How Climate Risk Beliefs Shape Corporate Social Responsibility?

Abstract

This paper examines whether belief differences about climate change affect firms' decision makings in Corporate Social Responsibility (CSR) commitment. We find that firms' Environmental, Social, and Governance (ESG) scores are higher if they are located in the counties where more people believe in global climate change. We use natural disasters as exogenous shocks to the beliefs about climate risk, and continue to find a positive association between CSR and perceptions of climate risk. Besides, the correlation between CSR and climate risk beliefs is stronger when firms have more local investors.

Keywords: Climate change beliefs, Corporate Social Responsibility, ESG Scores, Natural disasters

1. Introduction

Global climate change has significant negative impacts on the U.S. economy and imposes great cost on firms and individuals. According to a major scientific report by 13 federal agencies in 2018, global warming could affect the U.S. economy by as much as 10% by the end of the century if no substantial actions are taken[1]. Financial research also reveals how climate change can affect a firm's or government's cost of doing business or an individual's property value. Dessaint and Matray (2017) find that firm managers overreact to hurricane strikes by holding the cash that is over the optimal level. Painter (2020) finds that sea level rise affects the price of municipal bonds in coastal cities. In addition, Bernstein, Gustafson, and Lewis (2019) discover that global warming has negative impacts on house value that is subject to sea level rise exposure. It is important to study climate finance and understand how firms are impacted by climate change and how they react to climate risks.

Among different aspects of climate change, beliefs play crucial roles in determining firms' actions or attitudes towards climate risks. Li, Lin, Jin, and Zhang (2020) find that climate change, higher abnormal temperatures in particular, is associated with firms' reduction in local employment and establishments. They find the results to be stronger when firms are located in counties with a higher belief in climate change. Choi, Gao, and Jiang (2020) show that individuals' beliefs in climate change could lead to behavioral-biased trading in the stock market, which could cost them financially. Krueger, Sautner, and Starks (2020) survey global institutional investors and find that they take climate risk seriously and proactively engage in climate risk management in their portfolio investments. In addition, Baldauf, Garlappi, and Yannelis (2020) find that the effect of sea level rise on property price depends on the belief differences about climate change. Given the significant role of climate risk beliefs, our paper attempts to understand how belief differences shape firms' commitment to Corporate Social Responsibilities (CSR).

[1]Based on "U.S. climate report warns of damaged environment and shrinking economy", New York Times, November 23, 2019

Engle, Giglio, Kelly, Lee, and Stroebel (2020) show the possibility of hedging climate change risks by constructing a portfolio that long firms with high Environmental, Social, and Governance (ESG) scores and short firms with low ESG scores. Motivated by their results, we naturally start to examine if firms with varying degrees of climate change beliefs exhibit different levels of CSR commitments (or ESG scores), as improving ESG can be viewed as a way to hedge climate change risks[2]. We hypothesize that firms with a higher level of climate change beliefs would commit more to ESG related investments, especially in terms of environmental commitments.

Using county-level climate change beliefs data from Yale Climate Opinion Maps, we find that firms located in areas with higher beliefs have higher ESG scores. The results are also strong when we focus on the environmental or social component of ESG scores. The findings are consistent with the notion that managers are more likely to take actions in ESG to contribute to the societal goods in the environment or to hedge potential climate risks when they believe more in climate changes.

Although our results on the relationship between climate change beliefs and ESG scores sustain a series of robustness tests, there may still be concerns on endogeneity issues, such as some omitted variables affecting both factors. For example, executives who are more concerned about ESG issues might more likely choose areas with higher beliefs in climate change as their headquarters. To alleviate the potential endogeneity concerns, we examine an exogenous event that could change the climate change beliefs within a firm over a certain time, namely the natural disasters. Choi et al. (2020) find that people's attention and beliefs in climate change are affected by global warming or higher temperatures. We believe that natural disasters such as hurricanes or flooding can alter people's attention and change their beliefs in climate change[3].

[2]We use ESG scores as a proxy for firms' CSR activities, thus we use CSR and ESG interchangeably in the paper.

[3]We verify our assumptions in the Appendix Table A2, which indicates that the change in beliefs is highly significant and positive in counties where natural disasters strike.

By using natural disasters as a proxy for changes in climate change beliefs, we find consistent results that firms increase their ESG scores after the disasters strike. Firms also improve their ESG scores more when the damages from the disasters is higher. In addition, the effects are stronger when the disasters hit areas with higher beliefs. The results indicate that disasters and climate change beliefs reinforce each other and both contribute to firms making more CSR related commitments.

The results are consistent with literature that show the effects of surrounding environments on firms' decision making, for example of local climate policies (Ramelli, Wagner, Zeckhauser, and Ziegler, 2019), cultural (Ho, Wang, and Vitell, 2012), and religious environments (Cui, Jo, and Velasquez, 2015). We further explore a more direct connection between firms and local communities, namely local institutional investors. Institutional investors are believed to drive the improvements in CSR for stocks that they hold (Dyck, Lins, Roth, and Wagner, 2019; Chen, Dong, and Lin, 2020), as institutional investors are more likely to voice their concerns and push the changes in CSR related policies. We hypothesize that one of the channels local climate change beliefs have an impact on firms' CSR commitments is through institutional investors which are in the local areas, thus are subject to a similar level of beliefs as the firms.

We believe that local climate change beliefs should have more profound impacts on the firm's ESG scores when firms have more local institutional investors. By separating samples into two groups of firms with or without local investors, we find that the relationships between climate change beliefs and ESG scores are only significant when local investors are present. It indicates that local communities' beliefs, especially that of local institutional investors, have strong impacts on firms' decision making on CSR commitments.

This paper contributes to the broad climate finance literature that studies the interaction between climate change and finance, especially how climate change beliefs affect financial decision making. Most extant literature focuses on the relationship between beliefs and personal financing, such as how beliefs affect housing prices (Baldauf et al., 2020; Bakkensen and

Barrage, 2018), mortgage filings (Duan and Li, 2019), and demand for flood insurance (Ratnadiwakara and Venugopal, 2020). Li et al. (2020) provide a connection between beliefs and corporate finance decision making in their employment and investments. Our paper makes the contribution in showing the association between beliefs and the firm's CSR investments.

Our paper is related to the string of literature on the determinants of CSR scores. CSR scores appear to be shaped by corporate governance, scandals, ownership disparity, and managers' personal values (Jo and Harjoto, 2012; Arvidsson, 2010; Choi, Jo, Kim, and Kim, 2018; Hemingway and Maclagan, 2004). Our finding is more closely associated with literature that finds firms' CSR activities are affected by surrounding environments, such as by local religions beliefs (Cui et al., 2015; Cui, Jo, and Velasquez, 2016; Du, Jian, Zeng, and Du, 2014), and cultural and geographic environments (Ho et al., 2012). We discover a new CSR determinant that is related to the environments that the managers live in - climate change beliefs.

Lastly, our results are consistent with the literature that connects institutional investors with CSR performance. Literature indicates that institutional ownership and the taste of institutional investors drive firms to improve their CSR commitments (Dyck et al., 2019; Hwang, Titman, and Wang, 2017). Krueger et al. (2020) find that institutional investors care about climate risk and, in a related paper, Ilhan, Jrueger, Sautner, and Starks (2019) find that institutional investors demand a higher level of climate risk disclosures. We find that local institutional investors have a significant impact on a firm's choice in CSR commitments.

The remainder of the paper is organized as follows: Section 2 reviews the relevant literature and develop the hypotheses that we further test in Section 4. Section 3 describes the databases we combined for the empirical tests. Section 4 presents the empirical results to formally test our hypotheses. Section 5 concludes.

2. Literature Review and Hypothesis Development

While climate changes have great impacts on economies and firm activities, people's beliefs in climate risks play a significant role in determining their actions. Li et al. (2020) discover that firms reduce their employments and establishments when the areas experience abnormal long-term temperature rise. However, the effects are much more significant when the climate change beliefs are higher. Similar to their findings regarding the beliefs, a number of other recent literature discover various effects on people's life by the difference in beliefs. For example, Baldauf et al. (2020) find that the beliefs determine the price of houses that are projected to be underwater. When the percentage of climate change believers increases by one standard deviation, the prices drop by 7% for underwater houses. Bakkensen and Barrage (2018) use survey data in Rhode Island and find that the flood risk perceptions significantly affect the house prices. Ratnadiwakara and Venugopal (2020) discover the connection between climate change beliefs and the demand for flood insurance. Lastly, Duan and Li (2019) find that concerns about climate change affect the mortgage approval rate and loan amounts, and the effects are stronger when more people believe in climate change. Overall, these papers point out significant impacts of the climate change beliefs from financial perspectives.

Yet, to our knowledge, no extant literature has studied whether firms are more or less environmentally responsible when there are higher climate change beliefs. We are interested in studying firms' overall corporate social responsibility (CSR) or their environmental responsibility, as CSR or ESG is believed to be able to play a role in hedging climate risk. Engle et al. (2020) find that long-short portfolios consisting of firms with high and low ESG scores are able to hedge the innovations in climate news. The paper believes that when there is a negative shock in climate change news, high ESG firms can perform much better than the low ESG firms, and thus provides a hedge to the climate risks. If firm managers are more likely to believe that climate changes are an imminent risk, they might take actions to

combat or hedge the climate risk, through the mean of increasing firms' ESG scores. That leads to our first hypothesis:

Hypothesis 1 If firm managers are more likely to believe in climate change risks, we expect firms to have higher ESG scores and/or environmental scores.

The null hypothesis is that ESG scores of firms in which managers have higher beliefs in climate change would be no different or lower than that of firms with lower beliefs. We use the percentage of people who believe in climate change in the local communities as a proxy for the managers' beliefs.

We believe that there exists a correlation between ESG scores and local climate change beliefs, as extant literature finds that community or local environments/beliefs can shape firms' decisions, especially in terms of ESG commitment. Both Cui et al. (2015) and Du et al. (2014) find that local religious beliefs are associated with firms ESG contributions. Cui et al. (2015) find a negative correlation between Christian religiosity and management's decision in environmental practices. However, Du et al. (2014) find that firm's corporate environmental disclosure scores are positively associated with Buddhism religiosity using the China data. In addition, Cui et al. (2016) find a connection between community religion and a firm's performance in social aspects. Ho et al. (2012) use the global data and find that culture and geographic environments are significantly associated with a firm's CSR performance. The testing of our hypothesis will complement the string of literature that examines how the impact of firms' external environments affect their decision making in ESG improvements.

One problem with examining the correlation between ESG scores and climate change beliefs is that the beliefs are relatively sticky and the within-firm variation might not be significant. We need an exogenous event that is associated with climate change beliefs and can affect firms' decision making in ESG scores. Ramelli et al. (2019) use 2016 Trump's election as a shock to the U.S. climate change policy and find that long term investors appear to reward firms with climate responsible strategies. Although the 2016 election

result provides a useful shock to the climate change beliefs, we are more interested in events that might affect different firms differently at different times. Therefore, we turn to a series of exogenous events that happen at different locations during various times and are believed to associated with beliefs, namely natural disasters.

We use natural disaster events as a proxy to the change in climate change beliefs because physical climate change events such as natural disasters and rising temperatures appear to affect people's perception of climate risk. Choi et al. (2020) observe a change in people's beliefs about climate change when they experience abnormally high temperatures. Natural disasters such as hurricanes can affect firm managers' decision making and sometimes could cause them to make sub-optimal choices in an attempt to combat possible future disasters(Dessaint and Matray, 2017). Abnormal high temperatures also appear to affect firms' decision in various ways, such as employment and investments(Li et al., 2020) and mortgage lending (Duan and Li, 2019). Pankratz and Schiller (2019) combine the temperatures and flooding events as shocks to firms' perception of climate change risks and find that the climate shocks affect firms' decision making in adjusting their supply chain choices. The literature is consistent with our assumption that physical climate change-related events can play a role in altering people's beliefs in climate change. We propose to use the natural disaster events as a shock to the climate change beliefs and make our second hypothesis:

Hypothesis 2 If firm managers experience a shock to the changes in climate change beliefs, such as experience a natural disaster event, firms will more likely increase their ESG scores and/or environmental scores.

While natural disasters provide shocks to people's beliefs in climate changes, the effects might be asymmetric between high and low believers. In addition, the disasters and beliefs might reinforce each other, meaning disasters might have stronger impacts on areas with higher beliefs and weaker impacts on areas with lower beliefs. As a result, here is our follow up hypothesis:

Hypothesis 2a The effect of disasters on a firm's decision making in ESG improvement is stronger in areas with stronger beliefs about climate change.

Moreover, the degree of a shock to climate change beliefs depends on how big the shock is provided by the disasters. There could be a meaningful difference in impacts between disasters that provide greater shocks or damages to the community and those with less damages. Therefore, we hypothesize:

Hypothesis 2b The effect of disasters on a firm's decision making in ESG improvement is stronger in areas with larger disaster damages.

While local climate change beliefs have great impacts on firm managers, they can also affect a firm's shareholders from local areas. There is a group of important shareholders that we can locate and determine whether they are local investors, namely institutional investors. Institutional investors play an important role in the firm's decision makings, especially in terms of ESG investments. For example, Dyck et al. (2019) use global data and find that institutional investors drive firms' environmental and social performance. Hwang et al. (2017) find that firms react to higher ownership from socially responsible institutions by increasing their CSR scores. Krueger et al. (2020) use the survey data and find that institutional investors become more concerned about climate change risks and start to proactively engage in risk management. The ownership of institutional investors as a whole group are important determinants of firms' CSR commitments, however, we would like to focus on the role of local investors in our paper as we are interested in the impact of local climate beliefs by the investors. We believe that the effect of climate change beliefs on CSR would be different when local investors are present or not. Thus,

Hypothesis 3: The relationship between beliefs and CSR is affected by the presence of local institutional investors.

We expect climate change beliefs to have stronger impacts on CSR scores when local investors are presented. We further test all the above-mentioned hypotheses in Section 4.

3. Data

We compile the data used in this paper from the following five sources.

3.1. Beliefs about climate change

We follow Baldauf et al. (2020) and measure beliefs about climate change using Yale Climate Opinion Maps. The survey provides county-level data on questions about how people perceive climate change risk. We measure the beliefs about climate change (variable name: Belief) using the percentage of people who answer "YES" to the question: whether they believe that climate change is happening[4].

3.2. ESG Scores

We measure a firm's corporate social responsibility (CSR) commitment using environmental, social, and governance (ESG) disclosure scores from Bloomberg Data Service (Bloomberg). Bloomberg covers ESG scores for over 11,500 companies in 83 countries in 2019. Bloomberg ESG scores rate firms annually on a scale of 0 to 100 based on the quality of policy-related ESG data. It covers 120 environmental, social, and governance indicators including carbon emissions, climate change effect, diversity, community relations, human rights, independent directors, and many more. Several aspects covered by Bloomberg are particularly relevant to our research question regarding local climate change beliefs, such as climate change effect and community relations. Therefore, in this paper, we mainly use Bloomberg ESG score as a proxy for a firm's efforts on CSR commitment and focus on U.S. public firms that covered by Bloomberg. Bloomberg starts providing ESG data from 2006, and that is the start year of our sample.

[4]We obtain the belief data from three years of surveys (2014, 2016, and 2018). To construct panel data for firms in those counties, we expand the 2014 survey results to cover the year 2013 and before. We use the 2016 and 2018 survey results to cover the years 2015 and 2017, respectively.

There are numerous ESG data providers. Besides Bloomberg, another data provider, MSCI ESG Research, which provides commonly known KLD ESG scores, is also widely used in the literature. In one of the robustness tests, we replace Bloomberg score with KLD scores and find similar results[5].

3.3. Firm Financial Variables

We obtain a firm's annual fundamental variables from Compustat and stock return information from CRSP. Our industry classification follows the Fama-French 48 industry categories. We follow Harjoto, Jo, and Kim (2017) in constructing the control variables. In all regression models, we control for return on assets, the standard deviation of daily return for the firm-year, market to book ratio, RD expense ratios, total assets, number of analyst following the company, Herfindahl-Hirschman Index, total debt ratio, cash flow ratios, and industry median ESG scores. Summaries on the definitions of all variables can be found in the Appendix A table.

To merge firms with climate change belief data at the county level, we also extract firms' headquarter addresses from Compustat. We use the ESRI GIS tool to geocode the addresses and then apply the spatial join tool to match each address to a county ID. After the matching and requiring firms to have both ESG scores and climate change belief data, we end up with 1,254 firms and 9,024 firm-year observations covering the year 2006 to 2018.

3.4. Natural Disasters

We obtain the natural disaster data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS) maintained by the Center for Emergency Management and Homeland Security at Arizona State University (CEMHS, 2018). The dataset covers various types of natural disasters over the past few decades in the United States. We are interested

[5]At the time of writing, KLD only provides ESG scores for academic researchers up to 2016. Therefore, we use Bloomberg ESG score for our main results as the data is more up to date, and provide robust results using KLD scores.

in using natural disasters as an exogenous shock to people's perception of climate risk, and therefore, we focus on three types of natural disasters that are more climate change-related, flooding, hurricanes/tropical storms, and tornadoes. We aggregate the property damage from these three major types of natural disasters by each county year. SHELDUS provides the county id for us to match with the joint data on ESG and climate change beliefs.

3.5. Institutional Investor Equity Holdings and Addresses

To study local institutional ownership, we use information on 13F institutional investor stock holding data, which comes from Thomson Reuters. All institutional investment managers that have over $100 million of assets under management need to file Form 13F with the Securities and Exchange Commission (SEC). We obtain the quarterly equity holdings by institutional investors to calculate the ownership by local investors.

Further, we identify the institutional investors' addresses to match with firms' addresses. We acquire institutional investors' addresses from another mandatory SEC filings, Form ADV. Investment advisers are required to register with the SEC and file a Form ADV each year or when there are any material changes. The ADV filings are publicly available on the SEC's Investment Adviser Public Disclosure (IAPD) website. Investors' addresses can be found in Item 1F from Part 1 of ADV filings. We do not require firms and institutional investors to be in the same county, rather we define investors to be local investors if their addresses are within 100 miles of the firm's headquarter. We calculate the percentage of local ownership as aggregated shares hold by local investors divided by the total share outstanding of the firm in each quarter. We further take the mean of quarterly local ownership over the year as our local ownership definition.

4. Empirical Results

4.1. Descriptive Statistics

In this section, we report the summary statistics of variables used in the regression of ESG scores on climate change belief. In Panel A of Table 1, we report the summaries for our main variable, Belief, in 2014, 2016, and 2018 when Yale Climate Opinion Maps provide estimates on American's climate change beliefs at the county level. Across three years that we have data on, we find an increasing trend in Belief. On average, there are about 72% of believers, but the variation is large across different counties. For example, at the 5th percentile only 61% of the population believe in global climate change, while about 83% believe in it at the 95th percentile.

[Insert Table 1 here]

In Panel B, we report the summaries for ESG scores and control variables. The mean and standard deviation of the ESG score is about 17.8 and 10.5, respectively. The mean values of environmental (ENV) and social (SOC) scores are very close to ESG scores, but with a higher variation. The ENV score can range from 1.6 to 29 from the 5th percentile to the 95th percentile. The average governance (GOV) score is 51.6, but with much less variations (the standard deviation is 6). Given that the ESG score is an equal-weighted composite of ENV, SOC, and GOV scores, we expect the most variation of ESG to come from either the variation in ENV or SOC scores. We follow prior literature in constructing all control variables. The summaries of control variables show no out of ordinary departure from past literature. The mean market-to-book ratio is about 2.9, and the debt ratio is about 23%. We notice that the industry median ESG score is 12.8 which is less than the median ESG scores of 14 for overall firms. This indicates that our sample is slightly over-weighted by firms from lower ESG industries.

[Insert Table 2 here]

Table 2 reports Pearson correlations among those variables. The correlation matrix indicates that Belief is significantly correlated with ESG scores and all three component scores. The correlation coefficients between ESG and its three component scores are high as expected. Most of the correlation coefficients among control variables are less than 0.5, which mitigates the potential concerns on multicollinearity.

4.2. Climate Change Belief and ESG

4.2.1. Bivariate Relations

Our main research question is whether climate change beliefs affect firms' choices in becoming more transparent and making efforts to improve ESG scores. In Table 3, we sort climate change belief by terciles and report the summary statistics of ESG scores by each tercile.

[Insert Table 3 here]

The results indicate that firm's ESG scores are significantly higher when firms are located in communities with a higher percentage of believers. Firms' ESG scores in the top tercile are 1.8, or around 10% higher than that in the bottom tercile. The difference is highly significant at the t-stat of 9.02. When we separately examine ENV, SOC, and GOV scores, we find that the difference in ENV scores between high and low believer counties is the most significant. ENV scores for top tercile is 6.23, or a 43%, higher than that in bottom tercile. The results are consistent with our hypothesis that firms' ESG commitments are influenced by local communities. Climate change beliefs have a particularly strong impact on a firm's environmental activities.

4.2.2. Regression Results

In this subsection, we test the correlation between ESG scores and climate change beliefs in a regression setting, where we control for variables that affect ESG scores. In Table 4, we

report the results on the regression of ESG scores and each of its three component scores on climate change beliefs. We include industry and time fixed effects across all models to control for potential time trends and across industry differences in ESG scores. In Model 1, the result indicates that a one standard deviation increase in Belief, firms' ESG scores increase by 0.43, about 2.4% increase over mean ESG scores. The effects of Belief on ENV and SOC scores are in a similar magnitude to that on ESG scores. However, we do not find a significant correlation between Belief and GOV scores. The result on GOV scores is not unexpected, as we believe that climate change belief is more likely to be associated with a firm's commitment to overall ESG or environmental issues than on the governance issues.

[Insert Table 4 here]

4.2.3. Robustness Tests

In this subsection, we explore different sample periods and different ways of constructing Beliefs variable and ESG scores to examine the robustness of our main findings. As Yale Climate Opinion Maps only provide climate change belief data since 2014, we have to backdate the belief data to 2006, apply the survey results in 2014 for all years proceeding it. Although the climate change belief data across different years is very persistent, one might still worry about the accuracy of belief data applied to the year 2013 and before. The coefficient for pairwise correlation between one year's climate change belief and any of the other two years' data is 0.76, and it is highly significant. In Model 1 of Panel A in Table 5, we drop observations before 2014 and continue to find a significant coefficient on Beliefs. Our results are robust when we restrict sample with more reliable Beliefs data.

[Insert Table 5 here]

In Model 2, we adjust ESG scores by industry median value and find results are similar to that in our main specification. Instead of using continuous Beliefs variable, in Model 3, we use the High Beliefs dummy that takes one if it is higher than median Beliefs value. The

result indicates that firms have a higher ESG score of about 1.2 if they locate in above-median Beliefs areas, after holding all control variables constant. We argue that firms are more likely to take initiatives in ESG activities if they happen to locate in areas with higher climate change beliefs. However, one might believe that firms that are interested in higher ESG investment choose to move to the high Beliefs areas. Therefore, in Model 4, instead of using firms' Beliefs value at any given year, we use the firm's Beliefs value at the time of the founding. Most firms were founded before 2014 and arguably did not have a clear picture as to where more people might believe in climate change as the time when Yale Climate Opinion Maps come out. Our result is also robust to the using of Beliefs at the time of the founding.

Even though we include time fixed effects in our model to control for potential impact from a certain time trend, one might still be concerned about whether the measures across different years are comparable. For example, one might argue that the way survey questions on climate change are asked or perceived by people might vary during different years, or Bloomberg makes some systematic changes to how they calculate ESG scores during different years. To alleviate such potential concerns, we use the standardized value of Beliefs and/or ESG scores by year to obtain a relative ranking of a firm's Beliefs or ESG scores in a given year. By standardizing them, we also make the variables more comparable across different years. In Model 5, we report the result of the regression of ESG scores on standardized Beliefs. In Model 6, we replace the dependent variable to be standardized ESG scores. In Model 7, we standardize both ESG scores and Beliefs. Across all of those three models, we continue to find similar results on the correlation between ESG scores and Beliefs.

Lastly, there are a number of providers which provide ESG scores for firms. Besides Bloomberg ESG scores, KLD CSR scores is also populated in academic research. In Model 8, we use KLD CSR scores as dependent variables and find a highly significant coefficient on Beliefs (with a t-stat of 5.0). In Panel B, we replace ESG scores with ENV scores (footnote:

The results are also robust for SOC scores, but it is not reported here for brevity.). We find the coefficients on Beliefs to be significant across all models.

4.3. Natural Disasters and ESG

Given the limitation of Yale Climate Opinion Maps which does not cover the data before 2014, our previous results mainly focus on cross-sectional differences among firms, since most of our data on Beliefs are static across time series. In this section, we explore time-varying events that can affect climate change beliefs and further affect the firm's ESG scores, namely natural disasters. In Appendix B table, we test if the former is true. We use the periods between 2014 and 2018 when we can observe a change in Beliefs and test if the change in Beliefs is associated with the happening of natural disasters. In Panel A, we discover that the Beliefs increases by 2.2% between two years if no natural disasters happen, and it increases by 6.4% when disasters strike, a 200% higher. A t-test of the difference in change in Beliefs also shows it to be highly significant (t-stat = 18.63). In Panel B, we further run a regression of changes in Beliefs on happening of natural disasters or the amount of damages caused by natural disasters, along with a county fixed effect. The regression results also indicate a significant and positive correlation between natural disasters and Beliefs. The results are consistent with our prior belief that people's perceptions of climate change are affected by their experience of extreme natural disasters that are associated with climate change. Therefore, in Table 6, we use the happening of natural disasters as proxies for changes in climate change beliefs and test if firms' ESG scores are affected by such a time-varying proxy[6].

[Insert Table 6 here]

In the regression models in Table 6, we replace the independent variable as the dummy that indicates whether firms have experienced a natural disaster before. The After Natural

[6]Huang, Li, Lin, and McBrayer (2019) discover a similar result in the correlation between the happening of natural disasters and ESG scores, however, their paper focuses on using disasters as a shock to the impact of ESG scores on firm's cost of debt

Disasters dummy takes the value of one if it is after a firm hit by disasters, and zero otherwise. For firms that have never experienced a disaster during our sample periods, the value of the dummy is zero across the whole time series. As a result, our regression setting takes a difference-in-difference approach and test how firms' ESG scores change after firms hit by disasters, relative to firms not hit by disasters. Besides, we add a firm fixed effect to examine the time-varying effects on ESG scores within a firm.

We use ESG scores and its three component scores in each of the four models, and find that the coefficients on natural disaster dummy to be all significantly positive. It indicates that firms have higher ESG scores after experiencing disasters. The results echo with the climate change belief results and point to the channel where firm managers' decisions on ESG are affected by how they or the communities they locate at perceive climate change.

If natural disasters represent an exogenous shock to people's belief in climate change, then we should expect the shock to be stronger when the damages from disasters are higher or if it comes from areas with more believers. In Table 7, we test the hypothesis that the effects of disasters on ESG scores differ between high and low belief areas, and between high and low damage disasters.

[Insert Table 7 here]

In Models 1 and 2, we run the same regression as in Table 6 for ESG scores, but with a subsample of firms in high and low Beliefs areas, respectively. We calculate the Beliefs value within a firm across all periods and define a firm to be in a high (low) Beliefs area if its Beliefs value is higher (lower) than the median value. Both models show significant coefficients of the natural disaster dummy, indicating that the disasters have an effect on the firm's ESG scores for either low or high Beliefs areas. The coefficient on disasters is higher for high Beliefs areas than that for low Beliefs. To test if the difference is statistically significant, we use an interaction between disaster dummy and Beliefs dummy in Model 3 and include firms in high and low Beliefs areas and firms both hit and not hit by disasters in the sample (footnote: the lower term of High Beliefs is dropped from the model due to

the perfect collinearity with firm dummy). The coefficient on the interaction term is positive and highly significant. That means when a disaster strike area with more believers, firm managers increase their ESG scores after the disaster, and the increase is higher than the rest of the areas and higher than firms not hit by disasters. The results are consistent with our hypothesis that natural disasters and climate change beliefs reinforce each other and both show a positive impact of ESG scores.

Further, if people's perceptions are affected by disasters, then the degree of changes in beliefs should be influenced by the amount of damage caused by disasters. We separate samples by the amount of property damages from the disasters and report the regression results using a high (low) damage sample in Model 4 (5). Both models show significant coefficients on disaster dummy, but the coefficient on the model using high damage subsample is much higher than that using low damage subsample. In Model 6, when we include all samples and interact high damage dummy with disaster dummy, the interaction term is highly significant as expected[7].

In Panel B, we repeat the regression models in Panel A but replace the dependent variable with ENV scores. The results are quantitatively similar to that in Panel A. Combining both results, we conclude that the natural disaster events along with local climate change beliefs have a profound impact on firms' commitment to environmentally friendly activities, and further help improve firm's ESG score along the process.

4.4. Local Investor and ESG

So far, we focus on the connection between firms and local communities, on the basis that firm managers and employees live in the communities and thus are affected by local climate change beliefs. In this section, we explore a more direct connection between firms and local communities, namely whether firms have local institutional ownership. We identify firms' local ownership as the institutional investors which are within 100 miles of distance

[7]the lower term of High Damage is dropped from the model due to the perfect collinearity with firm dummy.

to the firms' headquarters. Dyck et al. (2019) shows that institutional investors have great influences on the firm's ESG investments. When more institutional investors are from local, we expect the influences to be stronger and firms' ESG commitments would be affected more by local beliefs. We formally test the Hypothesis 3 and present the results in Table 8.

[Insert Table 8 here]

First, we start with a subsample of firms that have or have zero local ownership and run the same regression models as in Table 4. From Models 1 and 2, we find that firms with local institutional ownership respond significantly to the level of the local climate change beliefs, while the correlation no longer exists for firms with no local ownership. When we include the interaction term between local ownership indicator with Beliefs in Model 3, the interaction term is highly significant and positive. In Models 4 to 6, we replace dependent variables with ENV scores and find consistent results. The results further confirm that local communities, including local investors, have strong effects on firms' decision making on ESG commitments.

5. Conclusion

The real impact of climate change on the economic activities appears to be affected by whether people believe in climate risk(Baldauf et al., 2020; Li et al., 2020; Bakkensen and Barrage, 2018; Ratnadiwakara and Venugopal, 2020; Duan and Li, 2019). We examine whether people's beliefs in climate risk affect firms' choice in becoming more environmentally and socially responsible. We find that firms tend to have higher ESG scores in areas with higher climate change believers. The results are robust to different ways of measuring CSR activities, as well as different sample period and measurements.

We further use the natural disaster events as a shock to within-firm change in climate risk beliefs and continue to find a positive and significant correlation between beliefs and ESG scores. The impact is stronger when the damages from natural disasters are large and

when the disasters happen at high belief areas. The results indicate that natural disasters and climate change beliefs reinforce each other and both contribute to firms' decision in committing CSR activities.

Lastly, we examine the correlation between beliefs and ESG scores with the presence of local institutional investors. Institutional investors are believed to play an important role in driving a firm's CSR performance(Dyck et al., 2019; Hwang et al., 2017; Krueger et al., 2020). Instead of focusing on the institutional investors as a group, we focus on local institutional investors who share similar beliefs with firm managers. It is also easier for local investors to instill environment-related beliefs into the local management team. Indeed, we find that the beliefs only play the role in pushing the ESG scores for firms when the local investors are present, while the relationship is no longer significant when firms have no local investors.

This paper, to our knowledge, is the first one to connect climate change beliefs with firms' CSR activities. With climate finance being a relatively new research area and starting to boom in the past few years, we believe that there is a wide range of future research available in this direction. Malik (2015) reviews a list of contemporary literature that examines the effect of CSR activities on firm values or performances. Future research examining the effect of climate change beliefs on the relationship between CSR and firm values could be beneficial.

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Table 1
Summary Statistics

This table presents the summary statistics on climate change beliefs and firm characteristics. In Panel A, we report the statistics on the percentage of people in a county who believe that global warming is happening, based on the survey data reported by Yale Climate Opinion Maps. In Panel B, we report the annual ESG disclosure scores, as well as its three component scores, namely environmental, social, and governance scores for firms covered by Bloomberg. The sample period is 2006 to 2018. The detailed definition of the rest of the variables can be found in Appendix A1 table.

Panel A. Percentage of Climate Change Believers

Year	mean	sd	p5	p25	p50	p75	p95
2014	67.9	6.2	58.0	64.0	68.0	73.0	80.0
2016	74.1	5.6	63.7	71.0	74.3	79.2	83.0
2018	74.7	5.8	64.1	71.4	75.0	78.4	83.7
Total	72.3	6.6	61.0	68.0	72.9	77.6	83.0

Panel B. Summary Statistics for ESG Scores and Other Control Variables

	mean	sd	p5	p25	p50	p75	p95
ESG Score	17.81	10.47	11.16	11.84	14.05	17.77	43.77
ENV Score	17.33	17.09	1.55	2.33	10.85	28.97	51.16
SOC Score	16.13	12.99	3.33	8.33	13.33	19.30	43.86
GOV Score	51.57	5.95	46.43	48.21	51.79	51.79	62.50
ROA	-0.04	0.25	-0.54	-0.02	0.02	0.06	0.15
Standard Deviation	0.03	0.02	0.01	0.01	0.02	0.03	0.06
Market to Book	2.87	5.32	0.18	1.07	1.80	3.29	10.05
RNDR	1.14	6.19	0.00	0.00	0.04	0.17	2.71
Log Asset	6.59	2.11	3.01	5.15	6.63	8.00	10.14
Log Number of Analyst	1.88	0.97	0.00	1.39	1.95	2.64	3.33
HHI Index	333.45	586.41	36.01	64.78	122.47	251.74	1480.50
Debt	0.23	0.23	0.00	0.03	0.16	0.36	0.68
Cash Flow	0.02	0.20	-0.37	0.01	0.06	0.11	0.22
Industry Median ESG	12.81	1.84	11.14	11.84	11.84	14.05	16.27

Table 2
Pearson Correlations

This table presents the pairwise Pearson correlations between two of the variables that are defined in Table 1. * represents that the correlation is significant at 5% level.

	Beliefs	ESG Score	ENV Score	SOC Score	GOV Score	ROA	SD	MB	RNDR	Log AT	Analyst	HHI Index	Debt	CF	Med. ESG
Beliefs	1														
ESG Score	0.0907*	1													
ENV Score	0.0857*	0.9741*	1												
SOC Score	0.0857*	0.8864*	0.7528*	1											
GOV Score	0.0723*	0.7775*	0.6732*	0.6380*	1										
ROA	-0.0220*	0.0873*	0.0435*	0.0741*	0.0854*	1									
Standard Deviation	-0.1594*	-0.2220*	-0.2031*	-0.2121*	-0.2056*	-0.0607*	1								
Market to Book	0.0042	-0.0036	0.005	0.0015	-0.0036	0.0746*	0.0037	1							
RNDR	0.0147*	-0.0157	-0.0244	-0.0068	-0.0146	-0.0642*	0.0241*	-0.0003	1						
Log Asset	0.0207*	0.5387*	0.4951*	0.4207*	0.4515*	0.0350*	-0.3881*	-0.0183*	-0.0281*	1					
Log Number of Analyst	0.0781*	0.4487*	0.4114*	0.3689*	0.3675*	0.0172*	-0.2277*	-0.0076	-0.0102	0.5733*	1				
HHI Index	-0.0212*	0.0451*	0.0806*	0.0276*	0.0278*	0.0068	-0.0151*	-0.0011	-0.0095	0.2016*	0.1482*	1			
Debt	0.0297*	0.0954*	0.0601*	0.0999*	0.0676*	-0.4236*	0.0251*	-0.0002	0.0545*	0.0504*	0.0745*	0.0035	1		
Cash Flow	-0.0472*	0.1186*	0.0771*	0.1000*	0.1126*	0.6843*	-0.2601*	-0.0109*	-0.0874*	0.1894*	0.1412*	0.0381*	-0.5104*	1	
Industry Median ESG	0.1371*	0.3192*	0.0805*	0.2767*	0.2762*	0.0063	-0.0814*	0.0003	-0.0115	0.2434*	0.1546*	0.4035*	0.0267*	0.0417*	1

Table 3
ESG Scores by the Level of Climate Change Beliefs

This table presents the mean value of ESG scores, as well as its three component scores, by different level of climate change beliefs. Climate change beliefs are sorted into terciles and low (median/high) level represents bottom (median/top) tercile of climate change beliefs. We also report the difference in means between high and low level of climate change beliefs. The t-stats for the difference in mean are reported in the last row.

Climate Change Beliefs	ESG Score	ENV Score	SOC Score	GOV Score
Low	17.24	14.47	15.53	51.43
Median	18.26	19.29	16.73	51.73
High	19.06	20.70	17.05	52.03
High-Low	1.82	6.23	1.52	0.60
t-stat	9.02	11.43	4.95	5.19

Table 4
ESG Score and Climate Change Beliefs

This table reports the results of regressions of ESG scores, as well as its three components scores, on climate change beliefs. The unit of observation is a firm-year. All variables are the same as defined in Table 1. All continuous, independent variables are normalized to mean of zero and a standard deviation of one. We include industry and time fixed effects throughout. The standard errors are clustered to account for heteroskedasticity. We report t-statistics in square brackets. ***, **, * represents statistical significance at the 1%, 5%, and 10% level respectively.

	1 ESG Score	2 ENV Score	3 SOC Score	4 GOV Score
Beliefs	0.4304***	0.4681***	0.6280***	0.0343
	[3.577]	[2.956]	[4.297]	[0.500]
ROA	-11.6184***	-13.8116***	-12.7804***	-4.2899**
	[-5.009]	[-4.842]	[-4.281]	[-2.438]
Standard Deviation	-0.5570**	-0.5770**	-0.5090*	-0.5525***
	[-2.502]	[-2.108]	[-1.786]	[-3.777]
Market to Book	0.0026	0.0180***	-0.0282***	-0.0008
	[0.458]	[2.737]	[-3.741]	[-0.221]
RNDR	0.0482**	-0.0270	0.2313***	0.0373***
	[2.318]	[-0.718]	[13.592]	[2.723]
Log Asset	7.8601***	9.9853***	7.8222***	3.2827***
	[40.462]	[38.914]	[35.792]	[25.387]
Log Number of Analyst	0.6417***	0.5138***	1.2120***	0.2275***
	[5.026]	[3.153]	[7.779]	[2.624]
HHI Index	0.0233	0.0050	0.0014	0.0967
	[0.208]	[0.034]	[0.010]	[1.398]
Debt	-2.0726***	-2.5558***	-1.8436***	-1.0667***
	[-7.580]	[-7.017]	[-5.911]	[-5.873]
Cash Flow	0.3127	-0.3500	1.2413	0.2344
	[0.460]	[-0.410]	[1.425]	[0.469]
Industry Median ESG	0.9579***	1.1700***	1.0924***	0.3462***
	[6.687]	[6.338]	[6.205]	[5.001]
Observations	9,024	9,024	9,024	9,024
R-squared	0.475	0.432	0.446	0.349

Table 5
ESG Score and Climate Change Beliefs - Robustness Tests

This table reports the results of regressions of ESG scores in Panel A, and ENV scores in Panel B, on climate change beliefs. The unit of observation is a firm-year. In Model 1, we include only sample periods between 2014 and 2018. In Model 2, we adjust the dependent variable by subtracting it from the industry median value. In Model 3, we replace the Beliefs variable to be a dummy indicating whether Beliefs is higher than the median value during the year. In Model 4, we use the Beliefs data at the location that the firm was founded as the main independent variable. In Model 5, we standardize the Beliefs by each year. In Model 6, we standardize the ESG (in Panel A) or ENV score (in Panel B) by each year. In Model 7, we standardize both ESG/ENV score and Beliefs by each year. In Model 8, we replace the ESG score with KLD CSR score provided by MSCI ESG Research. All other variables are the same as defined in Table 1. All continuous, independent variables are normalized to mean of zero and a standard deviation of one. We include industry and time fixed effects throughout. The standard errors are clustered to account for heteroskedasticity. We report t-statistics in square brackets. ***, **, * represents statistical significance at the 1%, 5%, and 10% level respectively.

Panel A. Robustness tests for ESG Scores

	1	2	3	4	5	6	7	8
				ESG Score				
	Years>=2014	ESG adjusted	ESG Score	ESG Score	ESG Score	ESG (Standardized)		KLD CSR Score
Beliefs	0.4647***	0.4211***				0.0420***		0.0737***
	[2.757]	[3.500]				[3.630]		[4.996]
High Beliefs			1.1966***					
			[6.195]					
Beliefs at founding				0.4304***				
				[3.577]				
Beliefs (Standardized by year)					0.3807***		0.0371***	
					[3.554]		[3.608]	
ROA	-11.1921***	-11.5366***	-11.5719***	-11.6184***	-11.6251***	-1.1333***	-1.1340***	-0.7266**
	[-3.561]	[-4.986]	[-5.003]	[-5.009]	[-5.014]	[-5.088]	[-5.093]	[-2.074]
Standard Deviation	-0.0717	-0.5257**	-0.5728***	-0.5570**	-0.5566**	-0.0570***	-0.0570***	-0.0598**
	[-0.238]	[-2.364]	[-2.584]	[-2.502]	[-2.501]	[-2.634]	[-2.633]	[-2.064]
Market to Book	0.0094	0.0038	-0.0002	0.0026	0.0026	0.0002	0.0002	0.1895
	[1.511]	[0.631]	[-0.037]	[0.458]	[0.453]	[0.450]	[0.444]	[1.429]
RNDR	0.0629**	0.0535***	0.0454**	0.0482**	0.0478**	0.0047**	0.0047**	0.1258**
	[2.357]	[2.842]	[2.263]	[2.318]	[2.287]	[2.350]	[2.319]	[2.050]
Log Asset	8.5819***	7.7885***	7.8317***	7.8601***	7.8611***	0.7573***	0.7574***	0.4145***
	[31.754]	[39.661]	[40.487]	[40.462]	[40.472]	[40.604]	[40.615]	[15.243]
Log Number of Analyst	0.9770***	0.6506***	0.6244***	0.6417***	0.6412***	0.0597***	0.0596***	0.1428***
	[5.604]	[5.045]	[4.899]	[5.026]	[5.021]	[4.866]	[4.861]	[8.574]
HHI Index	-0.1530	0.0783	0.0288	0.0233	0.0223	0.0003	0.0002	0.0372**
	[-0.620]	[0.679]	[0.257]	[0.208]	[0.198]	[0.032]	[0.022]	[2.560]
Debt	-1.8118***	-2.0409***	-2.0223***	-2.0726***	-2.0730***	-0.2024***	-0.2024***	-0.2002***
	[-5.351]	[-7.474]	[-7.443]	[-7.580]	[-7.582]	[-7.701]	[-7.703]	[-5.479]
Cash Flow	-1.0891	0.2939	0.3331	0.3127	0.3158	0.0303	0.0306	0.3403***
	[-1.277]	[0.431]	[0.491]	[0.460]	[0.464]	[0.463]	[0.468]	[3.238]
Industry Median ESG	0.9714***		0.9643***	0.9579***	0.9589***	0.0909***	0.0910***	-0.0027
	[3.351]		[6.719]	[6.687]	[6.695]	[6.600]	[6.607]	[-0.184]
Observations	5,176	9,024	9,024	9,024	9,024	9,024	9,024	4,630
R-squared	0.499	0.417	0.477	0.475	0.475	0.467	0.467	0.347

Panel B. Robustness tests for ENV Scores

	1	2	3	4	5	6	7	8
				ENV Score				
	Years>=2014	ENV adjusted	ENV Score	ENV Score	ENV Score	ENV (Standardized)		KLD ENV Score
Beliefs	0.6669***	0.6508**				0.0369***		0.0085**
	[2.979]	[1.975]				[2.994]		[2.457]
Beliefs (above median)			1.4234***					
			[5.587]					
Beliefs (when founded)				0.4681***				
				[2.956]				
Beliefs (Standardized by year)					0.4220***		0.0332***	
					[2.989]		[3.026]	
ROA	-13.4884***	-5.9867	-13.7170***	-13.8116***	-13.8110***	-1.1051***	-1.1052***	-0.1682**
	[-3.568]	[-0.427]	[-4.817]	[-4.842]	[-4.843]	[-4.963]	[-4.964]	[-2.015]
Standard Deviation	0.0961	-1.0296	-0.5967**	-0.5770**	-0.5768**	-0.0484**	-0.0484**	-0.0085
	[0.263]	[-1.146]	[-2.188]	[-2.108]	[-2.108]	[-2.243]	[-2.242]	[-1.150]
Market to Book	0.0269***	-1.9842	0.0146**	0.0180***	0.0180***	0.0016***	0.0016***	0.0036
	[3.754]	[-1.377]	[2.201]	[2.737]	[2.732]	[3.143]	[3.139]	[0.129]
RNDR	-0.0063	259.3184***	-0.0308	-0.0270	-0.0275	-0.0019	-0.0020	-0.0011
	[-0.141]	[5.442]	[-0.837]	[-0.718]	[-0.729]	[-0.663]	[-0.674]	[-0.142]
Log Asset	11.0895***	10.3693***	9.9487***	9.9853***	9.9859***	0.7795***	0.7796***	0.1082***
	[30.514]	[19.539]	[38.905]	[38.914]	[38.925]	[39.111]	[39.122]	[18.228]
Log Number of Analyst	0.8438***	2.1912***	0.4901***	0.5138***	0.5126***	0.0377***	0.0376***	0.0158***
	[3.759]	[5.021]	[3.013]	[3.153]	[3.145]	[2.970]	[2.962]	[3.698]
HHI Index	-0.0195	0.1161	0.0105	0.0050	0.0036	-0.0021	-0.0022	0.0035
	[-0.058]	[0.398]	[0.072]	[0.034]	[0.024]	[-0.180]	[-0.189]	[1.002]
Debt	-2.3451***	0.5128	-2.4919***	-2.5558***	-2.5554***	-0.2020***	-0.2020***	-0.0418***
	[-5.113]	[0.554]	[-6.884]	[-7.017]	[-7.017]	[-7.145]	[-7.144]	[-5.213]
Cash Flow	-2.2140**	6.4710*	-0.3259	-0.3500	-0.3466	-0.0259	-0.0256	0.0505**
	[-2.073]	[1.859]	[-0.382]	[-0.410]	[-0.406]	[-0.389]	[-0.385]	[2.026]
Industry Median ESG	1.2437***		1.1774***	1.1700***	1.1711***	0.0873***	0.0874***	0.0065*
	[3.153]		[6.360]	[6.338]	[6.344]	[6.143]	[6.149]	[1.916]
Observations	5,176	3,413	9,024	9,024	9,024	9,024	9,024	4,615
R-squared	0.454	0.297	0.434	0.432	0.432	0.430	0.430	0.303

Table 6
ESG Score and Natural Disasters

This table reports the results of regressions of ESG scores, as well as its three components scores, on the after natural disaster dummy, which take the value of one if it is after firms experience a natural disasters, and zero otherwise. The unit of observation is a firm-year. All other variables are the same as defined in Table 1. All continuous, independent variables are normalized to mean of zero and a standard deviation of one. We include industry and firm fixed effects throughout. The standard errors are clustered to account for heteroskedasticity. We report t-statistics in square brackets. ***, **, * represents statistical significance at the 1%, 5%, and 10% level respectively.

	1 ESG Score	2 ENV Score	3 SOC Score	4 GOV Score
After Natural Disasters	2.8514***	2.8920***	4.2622***	1.3043***
	[9.129]	[7.090]	[10.649]	[5.978]
ROA	-0.8453	0.0178	-2.1272	-1.1770
	[-0.512]	[0.009]	[-0.845]	[-0.829]
Standard Deviation	-1.5389***	-1.9114***	-1.5305***	-0.6866***
	[-8.506]	[-7.985]	[-6.751]	[-5.499]
Market to Book	-0.0010	0.0045	-0.0108	-0.0033
	[-0.265]	[1.151]	[-1.464]	[-1.038]
RNDR	0.0652***	0.0627***	0.1160***	0.0202
	[5.480]	[4.620]	[4.617]	[1.421]
Log Asset	4.3039***	3.6233***	7.4593***	2.6942***
	[9.842]	[6.393]	[12.860]	[7.982]
Log Number of Analyst	0.5998***	0.6834***	0.5036**	0.5099***
	[3.971]	[3.494]	[2.426]	[3.887]
HHI Index	-1.3928***	-1.5935***	-1.7174***	-0.6233***
	[-14.840]	[-13.345]	[-14.190]	[-10.336]
Debt	2.2302***	2.8925***	2.2229***	0.7915**
	[7.031]	[6.935]	[5.171]	[2.475]
Cash Flow	-0.5606	-0.9792	-0.2582	0.0284
	[-1.133]	[-1.610]	[-0.348]	[0.065]
Industry Median ESG	0.7075***	0.4426***	1.5227***	0.4662***
	[7.171]	[3.642]	[11.497]	[8.216]
Observations	8,957	8,957	8,957	8,957
R-squared	0.856	0.843	0.806	0.700

Table 7
ESG Score and Natural Disasters by Sub-samples

This table reports the results of regressions of ESG scores in Panel A, and ENV scores in Panel B, on the after natural disaster dummy, which take the value of one if it is after firms experience natural disasters and zero otherwise. In Model 1 (2), the subsample of firms that have higher (lower) than median Beliefs is included. In Model 4 (5), the subsample of firms that experience above (below) median damage is included. In Models 3 and 6, we use the whole sample. The unit of observation is a firm-year. All other variables are the same as defined in Table 1. All continuous, independent variables are normalized to mean of zero and a standard deviation of one. We include industry and firm fixed effects throughout. The standard errors are clustered to account for heteroskedasticity. We report t-statistics in square brackets. ***, **, * represents statistical significance at the 1%, 5%, and 10% level respectively.

Panel A. ESG Score

	1	2	3	4	5	6
	ESG Score					
	High Beliefs	Low Beliefs	All Sample	High Damage	Low damage	All Sample
After Natural Disasters	3.8242***	2.5244***	2.0537***	4.1356***	1.7837***	2.1655***
	[6.249]	[7.224]	[6.128]	[8.958]	[4.602]	[5.796]
After Natural Disasters * High Beliefs			2.3260***			
			[3.480]			
After Natural Disasters * High Damage						1.3433**
						[2.342]
ROA	-1.0135	-0.5511	-0.8281	1.1195	-2.2863	-0.8517
	[-0.423]	[-0.234]	[-0.498]	[0.402]	[-1.095]	[-0.518]
Standard Deviation	-1.6926***	-1.4628***	-1.5671***	-1.1990***	-1.7362***	-1.5315***
	[-6.434]	[-6.032]	[-8.670]	[-5.018]	[-6.868]	[-8.473]
Market to Book	-0.0012	0.1000	-0.0012	0.0012	-0.4255	-0.0011
	[-0.269]	[0.143]	[-0.297]	[0.300]	[-0.494]	[-0.292]
RNDR	0.0703***	-0.1989	0.0654***	0.0692	0.0772***	0.0650***
	[5.568]	[-0.630]	[5.462]	[0.957]	[6.666]	[5.480]
Log Asset	4.1781***	3.7805***	4.2395***	2.0287***	5.7891***	4.2947***
	[6.674]	[6.773]	[9.694]	[3.532]	[9.304]	[9.828]
Log Number of Analyst	0.6730***	0.5394**	0.6159***	1.0611***	0.3229	0.6004***
	[3.303]	[2.462]	[4.082]	[4.946]	[1.538]	[3.967]
HHI Index	-1.8112***	-1.0109***	-1.3861***	-1.2611***	-1.3896***	-1.3846***
	[-11.108]	[-9.688]	[-14.871]	[-9.848]	[-10.740]	[-14.692]
Debt	2.4467***	1.8718***	2.2563***	1.6046***	2.7265***	2.2329***
	[5.369]	[4.158]	[7.042]	[3.549]	[6.412]	[7.069]
Cash Flow	-0.6638	-0.3476	-0.5656	-1.1585	-0.3317	-0.5698
	[-0.980]	[-0.457]	[-1.132]	[-1.449]	[-0.531]	[-1.154]
Industry Median ESG	0.5680***	0.9109***	0.7199***	0.7031***	0.7536***	0.7203***
	[3.584]	[8.629]	[7.357]	[5.407]	[5.181]	[7.314]
Observations	4,455	4,502	8,957	3,709	5,247	8,957
R-squared	0.865	0.846	0.856	0.879	0.844	0.856

Panel B. ENV Score

	1	2	3	4	5	6
	ENV Score					
	High Belief	Low Belief	All Sample	High Damage	Low Dageme	All Sample
After Natural Disasters	4.6085***	2.3274***	1.5489***	4.6183***	1.4534***	1.9510***
	[5.728]	[5.197]	[3.568]	[7.790]	[2.764]	[3.804]
After Natural Disasters * High Belief			3.9164***			
			[4.438]			
After Natural Disasters * High Damage						1.8432**
						[2.433]
ROA	-0.3405	0.3013	0.0160	0.6403	-0.6032	0.0031
	[-0.346]	[0.299]	[0.024]	[0.521]	[-0.739]	[0.005]
Standard Deviation	-98.3454***	-74.4473***	-84.4946***	-57.2744***	-99.8519***	-82.0068***
	[-6.465]	[-5.583]	[-8.198]	[-4.282]	[-6.908]	[-7.951]
Market to Book	0.0000	0.0011	0.0000	0.0000	-0.0001	0.0000
	[0.518]	[0.732]	[1.040]	[1.082]	[-0.049]	[1.102]
RNDR	0.0003***	-0.0014	0.0003***	0.0003	0.0004***	0.0003***
	[4.751]	[-1.051]	[4.597]	[0.926]	[5.341]	[4.611]
Log Asset	1.6366***	1.2509***	1.6272***	0.3277	2.5836***	1.6715***
	[4.383]	[3.673]	[6.207]	[0.952]	[6.890]	[6.373]
Log Number of Analyst	0.8426***	0.5790**	0.7274***	1.0275***	0.5390*	0.7004***
	[3.111]	[2.008]	[3.634]	[3.639]	[1.927]	[3.490]
HHI Index	-0.0032***	-0.0015***	-0.0022***	-0.0021***	-0.0022***	-0.0022***
	[-11.126]	[-7.718]	[-13.396]	[-8.991]	[-9.443]	[-13.207]
Debt	5.1593***	4.6809***	5.0227***	3.4842***	6.2180***	4.9539***
	[5.341]	[4.277]	[6.973]	[3.497]	[6.450]	[6.977]
Cash Flow	-1.6773	-1.0676	-1.4650	-2.3418	-1.1318	-1.4713
	[-1.382]	[-0.727]	[-1.602]	[-1.522]	[-1.013]	[-1.634]
Industry Median ESG	0.1538	0.3034***	0.2206***	0.2346***	0.2146**	0.2190***
	[1.627]	[4.931]	[3.852]	[2.981]	[2.554]	[3.790]
Observations	4,455	4,502	8,957	3,709	5,247	8,957
R-squared	0.851	0.837	0.844	0.868	0.829	0.843

Table 8
ESG Scores and Local Institutional Ownership

This table reports the results of regressions of ESG or ENV scores on the climate change beliefs. In Model 1, the subsample of firms with the presence of local ownership is included. In Model 2, only firms that have no local ownership are included. In Model 3, we include the full sample and add the interaction term between local ownership dummy and Beliefs. We perform the same regression models in Models 4 to 6 but replace the dependent variable as ENV score. The unit of observation is a firm-year. All other variables are the same as defined in Table 1. All continuous, independent variables are normalized to mean of zero and a standard deviation of one. We include industry and time fixed effects throughout. The standard errors are clustered to account for heteroskedasticity. We report t-statistics in square brackets. ***, **, * represents statistical significance at the 1%, 5%, and 10% level respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	ESG Score			ENV Score		
	Local	No Local	All Sample	Local	No Local	All Sample
High Local Own * Beliefs			0.8054***			0.8580***
			[3.311]			[2.695]
Beliefs	0.6509***	-0.3263	-0.1402	0.6538***	-0.0556	-0.1214
	[4.849]	[-1.078]	[-0.598]	[3.655]	[-0.143]	[-0.397]
High Local Own			-0.2713			-0.4863
			[-1.162]			[-1.552]
ROA	-10.0755***	-15.4717***	-12.4414***	-11.3954***	-19.6917***	-14.6313***
	[-3.630]	[-3.611]	[-5.493]	[-3.222]	[-3.655]	[-5.131]
Standard Deviation	-0.6810**	-0.2862	-0.5883***	-0.6706**	-0.2900	-0.6286**
	[-2.539]	[-0.749]	[-2.639]	[-2.012]	[-0.622]	[-2.290]
Market to Book	-1.4090	-0.0205***	0.0043	-1.5328	-0.0127	0.0192***
	[-1.297]	[-2.654]	[0.715]	[-1.169]	[-1.260]	[2.795]
RNDR	0.0759***	-1.9168*	0.0438**	0.0109	-2.9570*	-0.0312
	[5.576]	[-1.796]	[1.975]	[0.419]	[-1.805]	[-0.798]
Log Asset	7.9965***	6.8650***	7.8501***	10.0895***	8.9768***	9.9787***
	[36.149]	[17.443]	[40.423]	[34.524]	[17.318]	[38.898]
Log Number of Analyst	0.5334***	1.3118***	0.6557***	0.4146**	1.2793***	0.5305***
	[3.511]	[5.546]	[5.110]	[2.120]	[4.295]	[3.235]
HHI Index	0.0414	-0.0012	0.0622	0.0149	-0.0047	0.0573
	[0.329]	[-0.006]	[0.559]	[0.090]	[-0.016]	[0.393]
Debt	-1.3314***	-3.8656***	-2.1407***	-1.5407***	-4.9199***	-2.6538***
	[-4.246]	[-6.873]	[-7.735]	[-3.665]	[-6.667]	[-7.197]
Cash Flow	0.3085	1.3406	0.4897	-0.3923	1.2113	-0.1730
	[0.409]	[0.957]	[0.731]	[-0.405]	[0.679]	[-0.203]
Industry Median ESG	0.9390***	0.6684**	0.9384***	1.0973***	0.9013**	1.1403***
	[5.794]	[2.351]	[6.560]	[5.234]	[2.520]	[6.186]
Observations	6,887	2,076	8,963	6,887	2,076	8,963
R-squared	0.494	0.494	0.478	0.450	0.466	0.434

Table A1
Variable Definitions

Variable Names	Variable Definitions
Climate Change Beliefs (Beliefs)	The percentage of people in a county who answer "Yes" to the survey question: "whether they believe that climate change is happening" from Yale Climate Opinion Maps 2014, 2016, and 2018
ESG Scores	Environmental, social, and governance (ESG) disclosure scores from Bloomberg Data Service (Bloomberg)
ENV Scores	Environmental disclosure scores from Bloomberg Data Service (Bloomberg)
SOC Scores	Social disclosure scores from Bloomberg Data Service (Bloomberg)
GOV Scores	Governance disclosure scores from Bloomberg Data Service (Bloomberg)
ROA	Income before extraordinary items (IB) divided by total assets (AT)
Standard Deviation	Standard deviation of daily returns for each firm-year
Market to Book	Market value of common equity (PRCC_C * CSHO) divided by the book value of equity (CEQ)
RNDR	Research and development expense (XRD) divided by revenue (REVT)
Log Asset	Natural log of total asset (AT)
Log Number of Analyst	Natural logarithm of number of analyst followings the firms, from IBES
HHI Index	Herfindahl–Hirschman Index based on Fama-French 48 industries
Debt	Total debt (DLC+DLTT) divided by total assets (AT)
Cash Flow	Cash flows from operating activities (OANCF) divided by total assets (AT)
Industry Median ESG	The median value of ESG scores by each Fama-French industry
Local Ownership	The sum of shares hold by local insitutional investors divided by share outstanding

Table A2
Natural Disasters and Changes in Beliefs

Panel A. Changes in Beliefs by natural disaster events

Natural disaster events	Mean of changes in Beliefs	N
No	2.220844	5949
Yes	6.411451	337
Yes-No	4.190607	-
t-stat	18.63	-

Panel B. Regression of Changes in Beliefs

	1	2
	Changes in Beliefs	
Natural disaster dummy	6.6392***	
	[33.330]	
Damage from disasters		0.2145***
		[3.690]
Observations	6,284	6,284
R-squared	0.272	0.204