# Do Public Concerns About ESG Issues Affect Firm Financial Performance?

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#### Abstract

This paper explores the impact of rising public concerns about ESG (Environmental, Social, and Governance) issues on firm financial performance. To quantify these concerns, we construct an ESG Concerns Index using Google search volume data. Our analysis reveals that as public concern over ESG issues grows, firms with higher ESG scores tend to experience a significant increase in profitability, largely driven by improved profit margins. Moreover, these effects are more pronounced in firms operating in competitive markets and those targeting individual consumers rather than industrial clients.

Keywords: ESG, Public attention, Online search volume, Firm financial performance

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## 1 Introduction

Environmental, Social, and Governance (ESG) factors have gained significant attention in recent years as stakeholders increasingly recognize their importance in assessing the sustainability and ethical impact of companies. ESG criteria encompass a wide range of issues, from a company's carbon footprint and resource management (Environmental), to its treatment of employees and community engagement (Social), to the transparency and accountability of its leadership (Governance). As awareness of these issues grows, so too does the pressure on firms to align their practices with these principles. Investors, consumers, and regulators are increasingly scrutinizing corporate behavior through an ESG lens, raising questions about how ESG issues might influence a firm's financial performance (Friede et al., 2015; Gillan et al., 2021). While many studies indicate that strong ESG practices can enhance firm profitability (Lins et al., 2017; Liang and Renneboog, 2017; Cao et al., 2019; Cornett et al., 2016), other research offers contrasting views (Di Giuli and Kostovetsky, 2014; Bhandari and Javakhadze, 2017). These mixed results may stem from the dynamic nature of ESG preferences, which can fluctuate with changing stakeholder attitudes toward sustainability (Pelster et al., 2024; Whitson et al., 2014; Khan et al., 2020; Brulle et al., 2012). Empirical studies on the impact of ESG on stock returns support this perspective, indicating that firms with higher ESG scores generally outperform those with lower scores during periods of heightened ESG concerns (Ardia et al., 2022; Choi et al., 2020; El Ouadghiri et al., 2021; Kvam et al., 2024; Santi, 2023; Serafeim, 2020).

The outperformance of firms with higher ESG scores compared to firms with lower ESG scores can be attributed to two channels (Pástor et al., 2021). The first is the cash flow channel, where firms with higher ESG scores benefit from increased cash flows due to shifts in customer preferences toward sustainable products. The second is the discount rate channel, where a reduction in the discount rate occurs as investors show a preference for sustainable investments. While previous research often emphasizes the discount rate channel—attributing superior stock performance of sustainable firms to shifts in investor preferences and be-

haviors—there is limited research on how public concerns about ESG issues impact firms' financial performance through the cash flow channel. This paper focuses on the cash flow channel and empirically tests whether public attention to ESG concerns affects firms' financial performance. Specifically, we hypothesize that increased public concerns about ESG issues lead to stronger financial performance in firms with higher ESG scores compared to those with lower scores.

Our main hypothesis is supported by several key arguments. First, the literature suggests that attention to ESG issues can serve as a strategy for product differentiation (McWilliams and Siegel, 2001; Albuquerque et al., 2019). Firms with strong ESG attributes may generate additional demand or ask premium prices for their products. Research indicates that companies with a robust ESG focus benefit from increased customer loyalty, higher purchase intentions, and positive word-of-mouth, driven by enhanced customer identification with the firm and greater satisfaction (Luo and Bhattacharya, 2006; Bhattacharya and Sen, 2004; Wu and Zhu, 2021; Ahmad et al., 2023). These factors contribute to improved overall performance for firms with higher ESG attributes. However, raising prices to reflect higher ESG standards could potentially lead to a decline in demand, as some customers may be unwilling to pay more for ESG-related benefits (Albuquerque et al., 2020; Bhattacharya and Sen, 2004). As customer preferences for sustainability can fluctuate over time, understanding ESG concerns is crucial for clarifying the relationship between ESG practices and firm performance. Increasing ESG concerns indicate heightened public awareness of these issues and a shift in consumer preferences toward sustainable products. As consumers increasingly prioritize ethical and sustainable practices, firms with higher ESG attributes are likely to obtain greater benefits compared to those with lower attributes. Moreover, as ESG concerns intensify, consumers may become increasingly willing to pay premium prices for products that align with ESG principles (Whitson et al., 2014). Second, Lins et al. (2017) highlight that ESG activities foster social capital and trust, assets that become especially valuable during economic crises when public confidence is generally low. Their empirical findings demonstrate that firms with strong ESG attributes outperformed those with weaker attributes financially during the 2008-2009 financial crisis. We argue that periods of heightened ESG concerns are analogous to economic downturns due to increased public scrutiny and demand for sustainable practices. Similarly, Garel and Petit-Romec (2021) highlight the parallel between pandemic crisis and heightened environmental risks, demonstrating that investors tend to reward firms with strong environmental responsibility during such periods.

We test our hypothesis using quarterly financial performance data from U.S. firms along with a novel proxy for ESG concerns. Building on prior research that utilizes internet search volume (Da et al., 2011, 2015; Zhao et al., 2023; Kvam et al., 2024; El Ouadghiri et al., 2021; Choi et al., 2020), we use Google Search Volume (GSV) as our measure of public concern about ESG issues. GSV is employed to construct our ESG Concerns Index for several reasons. First, GSV effectively captures this latent variable as it reflects attention, intention, and concern through specific search terms indicative of user interest in the topic (Da et al., 2011; Wu and Brynjolfsson, 2015; Ettredge et al., 2005). Previous studies have demonstrated the utility of internet search data in predicting consumer behavior and various economic activities (Choi and Varian, 2012; Goel et al., 2010; Wu and Brynjolfsson, 2015; Vicente et al., 2015; Silva et al., 2019; Da et al., 2011, 2015; Mavragani and Tsagarakis, 2016). Moreover, with the rise of internet, Google remains the most frequently visited website and has the longest average visit duration.<sup>1</sup>

We construct our ESG Concerns Index through a detailed process. We begin by compiling a list of ESG-related search terms from prior research (Dimson et al., 2015; Baier et al., 2020; Choi et al., 2020; El Ouadghiri et al., 2021; Kvam et al., 2024; Santi, 2023) and expanding this list using the top ten related queries from Google Trends. To accommodate variations in terminology and account for singular and plural forms, we adjust our search terms with punctuation such as '+', '-', and " ". We then select the top 20 search terms for each ESG category—environmental, social, and governance—based on their popularity,

<sup>&</sup>lt;sup>1</sup>Based on Digital 2021 report by social media companies We Are Social and Hootsuite. Retrieved from https://wearesocial.com/us/blog/2021/01/digital-2021-us/.

comparing them against the highest search volumes in Google Trends for each ESG pillar. For the overall ESG category, where only four search terms are available, we include all of them. Next, we measure gradual shifts in ESG concerns by calculating the deviation of monthly search volumes from the median of the previous 12 months. This monthly data is aggregated into quarterly figures to align with our accounting data. Following Da et al. (2015), we standardize each search term to enhance comparability. Finally, we compute the average of all standardized search terms to form the index.

Using quarterly data from U.S. firms from 2004 to 2022, we examine how the interaction between public concerns about ESG issues and firms' ESG scores influences their financial performance. We start by analyzing the impact of ESG on profitability, measured by return on assets (ROA). Our findings reveal a positive relationship between ESG scores and ROA, which becomes more pronounced as ESG concerns intensify. This increase in profitability is primarily driven by higher profit margins rather than increased asset turnover. Building on the insights of McWilliams and Siegel (2001) and Albuquerque et al. (2019), who suggest that firms can differentiate themselves through ESG practices, we demonstrate that as public concern about ESG issues grows, more customers are willing to pay premium prices, leading to higher profit margins and, ultimately, improved ROA.

Several studies have shown that ESG can be an effective product differentiation strategy, particularly for firms looking to distinguish themselves in increasingly competitive markets (Flammer, 2015; Zhao et al., 2023; Leong and Yang, 2020; Ryou et al., 2022). Building on this concept, we extend our analysis to explore whether heightened public concerns about ESG issues have different effects on firms operating in high versus low competitive environments. Consistent with prior research demonstrating the advantages of differentiation in the face of intensified competition (Hombert and Matray, 2018; Gu, 2016; Han et al., 2018), our findings indicate that firms with higher ESG scores experience greater operating profit margins and overall profitability as ESG concerns rise. However, this effect is only significant in highly competitive environments. In such settings, intense competition compels firms to respond to

growing public concerns about ESG issues. Companies in these environments are more driven to differentiate themselves through ESG practices, as failing to meet customer expectations for sustainability could lead to losing market share to competitors.

We further extend our analysis to examine whether the impact of heightened ESG concerns varies across industries. To do this, we categorize our sample into two groups based on consumer sensitivity, following the classifications outlined by Lev et al. (2010). Our findings reveal that while increasing public concerns positively affects firms with higher ESG scores in both high and low consumer sensitivity groups, the impact is more pronounced in the high-sensitivity group. This outcome aligns with our measure of ESG concerns, which is derived from Google search volumes and primarily captures individual rather than institutional attention (Da et al., 2011).

Our study makes several contributions to the literature. First, while previous research on climate change and ESG concerns has largely focused on the investor's perspective—particularly the effects of these concerns on asset pricing (Ardia et al., 2022; Choi et al., 2020; Santi, 2023; El Ouadghiri et al., 2021; Kvam et al., 2024; Serafeim, 2020)—we broaden the scope by examining the customer's perspective through the cash flow channel. Specifically, we investigate how ESG concerns influence a firm's financial performance. Although Ardia et al. (2022) also explore the significance of climate change concerns on both the cash flow and discount rate channels by decomposing stock returns into monthly cash flow news and discount rate news components using analysts' earnings forecasts, our approach differs. We assess the impact of ESG concerns on the cash flow channel by directly examining firms' bottom lines, utilizing historical earnings data from financial statements rather than expected earnings. Our research highlights the critical role of the cash flow channel, showing that rising ESG concerns significantly boost profitability, especially for firms with strong ESG attributes.

Second, while the relationship between ESG scores and firms' financial performance has been widely studied (Servaes and Tamayo, 2013; Di Giuli and Kostovetsky, 2014; Bhandari and Javakhadze, 2017; Lins et al., 2017; Liang and Renneboog, 2017; Cornett et al., 2016; Albuquerque et al., 2019, 2020; Chen and Xie, 2022; Zhao et al., 2023), our research introduces a new perspective by demonstrating that the positive impact of ESG on financial performance becomes more pronounced as public concerns about ESG issues intensify. Additionally, we highlight the critical role of ESG concerns and product market competition as moderating variables that amplify the effect of ESG attributes on firm financial performance.

Third, we contribute to the growing body of literature that utilizes internet search volume as a proxy for public attention on specific topics (Da et al., 2015; Kvam et al., 2024; El Ouadghiri et al., 2021; Choi et al., 2020). We develop an ESG Concerns Index by compiling ESG-related search terms from previous research, and subsequently expanding and refining this list based on search term popularity. Our approach to constructing the index is systematic, and we emphasize the importance of adjusting search terms for specific punctuation, as well as accounting for variations in terminology, such as singular and plural forms. Failing to make these adjustments could introduce bias and result in incomplete search volume data.

The remainder of the paper is organized as follows: Section 2 outlines our measurement of ESG concerns. Section 3 describes our data. Section 4 presents the empirical results. Finally, Section 5 concludes.

## 2 ESG Concerns and Financial Performance

To empirically investigate the impact of ESG concerns on firms' financial performance, it is essential to use a proxy that accurately captures public attention to ESG issues. Previous research has employed various measures to gauge this attention, including data from news media (Ardia et al., 2022; El Ouadghiri et al., 2021), social media platforms (Santi, 2023; Kvam et al., 2024), internet search volume (Kvam et al., 2024; El Ouadghiri et al., 2021; Choi et al., 2020), and public sentiment indicators from third-party agencies (Serafeim, 2020).

In our study, we use internet search volume as a measure of public awareness and interest in ESG issues. Specifically, we use search volume data from Google, the leading search engine, to accurately capture public search behavior.<sup>2</sup> Using internet search volume is ideal for capturing public concerns for several reasons. First, internet usage has surged, with the percentage of U.S. adults using the internet increasing from 52% in 2000 to 95% in 2023, while Google has become the most visited site, surpassing social media platforms and traditional newspapers, which have seen declining circulation.<sup>3</sup> Second, search volume reflects active public interest: specific Google search terms reveal users' attention and concerns (Da et al., 2011; Wu and Brynjolfsson, 2015; Ettredge et al., 2005). Following Kvam et al. (2024), we use the term 'ESG concerns' to describe public searches on ESG issues. While 'attention' or 'interest' could also apply, we adopt 'concerns' under the assumption that individuals search for these topics when they are particularly concerned about them. Spikes in searches, such as those related to global warming during extreme temperatures, illustrate this dynamic (Choi et al., 2020). Third, previous research shows that search volume can effectively predict various economic activities, including automotive and housing sales, unemployment rates, tourism, box-office and video game sales, music rankings, fashion trends, stock market movements, and even referendum outcomes (Choi and Varian, 2012; Goel et al., 2010; Wu and Brynjolfsson, 2015; Vicente et al., 2015; Silva et al., 2019; Da et al., 2011, 2015; Mavragani and Tsagarakis, 2016). These findings highlight the reliability and usefulness of search volume data as an indicator of public interest and behavior.

#### 2.1 Selection of ESG Search Terms

To construct the ESG Concerns Index, we begin by compiling relevant ESG-related search terms from previous studies. (Dimson et al., 2015; Baier et al., 2020; Choi et al., 2020; El

 $<sup>^2 \</sup>rm As$  per October 2023, Statcounter (https://gs.statcounter.com/search-engine-market-share) reports that Google held a search engine market share of 88.1% in the United States and 91.5% globally.

<sup>&</sup>lt;sup>3</sup>According to Semrush data, in December 2020, Google had 17.3 billion total web visits with an average time per visit of 24 minutes, surpassing social media platforms such as Facebook (3.75 billion visits, 23 minutes per visit), Twitter (914 million visits, 13 minutes per visit), and Instagram (871 million visits, 16 minutes per visit). Additionally, a 2020 global survey of internet users indicates that search engines are the primary channel for seeking information about brands, products, and services, accounting for 58.1%, compared to 31.7% on social networks. Data retrieved from https://www.pewresearch.org/ and https://wearesocial.com/us/blog/2021/01/digital-2021-us/.

Ouadghiri et al., 2021; Kvam et al., 2024; Santi, 2023). We exclude terms related to investments, such as "ESG investing", "impact investing", "ethical investing", as these are more closely associated with an investment perspective, whereas our analysis takes a customer perspective.

To ensure that no significant search terms are omitted, we follow Da et al. (2015) by examining the ten 'top related queries' for each of our initial search terms. Google provides these related queries based on popularity among users. We include relevant terms that were not initially on our list. For example, the term "extreme temperature" yields related queries such as "extreme cold", "extreme heat", "high temperature", "body temperature", "extreme temperature changes," "extreme cold temperature", "temperature definition", and "extreme vaporizer". We add the first two terms, as they are directly related to climate issues, and exclude terms like "high temperature", "body temperature", "temperature definition", and "extreme vaporizer" due to their broader scope and lack of relevance to environmental concerns. Other terms, such as "extreme temperature changes" and "extreme cold temperature", are already captured by including "extreme temperature" and "extreme cold."

We also use quotation marks to specify phrases with distinct meanings based on word order. For instance, the term "fair trade", which refers to ethical trade practices, may generate related queries like "trade fair", which refers to a commercial exhibition. By using the search term "fair trade" in quotes, we ensure that only the exact phrase is captured, avoiding irrelevant results.

Next, we refine our search terms to account for variations in terminology. For example, the term "csr" generates related queries like "csr car", "csr racing", and "csr racing 2", which refer to car racing video games rather than "corporate social responsibility." Panel A of Figure 1 shows the impact of irrelevant terms, with spikes in search volume for "csr" occurring in July 2012 and July 2016, corresponding to the release dates of the game sequels on June 28, 2012, and June 28, 2016, respectively. To filter out these irrelevant results, we add the punctuation "-" so that our search term becomes "csr -car -racing" instead of only

"csr".

Finally, we adjust for singular and plural forms by using the punctuation "+" symbol. For example, the term "greenhouse gas" generates related queries of "greenhouse gases". Panel B of Figure 1 plots search volume data for "greenhouse gas", "greenhouse gases", and a combined search query that includes both terms. If only "greenhouse gas" is used as the search term, searches for "greenhouse gases" will not be captured.

After reviewing the top related queries, we compile a total of 165 search terms across the environmental, social, governance, and overall ESG pillars. To focus our research on the terms most commonly used by the public, we select only the top 20 search terms for each of the environmental, social, and governance pillars. These top 20 terms are chosen based on their relative search volume, comparing each term against the highest search volume terms in Google Trends for each pillar. For the overall ESG pillar, we include all four search terms due to the limited number available.<sup>4</sup> Table 1 presents Google search terms for the overall ESG score as well as for each individual pillar.

#### 2.2 Construction of ESG Concerns Index

We use a multi-step process to construct the concerns index for overall ESG and each individual ESG pillar. First, following the methodology of Da et al. (2011), Kvam et al. (2024), and Zhao et al. (2023), we calculate search volume deviations from the median of the previous monthly search volume index (SVI) to capture gradual shifts in public concerns regarding ESG. Specifically, we compute the natural logarithm of the current month's search volume and subtract the natural logarithm of the median search volume from the preceding 12 months. This approach helps mitigate the impact of time trends (over time ESG is becoming increasingly popular) and seasonal effects (Da et al., 2011). Figure 2 shows the average SVI by month to illustrate the seasonality in the SVI data. The graph reveals a pro-

 $<sup>^{4}</sup>$ To ensure the robustness of our results, we conducted a test using an ESG concerns index constructed from the top 20 search terms for each environmental, social, and governance pillar, rather than the four overall ESG terms. The results confirm the consistency of our empirical findings.

nounced seasonal effect, especially for environmental and social terms. Specifically, search volume tends to decrease in June and December, reaching its lowest point in July. These low points could be attributed to holiday periods, where people may be relatively less interested in ESG issues. Using a 12-month median mitigates these seasonal fluctuations compared to shorter median periods, as it captures variations across an entire year. However, to explore whether the public may respond more quickly to ESG issues, we conduct a robustness test by constructing the ESG Concerns Index using deviations from 3- and 6-month medians. We argue that this deseasonalization method is preferable to alternatives, such as regression models with monthly dummies, which incorporate the entire sample period and may introduce look-ahead bias.

Second, since our study links search volume to quarterly financial performance, we aggregate the monthly data into quarterly figures by summing the monthly shifts in search volume. Third, following Da et al. (2015), we standardize each search term by scaling it according to its standard deviation to enhance comparability. The concerns index is then constructed by averaging the four terms for overall ESG and the top 20 search terms for each ESG pillar. Figure 3 displays the overall ESG Concerns Index (Panel A) and the concerns index for each ESG pillar (Panel B). Because our concerns index is based on deviations from the 12-month median search volume, data are available from Q1 2005 onward, given that Google SVI data are available starting from January 2004. This results in 72 unique quarterly data points from Q1 2005 to Q4 2022. As shown in the figure, the concerns indices for overall ESG and each individual ESG pillar generally move in the same direction, with correlations ranging from 72.3% to 89.0%.

#### 2.3 Existing Metrics on ESG Concerns

Recent literature increasingly emphasizes the importance of measuring public attention to ESG (Environmental, Social, and Governance) issues. Table 2 summarizes the various metrics used by previous research. For instance, Ardia et al. (2022) develop a media climate

change concern index based on daily news from major U.S. newspapers and newswires. Their findings reveal that unexpected increases in climate change concerns lead to higher stock prices for green firms and lower stock prices for brown firms, primarily due to changes in the discount rate channel.

Similarly, Choi et al. (2020) demonstrate that during periods of abnormally warm local temperatures, low-emission firms outperform high-emission firms, driven by retail investors' heightened awareness of climate risk and their tendency to avoid high-emission companies. Additionally, Santi (2023) find that positive investor sentiment toward climate issues, as analyzed through StockTwits posts, leads to reduced demand for high-emission stocks, resulting in an underperformance.

In another study, El Ouadghiri et al. (2021) assess public attention to environmental issues using media coverage, Google search volume, and data on global climate-related natural disasters. They discover that increased public attention positively affects the returns of U.S. sustainability stock indexes while negatively impacting conventional stock indexes. This effect is attributed not only to sustainable investors reallocating their portfolios but also to opportunistic behavior by other investors who anticipate higher demand for sustainable firms' stocks.

Expanding beyond environmental aspects, Kvam et al. (2024) include environmental, social, governance, and overall ESG concerns in their research. By analyzing Google search volume and sentiment analysis on Twitter, they find that firms with high ESG scores experience higher returns during periods of increased ESG concerns. Similarly, Serafeim (2020) find that rising public sentiment regarding sustainability activities leads to higher valuation premiums for firms with strong ESG performance.

Table 3 presents the correlation of our concerns index with the Media Climate Change Concerns score of Ardia et al. (2022) and the StockTwits Social Interaction data from Santi (2023). <sup>5</sup> Since both of these datasets are reported on a monthly basis, our ESG Concerns

<sup>&</sup>lt;sup>5</sup>We chose Stocktwits social interaction data over Stocktwits climate sentiment data because it measures the proportion of climate-related posts relative to total posts, aligning more closely with our internet search

Index in Table 3 is also presented monthly. The correlation matrix reveals strong correlations among the various ESG pillars, ranging from 72.3% to 89.0%, with the highest correlation observed between the environmental and social concerns indices. In contrast, the correlations between the MCCC and StockTwits data and the environmental and overall ESG concerns indices are lower, reflecting the broader scope of these indices.

We further hypothesize that the MCCC index may influence the ESG concerns index, as increased negative media reporting could drive individuals to seek more information online. This hypothesis is supported by prior research, which demonstrates that media coverage influences public concerns about climate change, as evidenced by public surveys (Brulle et al., 2012) and sentiment analysis on social media (Santi, 2023). Table 4 presents regression results using the MCCC index as the independent variable to analyze its effects on the environmental and ESG concerns indices. Columns 1 and 2 show positive and significant coefficients for the environmental and ESG concerns indices, respectively. However, the Rsquared values for these models are relatively low, at 1.9% in column 1 and 7.3% in column 2. These findings, consistent with Da et al. (2011), suggest that news media coverage explains only a small portion of the variation in internet search volumes related to ESG concerns. In columns 3 and 4, we replace the independent variable with quartile dummies for the MCCC index. This approach, similar to that of Choi et al. (2020), reveals a nonlinear relationship between the MCCC index and our ESG concerns measures. Positive and significant coefficients are observed only in the highest quartile, indicating that media coverage of climate change primarily influences public search behavior during periods of intense and negatively toned coverage.

## 3 Data and Variables

Our sample includes all U.S. firms available in the Refinitiv ESG database from 2004 to 2022. We begin our sample period in 2004 as this is when Google Search Volume data first became volume-based measures. available. We integrate ESG data from Refinitiv with quarterly accounting data obtained from Compustat. Following prior studies, we exclude financial firms (Servaes and Tamayo, 2013; Lins et al., 2017; Buchanan et al., 2018; Bae et al., 2021) and firms that do not meet specific asset and sales thresholds (Bhandari and Javakhadze, 2017; Chen and Chen, 2012). To ensure robustness and reduce the impact of outliers, we require that firms have at least \$10 million in assets and \$1 million in quarterly sales over the previous year. Table 5 defines all the variables used in the study, categorized into four main groups: financial performance variables, measures of ESG levels, control variables, and measures of ESG concerns.

#### **3.1** Financial Performance

Our dependent variable is the firm's financial performance, which we measure using four indicators. We begin by examining whether heightened public concerns about ESG aspects are associated with increased profitability. Profitability is measured using return on assets (ROA), calculated as operating income divided by total assets (Servaes and Tamayo, 2013; Lins et al., 2017; Albuquerque et al., 2020). Since a higher ROA can stem from either an increased profit margin or enhanced asset turnover, we incorporate both metrics into our analysis. Previous research indicates that firms with strong ESG attributes may be able to command higher selling prices (Lins et al., 2017; Albuquerque et al., 2019, 2020). However, firms that are heavily engaged in ESG initiatives may also face substantial costs. Including profit margin in the analysis allows us to determine which effect is more significant. We calculate the *operating profit margin* by dividing operating income by sales (Albuquerque et al., 2020). Alternatively, firms with high ESG attributes might choose not to raise prices, aiming to increase sales volume, which could result in higher asset turnover. Asset turnover is measured as the ratio of sales to total assets (Albuquerque et al., 2020; Zhao et al., 2023; Zhou et al., 2022). Finally, we include sales growth, calculated as the logarithmic change in current sales compared to the previous quarter (Liang and Renneboog, 2017). Previous research on the relationship between ESG attributes and sales growth has produced mixed results, with findings ranging from negative (Servaes and Tamayo, 2013) to positive (Lins et al., 2017), and even no significant impact (Di Giuli and Kostovetsky, 2014). By incorporating interaction variables between ESG attributes and concerns, our analysis may help clarify these conflicting outcomes.

#### 3.2 ESG Scores

We use Refinitiv ESG scores to evaluate firms' environmental, social, and governance (ESG) attributes. Refinitiv assesses sustainability performance based on publicly reported data across three pillars: Environmental (E), Social (S), and Governance (G). Each pillar is composed of several categories: the Environmental pillar includes resource use, emissions, and innovation; the Social pillar covers workforce, human rights, community, and product responsibility; and the Governance pillar encompasses management, shareholders, and CSR strategy.

Within each category, specific themes are addressed. For instance, the emissions category covers four themes: emissions, waste, biodiversity, and environmental management systems. Similarly, the product responsibility category includes themes such as responsible marketing, product quality, and data privacy. Refinitiv calculates scores for each ESG pillar, as well as an overall ESG score, by multiplying the weight of each category by its respective score. The weights for the Environmental and Social categories vary by industry, while the weight for the Governance pillar remains consistent across all industries. ESG scores range from 0 to 100, with 100 indicating excellent ESG performance and a high level of transparency in publicly reporting ESG matters.<sup>6</sup> In our analysis, we use both the overall ESG score and the individual scores for each ESG pillar, scaled by dividing each by 100.

 $<sup>^6 \</sup>rm Details$  on Refinitiv ESG scores can be found in https://www.refinitiv.com/en/sustainable-finance/esg-scores#methodology.

#### 3.3 Control Variables

Consistent with extant literature (Servaes and Tamayo, 2013; McWilliams and Siegel, 2001; Albuquerque et al., 2019, 2020; Liang and Renneboog, 2017; Zhou et al., 2022; Zhao et al., 2023), we include several control variables that may influence firms' financial performance beyond their ESG scores.

Size is measured as the logarithm of total assets at the end of quarter t. Larger firms typically possess greater resources and capabilities to invest in ESG initiatives, which can affect both their ESG scores and profitability.

Advertising is represented by the ratio of selling, general, and administrative (SG&A) expenses to sales at the end of quarter t. Due to the unavailability of quarterly advertising expenditure data, SG&A expenses serve as a proxy for advertising costs. Following Servaes and Tamayo (2013), a value of zero is assigned when SG&A expense data is missing. Their research suggests that the benefits of ESG initiatives are more pronounced for firms with high public visibility, often proxied by advertising expenditures.

 $R \ensuremath{\otimes} D$  is measured as the ratio of R \ensuremath{\otimes} D expenses to sales during quarter t, while Capex is measured as the ratio of capital expenditures to total assets during the same period. Our research, which examines the impact of ESG concerns from a customer perspective, aligns with the view that ESG initiatives can serve as forms of product differentiation (McWilliams and Siegel, 2001; Albuquerque et al., 2019). Albuquerque et al. (2019) emphasize that, in addition to advertising, R \ensuremath{\otimes} D and Capex intensity are critical components of a firm's product differentiation strategy. Firms pursuing product differentiation often incur substantial costs and investments to innovate and enhance their offerings, which can positively influence financial performance if successful. To differentiate the effects of ESG from those related to product differentiation, we include  $R \ensuremath{\otimes} D$  and Capex as control variables in our analysis. This approach ensures that our measurement of ESG remains distinct from the impact of product differentiation efforts.

Leverage is calculated as the ratio of total debt to total assets at the end of quarter t,

while *Cash* is measured as the ratio of cash and short-term investments to total assets during the same period. These variables influence a firm's financial flexibility, as less constrained firms tend to allocate more resources to ESG initiatives (Hong et al., 2012). Furthermore, financial leverage affects a firm's capital structure, which can, in turn, impact its overall performance.

#### **3.4 ESG Concerns**

We construct the *ESG concerns* index using the method detailed in Section 2. To do this, we download the search volume index (SVI) for each search term from Google Trends, covering the period from January 2004 to December 2022. Google Trends provides search volume data for various terms and topics within specific geographic regions and time frames. The data are normalized by dividing each data point by the maximum number of searches in a given area and period, resulting in an index of relative popularity rather than absolute search volumes. These normalized values are scaled on a range from 0 to 100, where 100 represents the peak search interest for the specified period and location. We limit our search volume data to the United States, as our sample consists of U.S. firms.

We incorporate additional measures of climate change and ESG concerns developed in previous studies. Specifically, we use the *Media Climate Change Concerns (MCCC)* index from Ardia et al. (2022) and *Stocktwits social interaction* data from Santi (2023).<sup>7</sup> The MCCC index serves as a proxy for shifts in climate change concerns, constructed from news articles published by major U.S. newspapers and newswires. It employs a risk and sentiment lexicon to evaluate the extent of discussion about future risk events and the sentiment (positive or negative) of each article. This index is available from January 2003 to August 2022. Stocktwits social interaction data act as a proxy for investor attention, measured by the proportion of climate-related posts on the Stocktwits platform relative to the total number

<sup>&</sup>lt;sup>7</sup>The MCCC index is available through https://sentometrics-research.com, while Stocktwits data is available through https://www.caterinasanti.com/research. We thank Ardia et al. (2022) and Santi (2023) for making these data accessible.

of posts. This dataset covers the period from January 2010 to September 2019.

#### **3.5** Summary statistics

Table 6 presents the summary statistics. All firm-level variables, except for ESG scores and size, are winsorized at the 1st and 99th percentiles. The dataset includes 2,231 U.S. firms, totaling 118,242 firm-quarter observations, of which 69,885 have ESG scores. Panel A shows our financial performance variables, which serve as the dependent variables. We observe that they all fall within the expected ranges based on prior studies (Albuquerque et al., 2019; Lins et al., 2017; Bhandari and Javakhadze, 2017). Return on assets has a mean of 2.27% (median 2.85%) with a standard deviation of 4.47%. The operating profit margin shows a mean value of -7.85% (median 12.75%) with a standard deviation of 119.34%.<sup>8</sup> Asset turnover has a mean of 25.32 (median 20.89) with a standard deviation of 18.55. Finally, sales growth has a mean of 2.03 (median 2.34) with a standard deviation of 22.82.

Panel B presents the summary statistics for ESG levels as measured by the Refinitiv ESG score. The mean ESG score is 0.41 (median 0.38), with a standard deviation of 0.19. Among the three ESG pillars, the environmental pillar has the lowest mean score at 0.27, with 27.88% of observations scoring zero, while the governance pillar has the highest mean score at 0.50. These figures are consistent with the findings of Kvam et al. (2024).

Panel C provides an overview of the summary statistics for the control variables. The mean value for size is 7.23 (median 7.16) with a standard deviation of 1.89. Advertising intensity has a mean of 0.28 (median 0.20) and a standard deviation of 0.33. The ratio of R&D expenses to sales averages 0.19 (median 0.00) with a standard deviation of 0.83. Capital expenditures (Capex) to total assets have a mean of 0.01 (median 0.007) with a standard deviation of 0.01. Leverage has a mean of 0.27 (median 0.24) with a standard deviation of 0.23. The average ratio of cash and short-term investments to total assets is

<sup>&</sup>lt;sup>8</sup>The high variability and negatively skewed distribution of operating profit margin are primarily driven by firms in SIC code 283 (biopharmaceuticals), which tend to have low sales but incur significant R&D expenses. We rerun the regressions excluding these firms, and the main results remain consistent.

 $0.19 \pmod{0.11}$  with a standard deviation of 0.21.

Panel D presents the variables that measure ESG attention. The mean ESG concerns is 0.10 (median 0.20), with a standard deviation of 0.71. Among the three ESG pillars, environmental concerns exhibit the highest variation, as reflected by a standard deviation of 0.72. This suggests that public attention towards environmental issues fluctuates more significantly than the other categories. In contrast, governance concerns show the least variation, indicating a more consistent level of public interest in governance-related topics.

#### 3.6 Methodology

We use a panel regression model to examine how public concerns about ESG issues affects firms' financial performance. Our primary focus is on the interaction term  $\beta_2$ , which captures the effect of the interaction between firms' ESG scores and the ESG concerns index, as detailed below:

$$\operatorname{Perf}_{it} = \beta_0 + \beta_1 \operatorname{ESG}_{it-1} + \beta_2 \operatorname{ESG}_{it-1}^* \operatorname{Concerns}_{t-1} + \beta_3 \operatorname{Control}_{it} + Industry FE + \gamma earQuarterFE + \epsilon_{it}$$
(1)

where  $Perf_{it}$  represents the financial performance of firm *i* in quarter *t*,  $ESG_{it-1}$  denotes the Refinitiv ESG score for firm *i* in the previous quarter *t-1*, and  $Concerns_{t-1}$  measures public concerns about ESG issues in the previous quarter *t-1*.

To account for the time delay in public reactions and their eventual impact on firm performance, we introduce a one-quarter lag for both ESG concerns and ESG scores. Our model also includes year-quarter and industry fixed effects. In line with Albuquerque et al. (2019, 2020), we use the Fama-French 12 industry classifications. Incorporating industry fixed effects is crucial because Refinitiv ESG scores are weighted differently across industries, especially for the environmental and social pillars. Since ESG concerns do not vary across firms, they are not included as a standalone variable in our model, as their effect is implicitly captured by the year-quarter fixed effects.

## 4 Results

In this section, we test the hypothesis that firms with higher ESG scores outperform those with lower scores during periods of heightened ESG concerns. We also examine how ESG concerns impact firms across different levels of market competition and within various industries. Finally, we conduct several robustness tests to validate the reliability of our main findings.

## 4.1 The Impact of ESG Scores and Concerns on Firms' Financial Performance

We investigate the impact of a firm's ESG score on financial performance and assess whether heightened ESG concerns amplify this relationship. To do so, we estimate several regressions incorporating interaction terms and control variables across various financial performance metrics, including return on assets, operating profit margin, asset turnover, and sales growth. Our primary model focuses on the interaction between firms' overall ESG scores and overall ESG concerns. Additionally, we delve into each ESG pillar—environmental, social, and governance—by analyzing the interaction effects between each pillar's score and its corresponding concerns.

Table 7 presents the results of our analysis. Column 1 shows that firms with higher ESG scores achieve higher returns on assets. This effect is further amplified during periods of heightened public ESG concerns, as indicated by the positive interaction between ESG scores and ESG concerns. Notably, this effect persists even after controlling for other variables in column 2, suggesting that as public ESG concerns rise, firms with higher ESG scores tend to experience greater profitability.

To understand the causes of increased profitability related to ESG issues, we focus on the effects of ESG scores and their interaction with ESG concerns on operating profit margin, asset turnover, and sales growth. Columns 3 and 4 reveal significant interaction effects between ESG scores and ESG concerns on operating profit margins. However, the interaction effects between ESG scores and ESG concerns are insignificant for asset turnover (Columns 5 and 6) and sales growth (Columns 7 and 8). This suggests that the profitability gains are primarily driven by higher operating profit margins rather than increased asset turnover or sales growth. As previously discussed, firms may leverage ESG initiatives to differentiate themselves from competitors, potentially generating additional demand or enabling premium pricing (McWilliams and Siegel, 2001; Albuquerque et al., 2019). Our findings indicate that as ESG concerns rise, firms that differentiate through ESG efforts are rewarded with higher profit margins and overall profitability.

In Table 8, columns 1-4, we replace the ESG concerns index with a dummy variable that equals 1 when ESG concerns are above the median. The results are consistent with those in Table 7, showing a significantly positive interaction between ESG scores and ESG concerns for both return on assets and operating profit margin. In columns 5–8, we analyze the impact of ESG scores on financial performance across varying levels of ESG concerns by dividing them into quartiles. The results show that the positive and significant effect of the interaction terms on return on assets and operating profit margin is only evident in the highest quartile of ESG concerns. In the third quartile, the interaction terms are positively correlated with operating profit margin but negatively correlated with asset turnover, resulting in no significant impact on return on assets. In the second quartile, no statistically significant effects are observed for any performance measures. These findings suggest that substantial increases in public concerns about ESG issues are necessary to significantly enhance the financial performance of firms with higher ESG scores.

The effect of ESG concerns on the relationship between ESG scores and financial performance demonstrates a significant economic impact. According to Table 7, Column 1, an increase of one standard deviation in ESG concerns (0.713) for a firm with a median ESG score (0.382) results in a 0.118 increase in return on assets (calculated as  $0.713 \times 0.382 \times 0.433$ ). For firms with an ESG score one standard deviation above the median (0.190 + 0.382), the increase in return on assets rises to 0.177 (0.713  $\times$  0.572  $\times$  0.433), representing an additional effect of 0.059. Given the median return on assets of 2.848, this effect is economically significant. Similarly, for operating profit margin, as shown in Column 2, a one standard deviation increase in ESG concerns leads to a 2.185 increase in operating profit margin (0.713  $\times$  0.382  $\times$  8.022). This effect is amplified by 1.087 (0.713  $\times$  0.190  $\times$  8.022) for firms with an ESG score one standard deviation higher. Given the median operating profit margin of 12.754, this impact is substantial.

Next, we apply the same model to analyze the effects of ESG concerns across the environmental, social, and governance pillars to determine if these effects are consistent. We regress the interaction between each ESG pillar score (environmental, social, and governance) and its corresponding ESG concerns (environmental, social, and governance) on financial performance. This approach allows us to evaluate whether the impact of ESG concerns varies across different pillars. Table 9 summarizes the results. Columns 1-4 display findings for the environmental pillar, Columns 5-8 for the social pillar, and Columns 9-12 for the governance pillar. We observe that increased environmental concerns lead customers to pay higher prices for firms with strong environmental performance, boosting profitability (Column 1) and indicating a higher willingness to pay (Column 2). Similarly, firms with higher social scores achieve greater profit margins (Column 6), with the effect being twice as large as that for the environmental pillar. However, this price increase can reduce product demand, as seen in lower asset turnover (Column 7). For the governance pillar, positive effects are noted on return on assets (Column 9) and operating profit margin (Column 10), but there is a significant negative effect on sales growth (Column 12). To address high correlations among ESG pillars, ranging from 40.5% to 72.6%, we include interaction terms for all pillars in a single model (Columns 13-16). When controlling for other pillars, the positive and significant interaction effects on operating profit margin for the environmental and governance pillars disappear (Column 14). Conversely, the social pillar's effects remain robust. However, for the social pillar, the interaction term on return on assets becomes negative and significant, likely due to reduced asset turnover (Column 15) and sales growth (Column 16). Despite this, the positive impacts from the environmental and governance pillars offset the negative effects, resulting in a favorable overall profitability outcome.

#### 4.2 Heterogeneity Analysis

#### 4.2.1 ESG Concerns and Product Market Competition

Several studies support the view that initiatives to improve ESG levels serve as a product differentiation strategy (McWilliams and Siegel, 2001; Albuquerque et al., 2019). For instance, Flammer (2015) and Zhao et al. (2023) demonstrate that firms enhance their ESG efforts in response to heightened product market competition. Similarly, Leong and Yang (2020) find that intensified market competition drives companies to improve their social performance, primarily by addressing negative social issues. On the other hand, Ryou et al. (2022) observe that firms tend to reduce voluntary ESG disclosures when competition increases, as such disclosures may reveal competitively sensitive information. These findings suggest that firms view ESG as a strategic tool for differentiating themselves from competitors, particularly in highly competitive markets.

The ability to differentiate is crucial for maintaining firm performance and resilience in highly competitive environments. For instance, R&D intensive firms that focus on product differentiation experience smaller declines in sales growth and profitability when faced with intense competition (Hombert and Matray, 2018). Additionally, the benefits of R&D become more pronounced as competition increases. Similarly, Gu (2016) finds that R&D-intensive firms achieve higher stock returns compared to those with lower R&D levels, but this advantage is most noticeable in highly competitive industries. In the context of ESG, Han et al. (2018) demonstrate that while ESG activities may initially reduce firm performance—partly due to agency problems where managers might overinvest in ESG improvements for personal gain (Barnea and Rubin, 2010; Bénabou and Tirole, 2010) —these activities become more beneficial as competition intensifies. These findings align with those of Hombert and Matray (2018), Gu (2016), and Han et al. (2018), suggesting that ESG efforts, as part of a firm's differentiation strategy, have a more positive impact in competitive markets.

Product market competition acts as an external governance mechanism that mitigates management's tendency to overinvest in ESG improvements for personal gains (Han et al., 2018; Babar and Habib, 2021) and helps reduce greenwashing practices, particularly in firms with high environmental costs (Arouri et al., 2021). As competition intensifies, firms are driven to enhance efficiency by aligning their ESG investments with genuine performance improvements rather than engaging in superficial compliance. Based on prior research, we anticipate a stronger interaction effect between ESG scores and ESG concerns in competitive environments. Heightened ESG concerns increase the pressure on firms, especially those in highly competitive markets, to strengthen their ESG practices.

To examine whether the effects of ESG concerns differ between firms operating in highly competitive versus less competitive environments, we divide our data into two groups based on the text-based Herfindahl-Hirschman Index (HHI) developed by Hoberg and Phillips (2016). The text-based HHI is a measure of market structure derived from the textual analysis of firms' product descriptions in their 10-K filings, which identifies similarities and competitive dynamics within industries. Since the HHI measures market concentration, we follow Ilhan et al. (2023) and classify a firm as operating in a competitive industry if its HHI score is below the sample median for a given year. Because text-based HHI scores are available only up to 2021, our analysis is limited to this timeframe. We then estimate our model separately for the two groups.

Table 10 presents the regression results for firms operating in high- (Columns 1-4) or lowcompetition environments (Columns 5-8). In the high-competition group, the interaction terms between ESG score and ESG concerns are significantly positive at the 1% level for both return on assets and operating profit margin (Columns 1 and 2). Conversely, in the low-competition group, the interaction term is positive only for operating profit margin, but with a lower coefficient and t-statistic (Column 6). Furthermore, negative coefficients for asset turnover and sales growth are observed in the low-competition group (Columns 7-8), which are not present in the high-competition group. In our main model presented in Table 7, the interaction term between ESG score and ESG concerns on sales growth (Column 8) is negative, though not statistically significant. However, the subgroup analysis reveals that this negative effect on sales growth predominantly arises from the low-competition group, while the coefficient in the high-competition group is positive. This suggests that the favorable effects of higher ESG attributes in the presence of heightened ESG concerns are pronounced only in high-competition environments. In such settings, the increase in operating profit margin does not result in a decline in product demand, as seen in the low-competition group, thereby effectively enhancing return on assets.

We further validate our findings by conducting a series of regressions that include triple interaction terms between ESG score, ESG concerns, and competition intensity across all performance measures. Competition intensity is defined as one minus the text-based HHI. The results indicate that the triple interaction terms are positive and significant for return on assets, operating profit margin, and sales growth at the 10%, 5%, and 1% significance levels, respectively (detailed results are omitted for brevity). These findings demonstrate that in the presence of heightened ESG concerns, a firm's ESG attributes enhance performance, particularly in highly competitive environments. Therefore, we conclude that both public concerns regarding ESG and competition intensity play a crucial role in moderating the relationship between ESG attributes and financial performance. Additionally, we conduct further regressions incorporating industry fixed effects, and the results remained consistent (results not shown for brevity), indicating that our findings are robust to industry-specific characteristics.

#### 4.2.2 High vs. Low Consumer Sensitivity

Our concerns index, predominantly reflects individual rather than institutional investor interest (Da et al., 2011). Increased ESG concerns signal growing awareness among individuals about ESG issues, influencing their preference for sustainable products and altering their purchasing behavior. Research on climate change and asset pricing indicates that climaterelated issues disproportionately affect individual investors, who are more susceptible to behavioral biases (Santi, 2023; Choi et al., 2020). Consequently, we expect that firms targeting individual customers will benefit more from higher ESG attributes compared to those focusing on institutional clients.

Previous research highlights that the impact of ESG attributes on firms varies depending on their target audience—individual consumers versus industrial customers. Lev et al. (2010) and Arian et al. (2023) demonstrate that ESG activities generally lead to greater improvements in sales, profitability, and firm value for consumer-oriented firms. This is because individual consumers are more influenced by psychological and social dynamics in their purchasing decisions, rather than just product attributes (Corey, 1991). In contrast, institutional customers make more procedural decisions and are less influenced by psychological factors. However, Luffarelli et al. (2019) present a different viewpoint, suggesting that firms targeting individual consumers may occasionally face negative sales impacts from ESG activities. This can occur when consumers are not fully aware of a firm's ESG attributes and are therefore unwilling to pay a premium for them.

To determine which group exhibits a stronger interaction effect between ESG scores and ESG concerns, we divide our sample into two categories based on Lev et al. (2010). Firms are classified using four-digit SIC codes as either targeting individual consumers or industrial customers. Those primarily serving individual consumers were categorized as having high consumer sensitivity. Table 11 presents the results, with Columns 1-4 for high consumer sensitivity firms and Columns 5-8 for low consumer sensitivity firms. Our analysis reveals that, in the context of heightened ESG concerns, firms serving both individual consumers and industrial customers experience increased returns on assets and operating profit margins.

Notably, the coefficient for operating profit margin in Column 2 is significantly higher than the one in Column 6, indicating a stronger effect for firms with high consumer sensitivity. To assess whether the differences in coefficients between high and low customer sensitivity are statistically significant, we perform a regression including a triple interaction term between ESG score, ESG concerns, and a high customer sensitivity dummy across all performance measures. Our results show that the triple interaction term is positive and significant (at the 5% level) only for operating profit margin (detailed results omitted for brevity). This suggests that while increasing ESG concerns positively impact firms with high ESG attributes, the effect is particularly pronounced for those targeting individual consumers. Initially, we did not include industry fixed effects in our regressions, as we believe that categorizing firms by consumer sensitivity adequately captures industry differences. To verify the robustness of our findings, we conduct additional regressions with industry fixed effects, which confirm that our results remain consistent (detailed results omitted for brevity).

#### 4.3 Robustness Tests

In this section, we perform several tests to ensure the robustness of our findings. First, we introduce U.S. state fixed effects as an alternative to industry fixed effects. Social and environmental activist groups, as well as local communities, can exert pressure on firms to adopt specific ESG activities (Bhandari and Javakhadze, 2017). Additionally, variations in state-level laws (Gao and Zhang, 2015) and political influences (Di Giuli and Kostovetsky, 2014) can affect firms' ESG practices differently across states. We hypothesize that these regional factors might also influence the interaction between ESG scores and ESG concerns in relation to various financial performance metrics. To account for these regional effects, we include state fixed effects in our model. The results, presented in Panel A of Table 12 show that the interaction terms between ESG score and ESG concerns have positive and significant effects on return on assets and operating profit margin, consistent with the findings in Table

Second, we conduct robustness tests using alternative methods to construct the ESG concerns index. Initially, we measure shifts in public concerns about ESG by calculating deviations in current month search volumes from the median of the previous 12 months. To address potential variations in public responsiveness, we also use 6- and 3-month medians as baselines. The results, presented in Panels B and C of Table 12 align with our main results, showing that the interaction terms between ESG scores and ESG concerns remain positive and significant for return on assets and operating profit margin. However, in Panel C, we observe that the interaction term between ESG scores and ESG concerns is negatively correlated with firms' sales growth. This indicates that as firms raise product prices to offset their high ESG attributes, some customers who are less concerned with ESG issues may choose not to purchase from these firms, leading to a decrease in sales growth.

Finally, we test the robustness of the interaction between ESG scores and ESG concerns using alternative dependent variables. First, we substitute return on assets with return on equity (ROE), and operating profit margin with gross profit margin. ROE is calculated by dividing net income by the book value of equity. To avoid distortion from negative equity, we exclude firms with negative equity from this calculation. Gross profit margin is computed as the difference between sales and the cost of goods sold, divided by sales. Additionally, we include operating cash flow to evaluate the prediction by Pástor et al. (2021), which suggests that firms with higher ESG attributes benefit from increased net cash flow due to shifts in customer preferences towards sustainable products. While return on assets accounts for accounting treatments and adjustments, operating cash flow provides insight into the actual cash flow impact of rising ESG concerns. Operating cash flow is calculated by dividing net operating cash flow by total assets. We also incorporate Tobin's Q into our analysis. Tobin's Q, which reflects a firm's value influenced by broader market perceptions and factors beyond profitability, is included due to its relevance in previous studies examining the relationship between ESG and firm value (Servaes and Tamayo, 2013;

7.

Cornett et al., 2016; Liang and Renneboog, 2017; Buchanan et al., 2018; Fatemi et al., 2018; Gao and Zhang, 2015; Ferrell et al., 2016). Albuquerque et al. (2019) demonstrate that firms with high ESG attributes and strong profit margins experience reduced sensitivity of profits to economic shocks, leading to lower systematic risk and higher firm value. Tobin's Q is calculated by adding the market value of equity to the difference between total assets and the book value of equity, then dividing this sum by total assets. The results, presented in Table 12, Panel D, show that the interaction terms between ESG scores and ESG concerns have positive and significant effects on return on equity and gross profit margin, consistent with our main findings. Furthermore, the interaction terms also positively impact operating cash flow and Tobin's Q. This suggests that as ESG concerns increase, firms with higher ESG scores not only report improved accounting profitability but also experience greater real cash flow from operations and higher market valuation, reflecting positive market perceptions and confidence.

## 5 Conclusion

Pástor et al. (2021) propose that green firms can outperform brown firms when ESG concerns unexpectedly increase, operating through two main channels: the cash flow channel and the discount rate channel. In this study, we focus on the cash flow channel described by Pástor et al. (2021), specifically examining how rising public concerns about ESG issues impact firms' financial performance. We measure public ESG concerns using Google search volume data. We start by compiling and expanding a list of ESG-related search terms based on prior research, refining this list according to term popularity. To construct our concerns index, we calculate the deviation of monthly search volumes from the median of the previous 12 months. We then aggregate these deviations into quarterly data, standardize each term, and average them to derive both overall ESG concerns and concerns for each ESG pillar. Our analysis indicates that our ESG concerns measure, based on internet search volumes, is significantly influenced by news media coverage on climate change, particularly during periods of heightened and negatively-toned reporting.

While Ardia et al. (2022) demonstrate that rising climate change concerns are associated with lower discount rates for green firms, our evidence indicates that heightened ESG concerns are also linked to increased profitability through the cash flow channel. This increase in profitability primarily results from higher profit margins. Firms that implement a product differentiation strategy (McWilliams and Siegel, 2001; Albuquerque et al., 2019) leverage their ESG attributes to adjust product prices. As public concerns about ESG issues grow, consumer behavior shifts toward a stronger preference for sustainable practices, making consumers more willing to pay premium prices. Consequently, firms that effectively use their ESG attributes to differentiate themselves achieve higher profit margins and improved returns on assets. However, our further analysis suggests that these effects become significant only when ESG concerns rise substantially.

Our findings reveal that the positive effects of higher ESG scores on operating profit margins and return on assets, in response to increasing ESG concerns, are observed only for firms operating in highly competitive environments. This suggests that both public ESG concerns and competitive intensity play a crucial role in moderating the relationship between a firm's ESG attributes and its financial performance. Both factors serve as external governance mechanisms that encourage firms to adopt more sustainable practices aligned with public expectations. Since our measure of ESG concerns is derived from Google search volumes—reflecting primarily individual rather than institutional attention (Da et al., 2011)—the impact of heightened ESG concerns is more pronounced for firms targeting individual consumers compared to those focusing on industrial customers.

Public concerns regarding ESG are dynamic and largely beyond the control of individual firms. These concerns can surge due to various external factors, such as significant environmental events or media influence. While firms cannot control shifts in public attention, they can manage their own ESG attributes. By consistently aligning their practices with high ESG standards, firms can better navigate fluctuations in public concern. This approach reassures firms of their ability to remain competitive and maintain stronger financial performance when public attention to ESG issues intensifies For investors, integrating ESG into their investment strategies is particularly advantageous during periods of heightened public concern, as firms with strong ESG performance are more likely to deliver superior financial return, driven by stronger bottom line.

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## Figure 1. Examples of search term refinements using "+" and "-" punctuation

This figure displays the monthly search volume index data from January 2004 to December 2022. Panel A compares the search terms "csr" with and without the exclusions of terms 'car' and 'racing'. Panel B compares the search terms "greenhouse gas", "greenhouse gases", and "greenhouse gas +greenhouse gases".





This figure shows the average monthly search volume index (SVI) for the same month across multiple years, covering overall ESG and each individual ESG pillar search term.



#### Figure 3. ESG concerns index

This figure presents the ESG concerns index. Panel A illustrates the overall ESG concerns index. Panel B shows the concerns index for each individual pillar: environmental, social, and governance.



Panel B Concerns index for environmental, social, and governance pillars



#### Table 1. Google search terms used

This table lists all the search terms used to construct the concerns index for overall ESG and each ESG pillar. We initially gathered ESG-related terms from previous studies (Dimson et al., 2015; Baier et al., 2020; Choi et al., 2020; El Ouadghiri et al., 2021; Kvam et al., 2024; Santi, 2023). To expand this list, we incorporated relevant terms identified through Google's top ten related queries for each initial search term. We further refined these terms to account for multiple terminologies and singular or plural forms by utilizing punctuation such as '-', '+', " ". Finally, we selected the top 20 search terms for each ESG pillar based on their relative search volumes compared to the highest-ranking term in Google Trends. For the overall ESG concerns index, we included a comprehensive set of search terms encompassing all ESG pillars.

ESG	Environmental	Social	Governance
csr -car -racing -certificate -	acid rain	animal testing +animals test-	board members +board
generate -ssl +corporate so-		ing	member -federal -hoa
cial responsibility			
esg +environmental social	biodiversity	career development	board of directors
governance			
sustainability	climate change	child labor	business ethics
sustainable development	natural disasters +natural	customer complaints +cus-	company policies +company
	disaster	tomer complaint	policy -insurance
	conservation -mass -law	equal rights	corporate governance
	deforestation	human rights	executive compensation
	emission +emissions -	equality -mathematics -math	political influence
	spectrum -spectra	-mathematical -equation	
		-equivalence -property -	
		properties	
	endangered species	inequality -graph -calculator	risk management
		-solve -triangle -sign -	
		compound -linear -math -an	
	energy use	"fair trade"	internal control -locus
	environmental	health and safety	internal audit
	global warming	public health	executive board
	greenhouse gas +greenhouse	social security	money laundering
	gases		
	pollution	social responsibility	embezzlement
	recycling	"working conditions"	ethical business
		+"work conditions"	
	renewable energy	professional development	business fraud
	waste disposal	civil rights	financial fraud
	water use	women rights	bank fraud
	ecosystem +ecosystems	occupational health	tax fraud
	endangered animals	free speech	security fraud
	recycle	freedom speech	executive pay

## Table 2. Measures of climate change and ESG concerns

This table summarizes various measures of climate change and ESG concerns used in previous research.

	Ardia et al. $(2022)$	Choi et al. (2020)	Santi (2023)	El (	El Ouadghiri et al. (2021)		Kvam et al. $(2024)$		Serafeim (2020)
Scope of ESG pillars	Environmental	Environmental	Environmental		Environmental		ES	SG	ESG
Measure of concerns Aims to	Media Climate Change Concerns (MCCC) index Unexpected change	Abnormal local temperature Public attention	Sentiment analy- sis on StockTwits Investor senti-	Media atten- tion Public atten-	Google search volume index Public atten-	Climate- related weather disasters Public atten-	Google search volume index Public atten-	Sentiment analysis on Twitter Investor senti-	Sentiment data from TruValue Labs Public sentiment
capture	in climate change concerns	to global warm- ing	ment on climate change	tion to cli- mate change & pollution	tion to cli- mate change & pollution	tion to climate change & pol- lution	tion to ESG	ment on ESG	on corporate sustainability performance
Description	Concern scores are calculated based on the number of articles and their associated levels of negativity and risk, sourced from ten major U.S. newspa- pers and two major newswires (MCCC index). Unexpected changes in the MCCC index are determined by the prediction errors of autoregressive time series model.	Abnormal local temperature is defined as the residual obtained from regressing a city's monthly temperature on its historical average monthly temperature and the current month's devia- tion from this average.	The monthly sentiment score is obtained by aggregating scores from mul- tiple StockTwits posts. Senti- ment analysis is performed using the R package sentimentr.	The number of articles published weekly in four US newspapers.	Normalized weekly search volume for specific key- words.	Dummy vari- able that equals one if a global climate- related natural disaster oc- curred during the week.	Abnormal daily search volume index (SVI) for over- all ESG and each of its pil- lars. The SVI for each pillar is derived by averaging the daily values of all relevant search terms within the re- spective topic.	Abnormal daily volume of Twitter posts contain- ing specific keywords is calculated for both positive and negative sentiments. Sentiment analysis is performed us- ing TextBlob, VADER, and Flair.	Measures ESG sentiment for a company over the past 12 months. Tru- Value aggregates unstructured data from over 100,000 sources and uses nat- ural language processing to generate senti- ment scores.
Selection of articles or keywords	Only articles la- beled as 'climate change' by the publishers were included, and arti- cles with keywords related to the stock market were re- moved.	Abnormal local temperature is calculated for the 74 cities that host major stock exchanges.	StockTwits posts include the fol- lowing strings: 'climate change', 'global warm- ing', 'emission', 'pollution', 'ex- treme weather', 'extreme tem- perature', and 'environmental'.	Articles related to 'climate change' and 'pollution'.	Using two keywords: 'climate change' and 'pollution'	Climate- related natural disasters such as storms, extreme tem- peratures, floods, wild- fires, and droughts.	Each pillar in- cludes several keywords (a list of keywords is available in the article's internet ap- pendix)	Posts con- taining the keywords 'cli- mate change', 'corporate governance', 'ESG', 'social responsibility', and 'sustain- ability' are selected.	ESG-relevant articles for each company are sourced from analyst reports, media outlets, NGOs, and government reg- ulators.
Data source	DowJones Factiva, ProQuest, and Lex- isNexis databases	Global Surface Summary of Day Data	StockTwits	LexisNexis databases	Google Trends	EM-DAT	Google Trends	Twitter	TruValue Labs

### Table 3. Correlation matrix ESG concerns

This table provides the correlation matrix for different measures of ESG attention, with all data presented on a monthly basis.

Variable	(1)	(2)	(3)	(4)	(5)
(1) ESG concerns	1.0000				
(2) (E)nvironmental concerns	0.7258	1.0000			
(3) (S)ocial concerns	0.7891	0.8898	1.0000		
(4) (G)overnance concerns	0.8176	0.7230	0.8619	1.0000	
(5) MCCC	0.2789	0.1542	0.1762	0.1988	1.0000
(6) Stocktwits social interaction	0.1307	0.1127	0.0652	0.0486	0.4827

#### Table 4. ESG concerns and MCCC indexs

This table reports the regression results of Media Climate Change Concerns (MCCC) index on the ESG concerns measures used in this study. Columns 1-2 display the regression results with environmental, and ESG concerns indices as the dependent variables. Columns 3-4 replicate the analysis using quartile dummies of the MCCC index as the independent variable. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coëfficients at the 10%, 5%, and 1% levels, respectively.

Dependent variable	Environmental	ESG	Environmental	ESG
	concerns	concerns	concerns	concerns
	(1)	(2)	(3)	(4)
MCCC	0.238**	0.429***		
	(0.105)	(0.102)		
MCCC Q2			0.024	0.016
			(0.147)	(0.143)
MCCC Q3			0.103	0.123
			(0.147)	(0.143)
MCCC Q4			0.320**	0.490***
			(0.147)	(0.143)
Constant	-0.465***	-0.457***	-0.285***	-0.086
	(0.141)	(0.137)	(0.109)	(0.106)
Observations	212	212	212	212
Adj. R-squared	0.019	0.073	0.016	0.061

## Table 5. Variable definitions

This table provides the definitions for all main variables used and their sources of data.

Variables	Definitions	Source
Panel A. Financial perform	ance	
Return on assets (ROA)	Calculated as operating income during quarter t divided by total assets at the end of quarter t, multiplied by 100	Compustat
Operating profit margin	Calculated as ratio of operating income to sales during quarter t. multiplied by 100	Compustat
Asset turnover	Calculated as sales during quarter t divided by total assets at the end of quarter t multiplied by 100	Compustat
Sales growth	Calculated as the natural logarithm of ratio between sales dur- ing quarter t and sales during quarter t-1, multiplied by 100	Compustat
Panel B. ESG level		
ESG score	Refinitiv overall ESG (environmental, social, and governance) score, divided by 100	Refinitiv ESG
(E)nvironmental score	Refinitiv score for environmental pillar, divided by 100	Refinitiv ESG
(S)ocial score	Refinitiv score for social pillar, divided by 100	Refinitiv ESG
(G)overnance score	Refinitiv score for governance pillar, divided by 100	Refinitiv ESG
Panel C. Control variables		
Size	Calculated as the natural logarithm of total asset at the end of guarter t	Compustat
Advertising	Calculated as the ratio of selling, general, and administrative expenses to sales during quarter t. Value of zero is assigned when selling general and administrative expense data is miss-	Compustat
R&D	ing Calculated as the ratio of R&D expenses to sales during quar- ter t. Value of zero is assigned when R&D expense data is	Compustat
Capex	missing Calculated as the ratio of capital expenditures during quarter t to total assots at the end of guarter t	Compustat
Leverage	Calculated as the ratio of total debt to total assets at the end of quarter t	Compustat
Cash	Calculated as the ratio of cash and short-term investments to total assets at the end of quarter t	Compustat
Panel D. ESG attention		
ESG concerns	Index to measure public concerns on environmental, social, and governance issues, constructed using internet search vol- ume	Google Trends
(E)nvironmental con-	Index to measure public concerns on environmental issues,	Google Trends
(S)ocial concerns	Index to measure public concerns on social issues, constructed using internet search volume	Google Trends
(G)overnance concerns	Index to measure public concerns on governance issues, con- structed using internet search volume	Google Trends
MCCC	Media Climate Change Concern index to measure changes in climate change concerns, derived from news articles in major U.S. newspapers and newswires	https://sentometrics- research.com/
Stocktwits social interac- tion	Index to measure investor attention on climate issues, cal- culated as the proportion of climate posts on the Stocktwits platform to total posts	https://www.caterinasanti.com/ research

#### Table 6. Summary statistics

This table reports summary statistics for our main variables. Panel A reports the statistics for the financial performance measures. Panel B reports the statistics for the overall ESG score as well as each individual ESG pillar. Panel C reports the statistics for the control variables. Panel D reports the statistics for the ESG concerns measures. All financial performance and control variables, except for size, are winsorized at the 1% and 99% percentiles.

Variables	Obs.	Mean	Std	25%	Median	75%
Panel A. Financial performance						
Return on assets	113,689	2.2718	4.4739	1.4228	2.8481	4.3650
Operating profit margin	115,410	-7.8504	119.3442	5.0988	12.7544	21.6890
Asset turnover	$115,\!386$	25.3216	18.5480	12.3177	20.8925	33.1727
Sales growth	114,814	2.0323	22.8173	-4.9109	2.3430	9.8255
Panel B. ESG level						
ESG score	69,885	0.4086	0.1903	0.2609	0.3820	0.5369
(E)environmental score	$69,\!885$	0.2672	0.2765	0.0000	0.1746	0.4802
(S)ocial score	69,885	0.4279	0.2166	0.2562	0.3926	0.5795
(G)overnance score	$69,\!885$	0.4959	0.2215	0.3182	0.4984	0.6729
Panel C. Control variables						
Size	115,442	7.2330	1.8905	5.8954	7.1645	8.4998
Advertising	$117,\!392$	0.2820	0.3305	0.0875	0.1978	0.3531
R&D	$117,\!392$	0.1931	0.8342	0.0000	0.0000	0.0708
Capex	113,768	0.0113	0.0129	0.0034	0.0072	0.0143
Leverage	$111,\!992$	0.2666	0.2286	0.0773	0.2398	0.3899
Cash	$115,\!439$	0.1858	0.2119	0.0338	0.1018	0.2554
Panel D. ESG attention						
ESG concerns	72	0.0960	0.7132	-0.3082	0.2038	0.5066
(E)nvironmental concerns	72	-0.2302	0.7210	-0.6745	-0.0585	0.2105
(S)ocial concerns	72	-0.2983	0.6403	-0.6196	-0.1779	0.072
(G)overnance concerns	72	-0.0763	0.5926	-0.4281	-0.0565	0.2156

# Table 7. Interaction effects of ESG scores and ESG concerns on financial performance

This table presents regression results analyzing the firm's ESG score and its interaction with ESG concerns across various financial performance measures, as indicated at the top of each column. ESG scores and ESG concerns are lagged by one quarter. Columns 1, 3, 5, and 7 exclude control variables, whereas columns 2, 4, 6, and 8 include them. All regressions incorporate industry and year-quarter fixed effects, with standard errors clustered by firm. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coefficients at the 10%, 5%, and 1% levels, respectively.

Dependent wariable	Return	Return	Opr. profit	Opr. profit	Asset	Asset	Sales	Sales
Dependent variable	on assets	on assets	$\operatorname{margin}$	$\operatorname{margin}$	turnover	turnover	$\operatorname{growth}$	$\operatorname{growth}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lag ESG	3.457***	1.047***	61.692***	1.945	-0.086	6.480***	-2.768***	-3.314***
	(0.282)	(0.254)	(6.166)	(2.560)	(1.412)	(1.598)	(0.329)	(0.437)
lag ESG x lag	$1.231^{***}$	$0.433^{***}$	$33.865^{***}$	8.022***	0.796	-0.544	0.254	-0.316
ESG concerns	(0.150)	(0.115)	(4.291)	(1.579)	(0.506)	(0.476)	(0.598)	(0.620)
Size		$0.184^{***}$		$3.040^{***}$		-2.086***		-0.049
		(0.039)		(0.486)		(0.216)		(0.059)
Advertising		-4.493***		$-56.447^{***}$		-9.688***		-6.358***
		(0.215)		(5.640)		(0.700)		(0.679)
R&D		$-2.362^{***}$		-137.819***		-3.847***		-5.407***
		(0.078)		(1.157)		(0.186)		(0.336)
Capex		$32.716^{***}$		$121.100^{***}$		-28.008		$26.694^{***}$
		(3.816)		(46.346)		(25.576)		(9.142)
Leverage		-1.619***		-14.870***		-9.098***		0.366
		(0.317)		(3.982)		(1.354)		(0.495)
Cash		$-0.754^{**}$		$26.256^{***}$		$-2.450^{*}$		13.191***
		(0.379)		(4.661)		(1.441)		(0.981)
Constant	$4.120^{***}$	$4.103^{***}$	$11.672^{***}$	6.514	29.472***	49.974***	$4.823^{***}$	$4.592^{***}$
	(0.271)	(0.387)	(2.772)	(4.330)	(1.444)	(2.024)	(0.910)	(1.062)
Observations	$65,\!812$	$63,\!392$	65,731	$63,\!392$	66,499	$64,\!032$	66,347	$63,\!956$
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.226	0.511	0.168	0.872	0.338	0.416	0.057	0.085

## Table 8. Interaction effects of ESG scores and ESG concerns on financial performance: Dummy variables and quartiles

This table displays regression results examining the firm's ESG score and its interaction with ESG concerns across various financial performance measures, as indicated at the top of each column. Columns 1-4 use a dummy variable for ESG concerns, which equals 1 if lagged ESG concerns exceed the median. Columns 5-8 employ quartiles of lagged ESG concerns. All regressions account for industry and year-quarter fixed effects, with standard errors clustered by firm. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coefficients at the 10%, 5%, and 1% levels, respectively.

Dependent variable	Return	Opr. profit	Asset	Sales	Return	Opr. profit	Asset	Sales
Dependent variable	on assets	$\operatorname{margin}$	turnover	growth	on assets	$\operatorname{margin}$	turnover	growth
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lag ESG	0.910***	-1.923	6.799***	-2.709***	$0.938^{***}$	-1.700	7.030***	-3.265***
	(0.263)	(2.643)	(1.639)	(0.640)	(0.276)	(2.799)	(1.653)	(1.016)
lag ESG x lag ESG	$0.447^{***}$	$10.855^{***}$	-0.845	-1.299				
concerns p50	(0.128)	(1.780)	(0.557)	(0.960)				
lag ESG x lag ESG					-0.058	-0.473	-0.491	1.182
concerns Q2					(0.133)	(1.793)	(0.498)	(1.344)
lag ESG x lag ESG					0.224	$10.054^{***}$	-1.120**	-1.288
concerns Q3					(0.140)	(2.333)	(0.538)	(1.477)
lag ESG x lag ESG					$0.598^{***}$	$11.158^{***}$	-1.034	-0.250
concerns Q4					(0.190)	(2.355)	(0.714)	(1.366)
Size	$0.184^{***}$	$3.047^{***}$	$-2.086^{***}$	-0.050	$0.184^{***}$	$3.047^{***}$	$-2.086^{***}$	-0.049
	(0.039)	(0.487)	(0.216)	(0.059)	(0.039)	(0.487)	(0.216)	(0.059)
Advertising	-4.499***	$-56.544^{***}$	$-9.682^{***}$	$-6.362^{***}$	$-4.498^{***}$	$-56.542^{***}$	-9.682***	$-6.359^{***}$
	(0.215)	(5.642)	(0.700)	(0.679)	(0.215)	(5.642)	(0.700)	(0.679)
R&D	$-2.364^{***}$	$-137.844^{***}$	-3.845***	$-5.408^{***}$	$-2.363^{***}$	$-137.843^{***}$	$-3.845^{***}$	$-5.406^{***}$
	(0.078)	(1.157)	(0.186)	(0.336)	(0.078)	(1.157)	(0.186)	(0.336)
Capex	$32.692^{***}$	$120.635^{***}$	-27.975	$26.715^{***}$	$32.703^{***}$	$120.652^{***}$	-28.000	26.823***
	(3.816)	(46.420)	(25.576)	(9.142)	(3.816)	(46.403)	(25.580)	(9.146)
Leverage	$-1.621^{***}$	$-14.897^{***}$	-9.097***	0.364	$-1.621^{***}$	$-14.897^{***}$	-9.097***	0.366
	(0.317)	(3.983)	(1.354)	(0.495)	(0.317)	(3.983)	(1.354)	(0.495)
Cash	-0.758**	$26.208^{***}$	$-2.447^{*}$	$13.185^{***}$	-0.757**	$26.210^{***}$	-2.446*	$13.183^{***}$
	(0.379)	(4.665)	(1.441)	(0.980)	(0.379)	(4.665)	(1.441)	(0.980)
Constant	4.113***	7.125	49.914***	$4.425^{***}$	$4.123^{***}$	$7.207^{*}$	50.000***	$4.219^{***}$
	(0.388)	(4.336)	(2.024)	(1.071)	(0.389)	(4.357)	(2.035)	(1.079)
Observations	$63,\!392$	$63,\!392$	64,032	$63,\!956$	$63,\!392$	$63,\!392$	64,032	$63,\!956$
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.511	0.872	0.416	0.085	0.511	0.872	0.416	0.085

#### Table 9. The interaction effects of each environmental, social, and governance pillar

This table presents regression results for each of the environmental, social, and governance scores and their interactions with the corresponding ESG concerns index, across various financial performance measures as indicated at the top of each column. All environmental, social, and governance scores and concerns are lagged by one quarter. Columns 1-4 display results for the environmental pillar, columns 5-8 for the social pillar, columns 9-12 for the governance pillar, and columns 13-16 present results for models that include all three ESG pillar scores and their interaction terms with the corresponding ESG concerns. All regressions account for control variables, industry fixed effects, and year-quarter fixed effects, with standard errors clustered by firm. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coefficients at the 10%, 5%, and 1% levels, respectively.

		Environ	mental			Soc	ial			Gover	nance			Comb	ined	
Dependent	Return	Opr. profit	t Asset	Sales	Return	Opr. profit	Asset	Sales	Return	Opr. profit	Asset	Sales	Return	Opr. profit	Asset	Sales
variable	on assets	margin	turnover	growth	on assets	margin	turnover	$\operatorname{growth}$	on assets	margin	turnover	$\operatorname{growth}$	on assets	margin	turnover	growth
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
lag Env	$0.422^{**}$	-3.299	4.898***	-2.337***									-0.065	-10.801***	1.920	-2.000***
	(0.211)	(2.123)	(1.283)	(0.349)									(0.253)	(2.798)	(1.456)	(0.477)
lag Env x lag	$0.325^{***}$	$2.641^{***}$	-0.069	1.026									$0.410^{***}$	-0.174	0.379	$2.610^{***}$
Env. concerns	(0.059)	(0.763)	(0.224)	(0.707)									(0.076)	(0.932)	(0.285)	(0.874)
lag Soc					$0.818^{***}$	$9.196^{***}$	$6.344^{***}$	-1.381***					$0.673^{**}$	$18.877^{***}$	$3.739^{**}$	0.989
					(0.250)	(2.724)	(1.567)	(0.494)					(0.300)	(3.667)	(1.794)	(0.672)
lag Soc x lag					0.121	$6.159^{***}$	-0.754*	-0.998					$-0.359^{***}$	$5.735^{***}$	$-1.159^{**}$	$-2.604^{**}$
Soc. concerns					(0.096)	(1.449)	(0.394)	(0.969)					(0.126)	(1.757)	(0.503)	(1.270)
lag Gov									$0.552^{***}$	$-5.512^{**}$	$5.060^{***}$	-3.086***	$0.425^{**}$	-6.403***	$3.607^{***}$	-2.702***
									(0.185)	(2.284)	(1.102)	(0.337)	(0.196)	(2.421)	(1.197)	(0.374)
lag Gov x lag									$0.372^{***}$	$3.324^{**}$	0.058	-1.768**	$0.306^{***}$	1.079	0.302	-2.046*
Gov. concerns									(0.102)	(1.432)	(0.465)	(0.891)	(0.112)	(1.476)	(0.512)	(1.045)
Constant	$4.094^{***}$	1.670	$52.616^{***}$	$3.319^{***}$	4.122***	$7.562^{*}$	$51.327^{***}$	$4.844^{***}$	$3.763^{***}$	5.275	48.266***	$5.626^{***}$	$3.947^{***}$	3.743	51.368***	$4.231^{***}$
	(0.417)	(4.647)	(2.189)	(1.085)	(0.396)	(4.478)	(2.117)	(1.061)	(0.381)	(4.185)	(1.992)	(1.048)	(0.422)	(4.731)	(2.272)	(1.106)
Observations	63,392	$63,\!392$	64,032	$63,\!956$	63,392	63,392	64,032	$63,\!956$	63,392	63,392	64,032	63,956	63,392	63,392	64,032	$63,\!956$
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.509	0.872	0.416	0.085	0.510	0.872	0.416	0.084	0.510	0.872	0.416	0.085	0.510	0.873	0.419	0.086

#### Table 10. ESG concerns in high vs low competitive environments

This table reports the regression results examining the firm's ESG score and its interaction with ESG concerns across various financial performance measures, as indicated at the top of each column. The sample is divided into two subsets based on text-based HHI scores (Hoberg and Phillips, 2016). Firms are classified as operating in a competitive industry if their HHI score is below the median for that year. Columns 1-4 present results for firms in high-competition industries, while columns 5-8 show results for firms in low-competition industries. ESG scores and ESG concerns are lagged by one quarter. All regressions control for a set of variables and include year-quarter fixed effects. Standard errors are clustered by firm. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coefficients at the 10%, 5%, and 1% levels, respectively.

High competition						Low competition					
Dependent	Return	Opr. profit	Asset	Sales	Return	Opr. profit	Asset	Sales			
variable	on assets	margin	turnover	$\operatorname{growth}$	on assets	margin	turnover	growth			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			
lag ESG	1.423***	6.056	7.478***	-3.717***	1.700***	10.297***	5.720**	-2.294***			
	(0.386)	(4.040)	(2.490)	(0.628)	(0.335)	(3.600)	(2.558)	(0.546)			
lag ESG x lag	$0.482^{***}$	$10.532^{***}$	-0.011	2.497	0.139	4.307***	$-1.977^{***}$	-3.114**			
ESG concerns	(0.159)	(2.118)	(0.785)	(1.588)	(0.136)	(1.320)	(0.728)	(1.259)			
Constant	$3.994^{***}$	-1.732	$57.662^{***}$	$4.002^{***}$	4.817***	$15.975^{***}$	$56.036^{***}$	6.835***			
	(0.502)	(6.346)	(2.941)	(1.499)	(0.442)	(4.934)	(3.267)	(1.460)			
Observations	28,450	28,450	28,727	$28,\!680$	26,565	26,565	26,877	26,862			
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Industry FE	No	No	No	No	No	No	No	No			
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
Adj. R-squared	0.525	0.889	0.172	0.095	0.304	0.531	0.129	0.083			

#### Table 11. ESG concerns in high vs low consumer sensitivity

This table presents regression results examining the firm's ESG score and its interaction with ESG concerns across various financial performance measures, as indicated at the top of each column. The sample is divided into two groups based on high and low consumer sensitivity classifications.(Lev et al., 2010). Columns 1-4 show the results for firms with high consumer sensitivity, while columns 5-8 display the results for firms with low consumer sensitivity. ESG scores and ESG concerns are lagged by one quarter. All regressions account for control variables and include year-quarter fixed effects, with standard errors clustered by firm. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coefficients at the 10%, 5%, and 1% levels, respectively.

	Н	ligh custome	er sensitivit	y	Low customer sensitivity				
Dependent	Return	Opr. profit	Asset	Sales	Return	Opr. profit	Asset	Sales	
variable	on assets	margin	turnover	$\operatorname{growth}$	on assets	$\operatorname{margin}$	turnover	$\operatorname{growth}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
lag ESG	1.373***	4.598	8.091***	$-2.643^{***}$	1.109***	8.914**	3.640	-3.090***	
	(0.412)	(4.419)	(2.854)	(0.800)	(0.348)	(3.594)	(2.305)	(0.459)	
lag ESG x lag	$0.419^{**}$	$12.626^{***}$	-1.150	-0.575	$0.412^{***}$	$5.255^{***}$	-0.201	-0.107	
ESG concerns	(0.190)	(3.020)	(0.858)	(0.985)	(0.140)	(1.555)	(0.690)	(0.766)	
Constant	$3.089^{***}$	-0.826	54.496***	4.327***	4.574***	$11.372^{**}$	$51.666^{***}$	$4.589^{***}$	
	(0.512)	(6.542)	(3.276)	(1.437)	(0.443)	(5.714)	(2.566)	(1.407)	
Observations	$27,\!357$	$27,\!357$	$27,\!621$	$27,\!559$	$36,\!035$	36,035	36,411	$36,\!397$	
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Industry FE	No	No	No	No	No	No	No	No	
Year-quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Adj. R-squared	0.592	0.917	0.255	0.099	0.338	0.429	0.156	0.075	

#### Table 12. Robustness tests

This table presents the regression results examining the firm's ESG score and its interaction with ESG concerns across various financial performance measures, as indicated at the top of each column. Panel A uses U.S. state fixed effects instead of industry fixed effects. Panel B and Panel C analyze shifts in public concerns about ESG by calculating deviations in current month search volumes from the 6-month median (Panel B) and the 3-month median (Panel C). Panel D includes additional dependent variables: (1) return on equity (net income/book value of equity), (2) gross profit margin ((sales - cost of goods sold)/sales), (3) operating cash flow (net operating cash flow/total assets), and (4) Tobin's Q ((total assets book value of equity + market value of equity)/total assets). ESG scores and ESG concerns are lagged by one quarter. All regressions control for a set of variables and include industry fixed effects (except in Panel A) and year-quarter fixed effects. Standard errors are clustered by firm. Robust standard errors are reported in parentheses. \*,\*\*, and \*\*\* Significant coefficients at the 10%, 5%, and 1% levels, respectively.

Panel A. State fixed effects				
Dependent Variables	Return on assets	Opr. profit mar-	Asset turnover	Sales growth
		gin		
	(1)	(2)	(3)	(4)
lag ESG	$1.001^{***}$	3.809	5.209***	-3.308***
	(0.276)	(2.762)	(1.847)	(0.437)
lag ESG x lag	0.490***	8.443***	-0.268	-0.257
ESG concerns	(0.117)	(1.606)	(0.570)	(0.619)
Constant	4.374***	8.414	51.320***	3.846***
	(0.758)	(6.151)	(4.797)	(1.309)
Observations	63,392	63,392	64,032	63,956
Control	Yes	Yes	Yes	Yes
States FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.496	0.869	0.209	0.082

Panel B. Alternative met	thod for constructing	ESG concerns - de	viation from 6-mon	th search volume median
Dependent Variables	Return on assets	Opr. profit mar-	Asset turnover	Sales growth
		gin		
	(1)	(2)	(3)	(4)
lag ESG	$1.101^{***}$	2.324	$6.455^{***}$	-3.231***
	(0.252)	(2.543)	(1.582)	(0.437)
lag ESG x lag	$0.304^{***}$	7.733***	-0.681	-1.205
ESG concerns	(0.100)	(1.481)	(0.417)	(0.815)
Constant	$4.061^{***}$	1.882	$51.060^{***}$	8.104***
	(0.406)	(5.724)	(2.109)	(1.191)
Observations	$63,\!835$	$63,\!835$	$64,\!489$	64,413
Control	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
Adj. R-squared	0.510	0.871	0.416	0.085
Panel C. Alternative met	thod for constructing	ESG concerns - de	viation from 3-mo	nth search volume median
Dependent Variables	Return on assets	Opr. profit mar-	Asset turnover	Sales growth
		gin		0
	(1)	(2)	(3)	(4)
lag ESG	1.120***	2.705	6.384***	-2.839***
	(0.251)	(2.540)	(1.577)	(0.435)
lag ESG x lag	0.182***	4.637***	-0.267	-2.967***
ESG concerns	(0.068)	(1.053)	(0.280)	(0.762)
Constant	4 008***	6 445	50 267***	4 593***
Constant	(0.396)	$(4\ 372)$	(2.076)	(0.991)
Observations	64 062	64.062	(2.010) 64 719	64 643
Control	Yes	Yes	Yes	Yes
Industry FE	Ves	Ves	Ves	Ves
Vear-quarter FE	Ves	Ves	Ves	Ves
Adi B-squared	0.510	0.871	0.416	0.085
Panel D. Additional den	endent variables	0.011	0.110	0.000
Dependent Variables	Boturn on og	Gross profit	Opr. cash flow	Tobin's O
Dependent variables	neturn on eq-	morgin	Opr. cash now	100m s Q
	(1)	(2)	(2)	(A)
lam ESC	<u>(1)</u>	(2)	<u>()</u>	(4)
lag ESG	$3.204^{+++}$	(0, 100)	$(0.003^{++})$	(0.148)
la a ECC ao la a	(1.091)	(2.188)	(0.218)	(0.148)
lag ESG x lag	$1.4(4^{+++})$	4.001 (1.5(0))	$(0.343)^{++}$	(0.054)
LSG concerns	(0.302)	(1.000)	(0.122) 1 102***	(U.U04) 1 004***
Constant	-1.008	$-10.321^{**}$	$1.123^{++27}$	$1.894^{-1.00}$
01	(1.440)	(4.247)	(0.339)	(0.217)
Observations	60,390	63,975	64,032	63,774 N
Control	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year-quarter FE	Yes	Yes	Yes	Yes
Adi. R-squared	0.171	0.840	0.338	0.292