4.400	7.400
Social Score	92,778	4.362	1.678	3.300	5.500
Governance Score	92,778	5.162	2.133	3.900	6.300

Panel B: Summary Statistics for Observations on Material Issues

	N	Average	St. Dev	p25	p75
MA Return -5, -2	46,430	0.045%	4.874%	-1.508%	1.469%
MA Return -1	46,430	0.040%	3.548%	-0.711%	0.695%
MA Return 0	46,430	0.140%	5.383%	-0.728%	0.739%
MA Return +1	46,430	-0.011%	2.800%	-0.721%	0.679%
MA Return +2, +5	46,430	-0.005%	4.170%	-1.511%	1.441%
News Score	46,430	57	16	48	68
Article Volume	46,430	5	5	3	6
Market Cap	46,430	84,000,000	123,000,000	6,104,866	126,000,000
Size	45,590	17.234	2.317	15.994	18.815
MTB	45,590	4.060	103.037	1.046	4.636
ESG Score	39,081	4.820	1.215	4.000	5.500
Environmental Score	39,081	5.941	1.987	4.500	7.300
Social Score	39,081	4.321	1.641	3.300	5.400
Governance Score	39,081	5.090	2.058	3.800	6.100

MA Return is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). News Score is a score that ranges from 0 to a 100 and tracks how positive or negative the ESG news coming out for a firm is on that date. 100 is the most positive news and 0 the most negative. Article Volume is the unique number of articles for the firm on that date. Market Cap is the beginning-of-day market capitalization (in $ thousands) for a firm on each day. Size is the logarithm of total assets. MTB is the firm's market-to-book equity ratio on the previous day. ESG score is the firm's ESG score given by MSCI on the previous day. Environmental, Social, and Governance Score are the three pillar scores for the firm given by MSCI on the previous day. Panel A includes all observations with available news data from TruValue Labs (TVL) where the volume articles are at least three. Panel B includes all observations with available news data from TVL where the volume of articles is at least three and the issue is classified as material for this industry by the Sustainability Accounting Standards Board.

Table 2: Frequency Table

Panel A: Frequency by Year

Year	All Obs.	Material Obs.	Social Capital	Human Capital	Natural Capital	Sustainability Leadership & Governance	Business Model & Social Innovation
2010	6,257	2,478	728	204	300	279	322
2011	7,176	2,739	636	206	265	311	329
2012	7,473	2,859	588	239	213	351	322
2013	8,621	3,391	718	258	250	343	426
2014	11,002	4,450	1,779	364	275	524	445
2015	17,883	7,737	3,120	1,069	836	1,214	979
2016	18,988	8,064	3,108	1,243	1,041	1,361	997
2017	22,176	9,527	4,094	1,439	1,458	1,589	1,475
2018	11,444	5,185	2,405	1,221	985	1,320	876
Total	111,020	46,430	17,176	6,243	5,623	7,292	6,171

Panel B: Frequency by Sector

Sectors	All Obs.	Material Obs.	Social Capital	Human Capital	Natural Capital	Sustainability Leadership & Governance	Business Model & Social Innovation
Energy	6,557	3,679	195	931	1,403	506	200
Materials	6,329	2,393	437	288	329	214	432
Industrials	11,099	2,749	450	588	474	380	443
Consumer Discretionary	18,008	6,730	4,589	1,494	1,517	1,008	1,805
Consumer Staples	10,820	4,841	1,959	546	366	441	301
Healthcare	19,102	12,076	4,159	319	105	747	65
Financials	7,567	1,869	561	589	134	986	180
Information Technology	18,771	6,785	2,798	694	524	1,063	2,082
Communication Services	8,493	3,649	1,965	636	229	1,838	395
Utilities	3,678	1,559	36	151	526	105	258
Real Estate	596	100	27	7	16	4	10
Total	111,020	46,430	17,176	6,243	5,623	7,292	6,171

Table 3: Panel Regressions on Market-Adjusted Returns

Panel A: All Observations

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.000293	-0.000594	0.000500	0.000153	0.002327*
	[-0.188]	[-0.611]	[0.372]	[0.197]	[1.696]
Positive News	0.000421	0.000733**	0.003198***	0.000116	0.000225
	[0.768]	[2.076]	[4.799]	[0.370]	[0.393]
Intercept	0.000308	0.000284***	0.000500***	-0.000119	-0.000110
	[1.615]	[2.926]	[3.537]	[-1.628]	[-0.712]

Panel B: Observations on Material Issues

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	0.002897	-0.000343	-0.001087	0.000249	0.002810
	[1.296]	[-0.236]	[-0.544]	[0.218]	[1.429]
Positive News	0.001646	0.001473**	0.006036***	-0.000062	0.000756
	[1.609]	[2.157]	[4.497]	[-0.107]	[0.810]
Intercept	0.000179	0.000244	0.000752***	-0.000114	-0.000211
	[0.621]	[1.397]	[2.649]	[-0.889]	[-0.852]

Panel C: All Observations, Excluding Those on Material Issues

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.002079	0.000513	0.000561	0.000406	0.001557
	[-1.271]	[0.502]	[0.415]	[0.498]	[0.858]
Positive News	-0.000170	0.000647**	0.000766	0.000216	0.000062
	[-0.289]	[1.981]	[1.616]	[0.645]	[0.096]
Intercept	0.000339	0.000226**	0.000362***	-0.000130	-0.000075
	[1.462]	[2.150]	[2.676]	[-1.472]	[-0.404]

Panels A, B, and C use 111,020, 46,430, and 64,590 observations respectively. Panel A includes all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least three. Panel B includes all observations with available news data from TVL where the volume of articles is at least three and the issue is classified as material for this industry by the Sustainability Accounting Standards Board (SASB). Panel C includes all observations with available news data from TVL where the volume of articles is at least three and the issue is not classified as material for this industry by SASB. The dependent variable is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news takes the value of one for a firm–date if the news score by TVL is 75 or more (25 or less). All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

Table 4: Panel Regressions with Equal- and Market-Weighted Least Squares Models for Samples with More News Articles

	EW					VW				
	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.001280	-0.003526	-0.006951*	0.000684	0.002381	0.000790	0.000663	-0.002506**	0.001723	0.001578
	[-0.555]	[-1.428]	[-1.651]	[0.469]	[0.784]	[0.375]	[0.613]	[-2.091]	[1.265]	[0.369]
Positive News	0.001449	0.002735*	0.021767***	-0.000362	0.000549	-0.000560	0.001125	0.003179***	0.000391	-0.000217
	[0.564]	[1.651]	[4.044]	[-0.191]	[0.260]	[-0.384]	[1.318]	[3.205]	[0.563]	[-0.136]
Intercept	-0.000056	0.000147	0.000767	-0.000363*	-0.000572	0.000456**	0.000155***	-0.000130	-0.000197**	0.000008
	[-0.119]	[0.522]	[1.279]	[-1.916]	[-1.557]	[2.009]	[2.668]	[-1.560]	[-2.527]	[0.036]

This table uses 17,002 observations, and it includes all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least five and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The dependent variable is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news takes the value of one for a firm–date if the news score by TVL is 75 or more (25 or less). EW are ordinary-least-square models where each observation is equal-weighted in the model. VW are ordinary-least-square models where each observation is weighted by its beginning-of-date market capitalization in the model. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

Table 5: Prediction of News Based on ESG Scores

Panel A: Article Volume More Than Two

	News Score			
	EW		VW	
Size	-1.211909***	-1.250770***	-1.688197***	-1.708951***
	[-6.299]	[-5.912]	[-4.070]	[-4.084]
MTB	-0.000652**	-0.000628*	-0.000764***	-0.000756***
	[-2.007]	[-1.794]	[-3.229]	[-2.704]
ESG Score	1.950869***		1.698084***	
	[6.119]		[4.070]	
Environmental Score		0.632013***		0.561703**
		[2.833]		[2.170]
Social Score		0.996794***		0.898204***
		[4.207]		[3.078]
Governance Score		0.298384*		0.054941
		[1.854]		[0.343]
Intercept	60.007702***	60.244156***	65.984978***	66.755127***
	[27.451]	[26.567]	[12.690]	[12.160]
Fixed Effects	Date & Industry Effects			
Observations	39,081	39,081	39,081	39,081
Adjusted R-squared	0.327	0.327	0.483	0.483

Panel B: Article Volume More Than Four

	News Score			
	EW		VW	
Size	-0.869064***	-0.975294***	-1.373034***	-1.402930***
	[-3.480]	[-3.436]	[-2.609]	[-2.629]
MTB	-0.004487	-0.002308	-0.003441	-0.000336
	[-0.453]	[-0.242]	[-0.468]	[-0.043]
ESG Score	2.172004***		2.080741***	
	[5.345]		[3.781]	
Environmental Score		0.818852***		0.705607**
		[2.640]		[2.423]
Social Score		1.083589***		0.898460***
		[3.675]		[2.800]
Governance Score		0.261148		0.139473
		[1.070]		[0.831]
Intercept	53.013390***	53.728123***	58.988609***	60.370293***
	[17.997]	[17.300]	[8.594]	[8.476]
Fixed Effects	Date & Industry Effects			
Observations	14,713	14,713	14,713	14,713
Adjusted R-squared	0.395	0.396	0.549	0.547

Panel A (B) includes all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least three (five) and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The dependent variable is the news score by TVL. Size is the logarithm of total assets. MTB is the firm's market-to-book equity ratio on the previous day. ESG score is the firm's ESG score given by MSCI on the previous day. Environmental, Social, and Governance Scores are the three pillar scores for the firm given by MSCI on the previous day. EW are ordinary-least-square models where each observation is equal-weighted in the model. VW are ordinary-least-square models where each observation is weighted by its beginning-of-date market capitalization in the model. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

Table 6: Panel Regressions for News Conditional on ESG Scores

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Positive News_Predicted	-0.000909	-0.000284	0.000892	0.000150	0.002195**
	[-0.678]	[-0.504]	[1.147]	[0.283]	[1.973]
Positive News_Residual	0.000726	0.000686	0.004095***	-0.000042	0.000649
	[0.700]	[0.863]	[3.172]	[-0.061]	[0.566]
Negative News_Predicted	0.004077	0.004925*	-0.000606	0.000016	-0.001231
	[0.631]	[1.798]	[-0.177]	[0.005]	[-0.207]
Negative News_Residual	0.000354	0.001227	-0.001036	0.000191	0.002846
	[0.206]	[0.896]	[-0.707]	[0.142]	[1.352]
Intercept	-0.000210	0.000048	0.000228	0.000043	-0.000131
	[-0.846]	[0.367]	[1.145]	[0.385]	[-0.567]

This table includes all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least three and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The dependent variable is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news predicted takes the value of one for a firm–date if the predicted news score from the model in Table 5 is in the top (bottom) quartile. Positive (negative) news residual takes the value of one for a firm–date if the residual news score from the model in Table 5 is in the top (bottom) quartile. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

Table 7: Panel Regressions Conditional on ESG Scores with Equal- & Market-Weighted Least Squares Models for Samples with More News

	EW					VW				
	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Positive News_Predicted	0.001731	0.000121	0.004504*	0.000597	0.001390	-0.001374	0.002180	0.002626*	-0.000249	-0.001415
	[0.531]	[0.082]	[1.754]	[0.398]	[0.645]	[-0.461]	[1.451]	[1.763]	[-0.213]	[-0.559]
Positive News_Residual	-0.000492	0.003935	0.013294***	-0.000885	-0.001366	-0.000410	0.000660	0.003284**	0.000803	0.000129
	[-0.163]	[1.539]	[2.947]	[-0.484]	[-0.596]	[-0.190]	[0.611]	[2.427]	[0.828]	[0.061]
Negative News_Predicted	0.011119	0.001465	0.001930	0.004799	-0.009646	-0.008474	0.008419	0.001463	-0.004398	-0.010486
	[1.046]	[0.321]	[0.229]	[0.645]	[-0.760]	[-0.606]	[0.824]	[0.478]	[-0.641]	[-1.139]
Negative News_Residual	-0.000455	-0.001811	-0.005994*	-0.000266	0.004130	0.002459	0.000368	-0.002708*	0.002348*	0.002669
	[-0.223]	[-0.855]	[-1.831]	[-0.249]	[1.305]	[1.150]	[0.422]	[-1.895]	[1.665]	[0.533]
Intercept	-0.000658*	-0.000022	0.000284	-0.000178	-0.000370	0.000242	0.000137**	-0.000212**	-0.000236***	0.000018
	[-1.730]	[-0.087]	[0.678]	[-1.046]	[-1.128]	[1.008]	[1.992]	[-2.545]	[-3.292]	[0.084]

This table uses 14,713 observations and it includes all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least five and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The dependent variable is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) residual news takes the value of one for a firm–date if the news score by TVL is 75 or more (25 or less) and the residual news score from daily models that regress the news score on the previous day's ESG score is more than 10 (less than -10). Positive (negative) predicted news takes the value of one for a firm–date if the news score by TVL is 75 or more (25 or less) and the residual news score from daily models that regress the news score on the previous day's ESG score is less than 10 (more than -10). EW are ordinary-least-square models where each observation is equal-weighted in the model. VW are ordinary-least-square models where each observation is weighted by its beginning-of-date market capitalization in the model. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

APPENDIX

Table 1: Article Volume More than Six

	EW					VW				
	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.000116	-0.000488	-0.013810	0.001523	0.003655	0.000249	0.000361	-0.004545**	0.003101*	0.003102
	[-0.036]	[-0.169]	[-1.608]	[0.809]	[0.869]	[0.075]	[0.219]	[-2.232]	[1.824]	[0.665]
Positive News	-0.003937	0.003251	0.033925***	-0.000030	-0.004466	-0.000568	0.001425	0.004822**	0.001637	0.000633
	[-1.005]	[0.858]	[2.912]	[-0.013]	[-1.245]	[-0.191]	[1.003]	[2.316]	[1.233]	[0.280]
Intercept	-0.000629	-0.000027	0.001359	-0.000247	-0.000030	0.000684***	0.000161*	0.000059	-0.000051	0.000170
	[-1.221]	[-0.075]	[1.503]	[-0.838]	[-0.063]	[2.977]	[1.950]	[0.486]	[-0.436]	[0.934]

This table uses 8,391 observations and it includes all observations with available news data from TruValue Labs (TVL) where volume of articles is at least seven and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The dependent variable is market adjusted return over the days relative to the date of the news (i.e. -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news takes the value of one for a firm-date if the news score by TVL is 75 or more (25 or less). EW is ordinary least square models where each observation is equal weighted in the model. VW is ordinary least square models where each observation is weighted by its beginning of date market capitalization in the model. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% level respectively.

Table 2: Six Factor Calendar Time Portfolios

Panel A: Article Volume More Than Two

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0006	-0.70	0.0047	4.14	-0.0004	-0.49	0.0031	2.95
Market	0.4125	3.83	0.6654	6.17	0.4703	4.56	0.6520	6.93
SMB	-0.1701	-1.01	0.5801	3.13	-0.0828	-0.54	0.4377	2.45
HML	-0.2060	-0.98	-0.4174	-1.88	-0.0265	-0.14	-0.4587	-2.58
UMD	-0.2405	-1.45	-0.1157	-0.85	-0.3107	-2.05	-0.1029	-0.81
RMW	-0.7999	-1.89	-0.6962	-2.88	-0.3901	-1.02	-0.4024	-2.02
CMA	0.4142	0.99	0.4048	1.20	0.1701	0.44	0.6845	2.39

Panel B: Article Volume More Than Four

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0013	-2.29	0.0062	4.68	-0.0011	-1.99	0.0048	4.08
Market	0.2174	4.07	0.1539	1.39	0.2359	4.50	0.1728	1.84
SMB	-0.2589	-1.70	0.3368	1.20	-0.1919	-1.37	0.2235	0.84
HML	-0.0775	-0.55	0.0252	0.05	-0.0192	-0.15	-0.1286	-0.28
UMD	-0.2022	-1.87	-0.0497	-0.21	-0.1874	-1.81	-0.1450	-0.70
RMW	-0.0378	-0.17	-0.2593	-0.77	0.2118	1.43	-0.3845	-1.27
CMA	0.4711	1.59	-0.8056	-1.46	0.3781	1.33	-0.4253	-0.84

This table uses 2,285 daily observations where each day portfolios are formed by equal or value-weighting all firms in that day they have a news score of 75 and more for positive news or 25 and less for negative news. The table shows calendar-time regressions where the dependent variable is the daily portfolio return minus the risk-free rate and the independent variables are the market return and the returns on the size (SMB), value (HML), momentum (UMD), profitability (RMW) and investment (CMA) factors. The sample from which firms are drawn to the positive and negative news portfolios includes all observations with available news data from TruValue Labs (TVL) where volume of articles is at least three for Panel A (five for Panel B) and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The intercept is the daily abnormal return for that portfolio.

Table 3: Panel Regressions on Industry Adjusted Returns

Panel A: All Observations

	Ind Adj Return -5, -2	Ind Adj Return -1	Ind Adj Return 0	Ind Adj Return +1	Ind Adj Return +2, +5
Negative News	-0.000239	-0.000529	0.000645	0.000206	0.002040
	[-0.158]	[-0.545]	[0.490]	[0.275]	[1.547]
Positive News	0.000599	0.001029***	0.003503***	-0.000024	0.000235
	[1.140]	[3.002]	[5.298]	[-0.080]	[0.424]
Intercept	-0.000086	0.000153*	0.000373***	-0.000198***	-0.000445***
	[-0.482]	[1.790]	[3.111]	[-2.899]	[-2.953]

Panel B: Observations on Material Issues

	Ind Adj Return -5, -2	Ind Adj Return -1	Ind Adj Return 0	Ind Adj Return +1	Ind Adj Return +2, +5
Negative News	0.002960	-0.000234	-0.000961	0.000392	0.002993*
	[1.377]	[-0.160]	[-0.512]	[0.370]	[1.730]
Positive News	0.002321**	0.001890***	0.006650***	-0.000329	0.000734
	[2.390]	[2.881]	[5.015]	[-0.595]	[0.843]
Intercept	-0.000237	0.000098	0.000603***	-0.000195	-0.000530**
	[-0.887]	[0.633]	[2.603]	[-1.591]	[-2.305]

Panel C: All Observations Excluding Those on Material Issues

	Ind Adj Return -5, -2	Ind Adj Return -1	Ind Adj Return 0	Ind Adj Return +1	Ind Adj Return +2, +5
Negative News	-0.002273	0.000391	0.000537	0.000078	0.000969
	[-1.441]	[0.394]	[0.407]	[0.097]	[0.549]
Positive News	-0.000050	0.000794**	0.000967**	0.000125	-0.000035
	[-0.090]	[2.519]	[2.159]	[0.392]	[-0.056]
Intercept	-0.000070	0.000113	0.000237*	-0.000196**	-0.000407**
	[-0.319]	[1.143]	[1.892]	[-2.414]	[-2.225]

Panels A, B and C use 111,020, 46,430 and 64,590 observations respectively. Panel A includes all observations with available news data from TruValue Labs (TVL) where volume of articles is at least three. Panel B includes all observations with available news data from TVL where volume of articles is at least three and the issue is classified as material for this industry by the Sustainability Accounting Standards Board (SASB). Panel C includes all observations with available news data from TVL where volume of articles is at least three and the issue is not classified as material for this industry by SASB. The dependent variable is industry adjusted return over the days relative to the date of the news (i.e. -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted industry returns). Positive (negative) news takes the value of one for a firm-date if the news score by TVL is 75 or more (25 or less). All models include date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% level respectively.

Table 4: Panel Regressions with Equal and Market Weighted Least Squares Models for Samples with More News Articles

	EW					VW				
	Ind Adj Return -5, -2	Ind Adj Return -1	Ind Adj Return 0	Ind Adj Return +1	Ind Adj Return +2, +5	Ind Adj Return -5, -2	Ind Adj Return -1	Ind Adj Return 0	Ind Adj Return +1	Ind Adj Return +2, +5
Negative News	-0.001518	-0.002937	-0.006737*	0.001076	0.002231	-0.000706	0.000540	-0.001921*	0.001184	0.000807
	[-0.798]	[-1.093]	[-1.659]	[0.817]	[0.905]	[-0.399]	[0.575]	[-1.810]	[1.229]	[0.402]
Positive News	0.002052	0.003455**	0.022496***	-0.000430	0.000278	-0.000019	0.001022*	0.003822***	0.000119	-0.001165
	[0.858]	[2.172]	[4.209]	[-0.233]	[0.136]	[-0.015]	[1.653]	[4.124]	[0.187]	[-0.788]
Intercept	-0.000350	-0.000015	0.000704	-0.000372**	-0.000954***	0.000146	0.000011	-0.000186**	-0.000270**	-0.000354
	[-0.758]	[-0.056]	[1.421]	[-1.990]	[-2.800]	[0.466]	[0.150]	[-1.998]	[-2.433]	[-1.449]

This table uses 17,002 observations and it includes all observations with available news data from TruValue Labs (TVL) where volume of articles is at least five and the issue is classified as material for this industry by the Sustainability Accounting Standards Board. The dependent variable is industry adjusted return over the days relative to the date of the news (i.e. -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted industry returns). Positive (negative) news takes the value of one for a firm-date if the news score by TVL is 75 or more (25 or less). EW is ordinary least square models where each observation is equal weighted in the model. VW is ordinary least square models where each observation is weighted by its beginning of date market capitalization in the model. All models include date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% level respectively.

Table 5 Prediction of News based on ESG Scores for Immaterial Observations

	News Score			
	EW		VW	
Size	-1.175214***	-1.260227***	-1.169839***	-1.237849***
	[-6.775]	[-7.012]	[-4.252]	[-4.526]
MTB	-0.000061	-0.000091	-0.000304**	-0.000355***
	[-0.300]	[-0.482]	[-2.454]	[-2.937]
ESG Score	1.553475***		0.882700***	
	[6.781]		[3.252]	
Environmental Score		0.637392***		0.442231***
		[4.805]		[3.120]
Social Score		0.592292***		0.395240**
		[4.007]		[2.252]
Governance Score		0.347701***		0.005624
		[3.994]		[0.053]
Intercept	62.566994***	62.827446***	65.220253***	65.754829***
	[33.413]	[33.703]	[19.696]	[19.923]
Fixed Effects	Date & Industry Effects			
Observations	53,697	53,697	53,697	53,697
Adjusted R-squared	0.151	0.152	0.272	0.274

This table includes observations that are classified as immaterial from TruValue Labs (TVL) where volume of articles is at least three and the issue is classified as immaterial for this industry by the Sustainability Accounting Standards Board. The dependent variable is the news score by TVL. Size is the logarithm of total assets. MTB is the firm's market-to-book equity ratio in the previous day. ESG score is the firm's ESG score given by MSCI in the previous day. Environmental, Social and Governance Score are the three pillar scores for the firm given by MSCI in the previous day. EW is ordinary least square models where each observation is equal weighted in the model. VW is ordinary least square models where each observation is weighted by its beginning of date market capitalization in the model. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% level respectively.

Table 6 Panel Regressions for News Conditional on ESG Scores for Immaterial Observations

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Positive News_Predicted	-0.001972	0.003809	-0.005916	0.004378	0.005142
	[-0.325]	[0.864]	[-1.307]	[1.006]	[0.620]
Positive News_Residual	0.000005	0.000321	0.000481	0.000230	0.000286
	[0.009]	[1.056]	[1.231]	[0.678]	[0.511]
Negative News_Predicted	-0.002055	-0.001169	-0.001100	0.002674	-0.001490
	[-0.487]	[-0.522]	[-0.369]	[0.860]	[-0.323]
Negative News_Residual	-0.003904**	-0.001440	0.000452	-0.000681	0.003828*
	[-2.319]	[-1.447]	[0.376]	[-0.870]	[1.678]
Intercept	0.000264	0.000043	0.000101	0.000009	-0.000160
	[1.251]	[0.457]	[1.001]	[0.118]	[-0.977]

This table includes observations that are classified as immaterial from TruValue Labs (TVL) where volume of articles is at least three and the issue is classified as immaterial for this industry by the Sustainability Accounting Standards Board. The dependent variable is market adjusted return over the days relative to the date of the news (i.e. -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news predicted takes the value of one for a firm-date if the predicted news score from the model in Table 5 scores at the top (bottom) quartile. Positive (negative) news residual takes the value of one for a firm-date if the residual news score from the model in Table 5 scores at the top (bottom) quartile. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% level respectively.

Table 7: Panel Regressions by Theme

Panel A: Social Capital

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.005369**	-0.002321	-0.010715**	0.000048	0.001873
	[-2.057]	[-1.472]	[-2.558]	[0.047]	[1.087]
Positive News	-0.000501	0.003242**	0.018651***	0.002148*	0.000594
	[-0.269]	[1.987]	[4.118]	[1.807]	[0.379]
Intercept	-0.000799	-0.000414	0.001898*	-0.000480	0.000088
	[-1.483]	[-1.448]	[1.848]	[-1.525]	[0.174]

Panel B: Human Capital

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.001267	0.000001	-0.002164	-0.000536	-0.001298
	[-0.619]	[0.001]	[-1.503]	[-0.416]	[-0.550]
Positive News	-0.001208	0.002524**	-0.000468	0.002349*	0.001233
	[-0.456]	[2.196]	[-0.187]	[1.931]	[0.477]
Intercept	-0.000979	-0.000944***	-0.000662	-0.000248	-0.000900
	[-1.372]	[-2.741]	[-1.352]	[-0.766]	[-1.317]

Panel C: Natural Capital

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	0.000570	-0.000385	-0.005495***	0.000928	-0.004394
	[0.207]	[-0.364]	[-2.715]	[0.811]	[-1.557]
Positive News	0.001885	0.001866**	-0.001607*	-0.000237	0.000896
	[1.422]	[2.087]	[-1.664]	[-0.293]	[0.611]
Intercept	-0.001753**	-0.000320	0.000784	0.000053	0.000618
	[-2.251]	[-0.947]	[1.597]	[0.150]	[0.901]

Panel D: Sustainability Leadership and Governance

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	0.002114	0.000039	-0.000557	-0.000747	0.000523
	[1.105]	[0.027]	[-0.383]	[-0.809]	[0.299]
Positive News	0.002017	0.002531	0.003185	0.006077	0.002300
	[0.695]	[1.352]	[1.091]	[1.253]	[0.876]
Intercept	-0.001304**	-0.000725**	0.000143	-0.000216	-0.000263
	[-2.065]	[-1.990]	[0.271]	[-0.631]	[-0.568]

Panel E: Business Model and Social Innovation

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Negative News	-0.001911	-0.021119	-0.001681	0.001369	-0.001422
	[-0.249]	[-1.601]	[-0.474]	[0.338]	[-0.145]
Positive News	-0.002212	-0.000314	0.003510***	0.000690	-0.001190
	[-1.205]	[-0.271]	[3.179]	[1.098]	[-0.822]
Intercept	0.000965	0.000592*	-0.000493	-0.000314	0.001458**
	[1.163]	[1.778]	[-1.483]	[-1.292]	[2.315]

Panels A-E use 17,176, 6,243, 5,623, 7,292, and 6,171 observations, respectively, and include all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least three. The dependent variable is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news takes the value of one for a firm–date if the news score by TVL is 75 or more (25 or less). All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

Table 8: Six Factor Calendar Time Portfolios by Theme

Panel A: Social Capital

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0003	-1.62	0.0031	8.06	-0.0003	-1.56	0.0013	5.44
Market	0.1429	5.23	0.2564	5.59	0.1483	6.13	0.2946	8.77
SMB	-0.0680	-1.37	0.1048	1.19	-0.0569	-1.46	0.0134	0.24
HML	-0.0453	-0.72	-0.0516	-0.41	-0.0514	-0.99	-0.1687	-2.20
UMD	0.0095	0.28	-0.0707	-1.02	-0.0060	-0.21	-0.0748	-1.58
RMW	-0.1194	-1.52	0.1444	0.89	-0.0560	-0.81	0.0785	0.78
CMA	0.0932	0.95	-0.2760	-1.49	0.0927	1.14	0.0101	0.09

Panel B: Human Capital

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0009	-2.86	-0.0001	-0.21	-0.0007	-2.32	-0.0001	-0.25
Market	0.2581	5.47	0.0629	2.86	0.2594	5.56	0.0640	2.91
SMB	-0.1154	-1.39	0.0327	0.61	-0.1248	-1.50	0.0308	0.57
HML	0.0387	0.34	-0.1036	-1.45	0.0345	0.30	-0.1069	-1.49
UMD	-0.1951	-3.19	-0.0250	-0.48	-0.1534	-2.42	-0.0271	-0.52
RMW	0.1308	0.89	0.0328	0.50	0.1246	0.86	0.0342	0.52
CMA	0.0270	0.15	0.0666	0.87	0.0159	0.09	0.0677	0.89

Panel C: Natural Capital

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0004	-2.27	0.0001	0.48	-0.0004	-2.23	0.0001	0.30
Market	0.1166	5.18	0.3665	8.85	0.1184	5.24	0.3568	9.12
SMB	-0.0112	-0.23	0.0448	0.73	0.0026	0.06	0.0043	0.07
HML	-0.0773	-1.18	-0.1841	-2.04	-0.0664	-1.03	-0.1488	-1.82
UMD	-0.0713	-1.49	-0.2493	-2.65	-0.0733	-1.61	-0.2005	-2.16
RMW	-0.0535	-0.66	-0.0217	-0.24	0.0008	0.01	-0.0034	-0.04
CMA	0.0953	0.91	0.1373	1.26	0.0486	0.56	0.0811	0.80

Panel D: Sustainability Leadership and Governance

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0001	-0.31	0.0003	1.63	-0.0003	-0.83	0.0004	1.72
Market	0.2906	5.82	0.0464	1.84	0.2894	5.96	0.0462	1.84
SMB	-0.0911	-0.92	-0.0089	-0.24	-0.1127	-1.16	-0.0036	-0.10
HML	0.1634	1.39	-0.0926	-1.50	0.1431	1.26	-0.0937	-1.52
UMD	-0.2407	-2.94	-0.0325	-1.16	-0.1958	-2.69	-0.0339	-1.22
RMW	-0.0462	-0.28	-0.1139	-1.10	-0.0378	-0.22	-0.1111	-1.07
CMA	0.1260	0.78	0.1365	1.26	0.1994	1.15	0.1412	1.30

Panel E: Business Model and Social Innovation

	Equal-weighted				Value-weighted			
	Negative News		Positive News		Negative News		Positive News	
	Coeff	t	Coeff	t	Coeff	t	Coeff	t
Intercept	-0.0001	-1.40	0.0008	2.54	-0.0001	-1.40	0.0006	2.30
Market	0.0069	0.70	0.3152	8.31	0.0069	0.70	0.3072	8.26
SMB	-0.0126	-0.75	0.0748	1.27	-0.0126	-0.75	0.0348	0.61
HML	0.0097	0.24	0.0084	0.08	0.0097	0.24	0.0625	0.75
UMD	-0.0083	-0.57	-0.1056	-1.30	-0.0083	-0.57	-0.0815	-1.03
RMW	-0.0829	-1.79	0.1603	1.53	-0.0829	-1.79	0.1783	1.65
CMA	0.0177	0.52	0.1068	0.79	0.0177	0.52	0.0935	0.73

This table uses 2,285 daily observations where each day portfolios are formed by equal or value-weighting all firms in that day they have a news score of 75 and more for positive news or 25 and less for negative news. The table shows calendar-time regressions where the dependent variable is the daily portfolio return minus the risk-free rate and the independent variables are the market return and the returns on the size (SMB), value (HML), momentum (UMD), profitability (RMW) and investment (CMA) factors. The sample from which firms are drawn to the positive and negative news portfolios includes all observations with available news data from TruValue Labs (TVL) where volume of articles is at least three. The intercept is the daily abnormal return for that portfolio.

Table 9: Prediction of News Based on ESG Scores by Theme

	News Score				
	Social Capital	Human Capital	Natural Capital	Sustainability Leadership & Governance	Business Model & Social Innovation
Size	-0.654556***	0.748449*	-0.832412*	0.155258	-0.587031*
	[-2.601]	[1.955]	[-1.673]	[0.412]	[-1.690]
MTB	-0.003300	0.001093**	-0.042370	0.043966**	-0.030246*
	[-0.199]	[2.502]	[-1.105]	[2.561]	[-1.959]
ESG Score	2.122160***	0.630317	1.266316**	1.447131***	0.356096
	[4.463]	[1.190]	[2.008]	[2.665]	[0.738]
Intercept	50.411732***	31.516819***	61.769062***	32.584560***	71.974022***
	[15.552]	[7.265]	[10.426]	[7.023]	[20.999]
Fixed Effects	Date & Industry Effects				
Observations	14,716	5,626	5,086	6,061	5,449
Adjusted R-squared	0.308	0.106	0.374	0.207	0.185

This table includes all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least three and Table 5 A is replicated by theme. The dependent variable is the news score by TVL. Size is the logarithm of total assets. MTB is the firm's market-to-book equity ratio on the previous day. ESG score is the firm's ESG score given by MSCI on the previous day. Environmental, Social, and Governance Scores are the three pillar scores for the firm given by MSCI on the previous day. Each observation is equal weighted in the model. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.

Table 10: Panel Regressions Conditional on ESG Scores by Theme

Panel A: Social Capital

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Positive News_Predicted	-0.000883	0.001901	0.000885	0.001057	0.004621*
	[-0.536]	[1.644]	[0.403]	[1.107]	[1.716]
Positive News_Residual	0.000732	0.004603**	0.013410***	0.001608	-0.000081
	[0.352]	[2.076]	[3.291]	[1.106]	[-0.050]
Negative News_Predicted	-0.012038	-0.003391**	-0.007838	-0.001203	0.005914
	[-1.413]	[-2.059]	[-1.485]	[-0.921]	[1.481]
Negative News_Residual	-0.003209	-0.002522	-0.011203**	-0.000221	0.002634
	[-1.485]	[-1.185]	[-2.536]	[-0.171]	[1.446]
Intercept	-0.001071**	-0.000521*	0.001410*	-0.000243	0.000091
	[-2.111]	[-1.840]	[1.732]	[-0.855]	[0.187]

Panel B: Natural Capital

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Positive News_Predicted	0.002752	0.004040*	0.000530	0.001732	0.000179
	[0.927]	[1.948]	[0.540]	[1.103]	[0.068]
Positive News_Residual	0.000838	-0.000040	-0.002056**	-0.001263	0.001128
	[0.549]	[-0.053]	[-2.354]	[-1.433]	[0.627]
Negative News_Predicted	0.000174	0.000044	-0.002789	-0.000475	-0.001602
	[0.049]	[0.028]	[-1.003]	[-0.286]	[-0.617]
Negative News_Residual	-0.000668	-0.001001	-0.003431**	0.001577	-0.007490**
	[-0.212]	[-0.670]	[-2.269]	[1.120]	[-2.331]
Intercept	-0.001455**	0.000068	0.000646*	0.000333	0.000716
	[-2.116]	[0.222]	[1.911]	[0.977]	[1.064]

Panel C: Sustainability Leadership and Governance

	MA Return -5, -2	MA Return -1	MA Return 0	MA Return +1	MA Return +2, +5
Positive News_Predicted	-0.011415	0.000456	0.002031	0.009919	-0.001090
	[-1.545]	[0.142]	[0.474]	[1.314]	[-0.177]
Positive News_Residual	0.005659*	0.002233	-0.001055	-0.000110	0.003772
	[1.906]	[0.993]	[-0.304]	[-0.047]	[1.220]
Negative News_Predicted	-0.000287	-0.001069	-0.000606	-0.000962	0.002892
	[-0.081]	[-0.641]	[-0.315]	[-0.603]	[0.883]
Negative News_Residual	0.002053	-0.000247	0.000057	-0.000639	-0.001949
	[0.925]	[-0.248]	[0.037]	[-0.573]	[-0.920]
Intercept	-0.001061*	-0.000510	-0.000214	-0.000227	0.000532
	[-1.686]	[-1.500]	[-0.422]	[-0.615]	[1.055]

Panels A-C use 14,716, 5,086, and 6,061 observations, respectively, and include all observations with available news data from TruValue Labs (TVL) where the volume of articles is at least three. The dependent variable is the market-adjusted return over the days relative to the date of the news (i.e., -5, -2 is cumulative firm returns between five and two days before the news minus cumulative value-weighted market returns). Positive (negative) news predicted takes the value of one for a firm–date if the predicted news score from the model in Table 9 is in the top (bottom) quartile. Positive (negative) news residual takes the value of one for a firm–date if the residual news score from the model in Table 5 is in the top (bottom) quartile. All models include industry and date fixed effects. Standard errors are robust to heteroscedasticity and clustered at the firm level. ***, **, * are statistically significant at the 1, 2, and 5% levels, respectively.