



Investor rewards to environmental responsibility: Evidence from the COVID-19 crisis

Alexandre Garel, Arthur Petit-Romec

► To cite this version:

Alexandre Garel, Arthur Petit-Romec. Investor rewards to environmental responsibility: Evidence from the COVID-19 crisis. *Journal of Corporate Finance*, 2021, 68, pp.101948. <10.1016/j.jcorpfin.2021.101948>. <hal-03204216>

HAL Id: hal-03204216

<https://hal.science/hal-03204216v1>

Submitted on 24 Apr 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons CC BY-NC 4.0 - Attribution - Non-commercial use - International License

Investor Rewards to Environmental Responsibility: Evidence from the COVID-19 Crisis

This version: February 2021

Alexandre Garel¹
Audencia Business School

Arthur Petit-Romec²
TBS Business School

Abstract

The COVID-19 shock and its unprecedented financial consequences have brought about vast uncertainty concerning the future of climate actions. We study the cross-section of stock returns during the COVID-19 shock to explore investors' views and expectations about environmental issues. The results show that firms with responsible strategies on environmental issues experience better stock returns. This effect is mainly driven by initiatives addressing climate change (e.g., reduction of environmental emissions and energy use), is more pronounced for firms with greater ownership by investors with long-term orientation and is not observed prior to the COVID-19 crisis. Overall, the results indicate that the COVID-19 shock has not distracted investors' attention away from environmental issues but on the contrary led them to reward climate responsibility to a larger extent.

Keywords: COVID-19, Financial crisis, Environmental Responsibility, Climate Change

¹Corresponding Author. Audencia Business School, 8 Route de la Jonelière, 44312 Nantes, France. E-mail: agarel@audencia.com

²TBS Business School, 1 Place Alfonse Jourdain 31068 Toulouse, France; E-mail: arthur.romec@gmail.com

We thank the Editor (Douglas Cumming) and two anonymous referees for helpful comments. We also thank Richard Baldwin, Thomas Bourveau, François Derrien, Gunther Capelle-Blancard, Alberta Di Giuli, José Martin-Flores, David Stolin, Alexander Wagner, and Charles Wyplosz for helpful discussions. Part of this research was conducted while Arthur Petit-Romec was an assistant professor of finance at SKEMA Business School, Université Côte d'Azur.

'I believe that the pandemic has presented such an existential crisis – such a stark reminder of our fragility – that it has driven us to confront the global threat of climate change more forcefully and to consider how, like the pandemic, it will alter our lives. It has reminded us how the biggest crises, whether medical or environmental, demand a global and ambitious response.' Larry Fink (2021 Letter to CEOs)³

1. Introduction

Climate change and the large financial risks it imposes on companies represent a key economic challenge (e.g., Carney 2015; Litterman 2017; Nordhaus 2019). Survey evidence suggests that investors believe that climate risks have financial implications for their portfolio firms and increasingly call for climate risk reporting (e.g., Ilhan, Krueger, Sautner, and Starks 2019; Krueger, Sautner, and Starks 2020). While investors, corporate leaders, policy makers, and other stakeholders were focusing on environmental issues, the COVID-19 crisis came as a complete surprise since pandemic risk was not receiving a lot of attention.⁴ Ramelli and Wagner (2020) note that the five risks listed as being most likely to materialize in the World Economic Forum's Global Risk Report 2020 concern environmental issues whereas infectious diseases were ranked 10 and quite unlikely.

In this paper, we examine whether firms that were getting ready for climate change through the adoption of responsible initiatives on environmental issues experience better stock returns during the COVID-19 crisis. Even though the COVID-19 crisis was not primarily caused by environmental issues or climate change, it may still have led investors to reassess the importance of environmental responsibility. First, as illustrated by the quote from Larry Fink, anecdotal evidence indicates that many investors view a similarity between pandemics and environmental risks in terms of impact and expect that the COVID-19 crisis will strengthen the focus on climate change. A poll conducted by J.P. Morgan Research among investors from 50 global institutions, representing a total of \$12.9 trillion in assets under management, further indicates that the large majority of investors expect environmental and climate responsibility to become even more important following the COVID-19

³ Source : <https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter>

⁴ Schoenfeld (2020) finds that managers systematically underestimated their exposure to pandemics in their SEC-mandated risk factors. Loughran and McDonald (2020) document that about 80% of companies had no pandemic risk disclosure in 2018.

crisis (J.P. Morgan 2020).⁵ More generally, the materialization of pandemic risk and the materialization of climate risk both represent rare disasters. The rare disaster literature highlights how the exposure of firms to tail risk events is difficult to assess empirically because such events rarely materialize (e.g., Ramelli and Wagner 2020). The experience of a rare disaster (i.e., the pandemic) may have led investors to revise upwards the probability and the expected impact of climate risk, another rare disaster, and hence reassess the value of environmental responsibility. Second, investors may also have anticipated that the COVID-19 crisis will spur a green recovery. As pointed by a PWC's report⁶, calls are increasing for green recovery packages. Moreover, many citizens across the world are prepared to accept an extraordinary level of government intervention because of the perceived threat level from COVID-19 and expect the protection of the environment to be a priority of recovery plans.⁷ If investors expect governments to intervene in favor of climate change, they are likely to revise the value they attach to environmental responsibility. Firms that already emit low carbon emissions, that have undertaken investments to use less and greener energy or resources, and that have already adapted their strategy and disclosures should have an edge in a post-COVID world where public interventions and policies aim to mitigate climate change. If the COVID-19 crisis indeed leads investors to revise the value they attach to environmental responsibility, one would expect firms with greater environmental responsibility during the COVID-19 crisis to experience relatively higher stock returns.

In our empirical analysis, we study the cross-section of stock price reactions to the COVID-19 shock⁸, which, as highlighted by Ramelli and Wagner (2020), provides an opportunity to observe how investors responded to the crisis and what they expect for the future. Specifically, using data from

⁵ More specifically, more than 70% of respondents responded that it was “rather likely”, “likely”, or “very likely” that the occurrence of a low probability / high impact risk, such as COVID-19, would increase awareness and actions globally to tackle high impact / high probability risks such as those related to climate change and biodiversity losses.

⁶ Source : <https://www.pwc.co.uk/services/sustainability-climate-change/insights/post-pandemic-world-and-climate-change.html>

⁷ In a May 2020 poll, three in four people polled across 16 countries expect their government to make protection of the environment a priority when planning a recovery from the coronavirus pandemic (Source: <https://www.ipsos-mori/en-uk/majority-people-expect-government-make-environment-priority-post-covid-19-recovery>).

⁸ Although the COVID-19 shock led to one of the fastest declines in market valuations with the S&P index taking 16 days in February 2020 to fall by 20%, there is substantial cross-sectional variation in stock price reactions to the COVID-19 shock.

Thomson Reuters Asset4 ESG database for a sample of large U.S. listed companies, we explore whether a firm's environmental score affects its stock price reaction to the COVID-19 shock. The environmental score measures a firm's commitment and effectiveness toward adopting responsible initiatives and strategies on environmental issues including the reduction of environmental emissions (e.g., greenhouse gases, ozone-depleting substances) and the efficient use of natural resources in the production process.

We find that firms with good environmental scores have significantly higher stock returns during the COVID-19 crisis (i.e., the period from February 20 to March 20).⁹ The results are robust to controlling for industry fixed effects and various firm characteristics known to be related to stock returns. The effect of the environmental score is economically sizeable. A one-standard deviation higher environmental score is associated with stock returns higher by 1.4 percentage points during the COVID-19 shock. The economic significance of the environmental score in explaining the cross-section of returns is almost of the same order of magnitude as the economic significance of cash holdings or long-term debt.

Next, we explore whether our results reflect investors penalizing firms with poor environmental performance or investors rewarding firms with superior environmental performance. Specifically, we assess whether the results are more pronounced at high or low levels of environmental score. We find that the difference in returns between firms in the best and worst quartile in terms of environmental score is statistically significant and equal to about 3.7 percentage points. On the contrary, we find that the differences in returns between firms in the second or third quartile and worst quartile are positive but not statistically different. Our results therefore indicate that investors rewarded firms with superior environmental score during the COVID-19 crisis.

We complement this analysis of the cross-section of stock returns with difference-in-differences regressions at a daily frequency. In this setting, we can include firm fixed effects that capture

⁹ It is difficult to set a clear starting date for the COVID-19 crisis. We retain the date of February 20 because we observe graphically that a prolonged decline in major U.S. indices (i.e., Russell, S&P, and Dow Jones) started on February 20 (see Figure 1).

unobservable and observable persistent firm characteristics. We still find that firms with greater environmental scores have higher returns during the COVID-19 crisis. Our core result is also robust to using an alternative data source of the computation of environmental scores (KLD).

It could be that investors rewarded firms with greater ESG performance in general and not specifically greater environmental responsibility. Lins, Servaes, and Tamayo (2017) show that firms with high CSR intensity experience higher stock returns during the 2008-2009 financial crisis, consistent with the trust between a firm and its stakeholders, built through investments in CSR, paying off when the level of trust in corporations suffers a negative shock. The roots of the COVID-19 crisis are however fundamentally different from the ones of 2008 global financial crisis (GFC) (Reinhart 2020). In particular, the COVID-19 crisis started outside the financial sector and was not produced by excessive risk-taking. Hence, the COVID-19 crisis may not represent a negative shock in the level of trust in corporations during which all investments in CSR pay off. Consistent with this view, we find that responsible strategies on social issues have a positive but not statistically significant association with stock returns during the COVID-19 crisis.¹⁰ Our findings are therefore specific to environmental responsibility.

We then examine whether specific components of the environmental score are more important for stock returns. Given the emphasis placed on climate change and, on concerns over global warming linked to CO₂ emissions in particular, we expect that responsible initiatives specifically addressing firms' climate performance are more likely to be rewarded by investors. Consistent with this prediction, we find that the subcomponent related to the reduction of environmental emissions strongly affects stock returns during the COVID-19 shock. This result complements prior studies documenting that carbon emissions increase downside risk (e.g., Ilhan et al. 2019). The other subcomponent that mainly influences stock returns during the COVID-19 shock is a firm's resource use, which also captures, to

¹⁰ Arguably, some aspects of a firm's relationships with its customers and workers are likely to play an important role during the COVID-19 crisis. For example, a firm's ability to switch to online selling and to find innovative ways to maintain service quality or a firm's effort to efficiently put in place remote working and preserve employee motivation should be very valuable and associated with better performance during the COVID-19 crisis. However, these aspects of employee or customer-related responsibility are not covered by traditional ESG databases such as Asset 4. Relying on measures recently introduced in labor economics, Pagano, Wagner, and Zechner (2020) show firms that are more resilient to social distancing significantly outperformed those with lower resilience during the COVID-19 outbreak.

some extent, initiatives addressing climate responsibility (e.g., water use and energy use in the supply chain). The decomposition of the environmental score therefore indicates that investors have mainly rewarded initiatives that specifically address climate responsibility.

Investors differ in the importance they place on environmental responsibility. It is therefore unlikely that all investors will reward environmental responsibility to the same extent. Prior evidence suggests that investors with long-term orientation are more concerned with environmental responsibility (e.g., Gibson and Krueger 2018; Ramelli et al. 2018). We therefore explore whether responsible strategies on environmental issues are rewarded to a larger extent when investors have a long-term orientation. Using two standard measures of investor horizons (based on investors' portfolio turnover or on long-term orientation associated with specific investor types) at the firm level, we find that the positive effect of the environmental score on stock price reactions to the COVID-19 crisis is significantly more pronounced for firms with greater long-term investor ownership.

The evidence that firms with responsible initiatives on environmental issues experience better stock returns during the COVID-19 crisis indicates that investors expect them to do better in the long-run. It could however be that investors only value environmental responsibility to the extent that it allows firms to generate short-term profits or to access financial resources. We provide two additional tests to assess this possibility. First, we do not find evidence that environmental score is related to financial analysts' forecast revisions of one-year ahead earnings per share (EPS) during the COVID-19 crisis. However, the environmental score exhibits a positive and statistically significant association with the forecast revision of EPS long-term growth. These results are consistent with survey evidence indicating that investors view that the COVID-19 crisis as a *long-term* catalyst of environmental and climate responsibility. Second, if firms with high environmental score had better returns during the COVID-19 crisis because they have more financial flexibility or better access to finance, one would expect those firms to benefit less from the

news concerning stimulus package and policy responses to the COVID-19 crisis on March 24. We do not find evidence that it is the case.

Overall, our analyses indicate that although the COVID-19 shock and its severe consequences took virtually all investors and companies by surprise, those with high environmental score have significantly higher stock returns. Investors rewarded environmental responsibility such as the reduction of environmental emissions during the COVID-19 crisis. These results suggest that the unprecedented and novel risk posed by the COVID-19 crisis has not led investors to distract their attention away from environmental issues. On the contrary, our results are consistent with the idea that the COVID-19 crisis has renewed the focus on climate change, acting as a wake-up call for decision makers and investors.

Our paper contributes to different streams of the literature. First, our results are closely related to studies analyzing whether corporate social responsibility affects share price resilience during economic shocks (e.g., Albuquerque et al. 2020; Dermers et al. 2020; Ding et al. 2020; Lins et al. 2017). Concurrent studies focusing on the COVID-19 shock provide mixed evidence. Albuquerque et al. (2020) find that stocks with higher ESG scores have significantly higher returns during the COVID-19 crisis while Dermers et al. (2020) show that ESG scores do not have explanatory power for returns during the COVID-19 shock. Unlike the two aforementioned studies, which both consider broad ESG scores, we specifically focus on the environmental score and consider the E, S, and G scores separately. Consistent with our motivation and predictions that are centered on environmental responsibility, our results show that only the environmental score but not the social score or governance score is associated with better stock returns during the COVID-19 shock. We deepen the debate about the role of ESG scores during the COVID-19 crisis by highlighting the need to disaggregate broad ESG scores and treat separately the different components to better understand the role of social and environmental responsibility in the COVID-19 crisis.

Second, our results are related to prior studies specifically focusing on environmental responsibility and analyzing its links with financial performance at the firm level. Prior studies examine the effect of environmental performance or risk on different corporate outcomes. For example, recent articles have looked at how carbon risk and drought risk affect capital structure (e.g., Ginglinger and Moreau 2019; Nguyen and Phan 2020). Other studies examine how environmental performance and risk affect the pricing of corporate bonds and the cost of capital (e.g., Chava 2014; De Angelis et al. 2020; Eichholtz et al. 2019; Huynh et al. 2020; Seltzer et al. 2020). Related studies analyze stock market reaction to different events related to environmental issues¹¹ such as industrial disasters (Capelle-Blancard and Laguna 2010), the announcement of corporate news related to environment (Flammer 2013), Donald Trump's election and his nomination of Scott Pruitt, a climate skeptic, to lead the Environmental Protection Agency (Ramelli et al. 2018), the Paris agreement (Monasterolo and De Angelis 2020), global climate strikes (Ramelli et al. 2020), and extreme temperatures (Choi et al. 2020). We expand these studies by examining the association between environmental responsibility and stock performance in the COVID-19 shock that was largely unexpected and hit firms with unprecedented force. Our results indicate that the COVID-19 shock has led investors to revise the value attached to environmental responsibility.

Third, our paper contributes to the burgeoning literature on the COVID-19 shock and its consequences on firms. Fahlenbrach et al. (2020) and Ramelli and Wagner (2020) show a negative (positive) relation between stock returns during the COVID-19 shock and leverage (cash holdings). Using stress tests under different scenarios of revenue shortfalls, De Vito and Gómez (2020) investigate how the COVID-19 shock could affect the liquidity of listed firms. Capelle-Blancard and Desroziers (2020) study how stock markets have integrated public information about the COVID-19, the subsequent lockdowns, and the policy reactions. Other papers provide

¹¹ Although the COVID-19 crisis was not directly caused by the materialization of environmental risks, it has brought about substantial questions regarding the future of environmental actions. From this perspective, studying the stock market reaction of firms with greater environmental responsibility is informative about the views and anticipations of investors regarding the value attached to environmental responsibility.

evidence that managers systematically underestimated their exposure to pandemics and that the large majority of companies had no pandemic risk disclosure (Loughran and McDonald 2020; Schoenfeld 2020).¹²

Fourth, our paper relates to the rare disaster literature. This literature shows how some puzzles in finance (e.g., excess volatility and high equity premiums) can be rationalized as an attempt by investors to price the tail risk of future disaster events (e.g., Gabaix, 2012; Gourio, 2012; Wachter, 2013). Both the materialization of pandemic risk and the materialization of climate risk represent rare disasters. Studying whether firms that were getting ready for climate risk through the adoption of responsible strategies on environmental issues have better stock returns during the COVID-19 crisis is therefore informative on how the materialization of a rare disaster leads investors to reassess the value of getting ready for another, and probably the next, rare disaster. Our findings offer evidence supporting the view that investors view a similarity between pandemic and environmental risks and expect that the COVID-19 shock will strengthen the focus on environmental issues.

The remainder of the paper is organized as follows. The next section presents the sample construction and the main variables used in the empirical analysis. Section 3 presents the results and robustness tests. We conclude in Section 4.

2. Data, Sample and Summary Statistics

2.1 Data and Sample Construction

We obtain data on environmental responsibility from Thomson Reuters Asset4 ESG database, which offers one of the most comprehensive ESG databases covering over 70% of global market capitalization, across more than 450 different ESG metrics, with history going back to 2002.

¹² Schoenfeld (2020) finds that an indicator variable for whether that firm includes pandemics as a risk factor in their risk disclosure is not associated with stock returns during the COVID-19 crisis. Our results are therefore unlikely to be driven by firms with high environmental score being more concerned about pandemic risk.

Thomson Reuters collects information from a wide variety of data sources (e.g., corporate annual reports, stock exchange filings, corporate socially responsible reports, non-profit organizations, the news media) to produce three pillar scores: Environmental, Social, and Corporate Governance. The pillar scores are based on a large number of individual indicators capturing different aspects of environmental or social responsibility. Many recent studies rely on Asset4 ESG database because it has significantly increased its coverage and contrary to MSCI does not face a major structural break in the series (e.g., Cheng et al. 2014; Dyck et al. 2019; Gonenc and Scholtens 2017). For robustness purposes, we also compute environmental scores using data from MSCI KLD.

We obtain stock market data and accounting data from Thomson Reuters database (EIKON). Accounting data are based on the last quarter ending at or before the end of 2019. Consensus forecast data are from IBES. We drop financial firms, utilities, not for profit and governmental firms, and firms with non-U.S. headquarters. We also remove stocks with prices of less than \$1 (Fahlenbrach et al. 2020). Finally, we drop firms for which information on key control variables, which are described in the next section, is missing. These restrictions result in a final sample of 1,626 large U.S. listed firms for which all key variables are available for the COVID-19 crisis period.¹³

2.2 Main Variables

Our main dependent variable is the buy-and-hold stock return during the COVID-19 crisis. Although it is difficult to set a clear starting date for the COVID-19 crisis, we initially focus on the period from February 20 to March 20 based on what we observe for the time series of index returns. Figure 1 shows the returns of major U.S. indices (i.e., Russell, S&P, and Dow Jones) since January 2020 and indicates that a prolonged decline in major indices started on February 20. This period is very close to the *fever* period (i.e., February 24 to March 20) used in Ramelli and

¹³ In the online appendix, we provide the list of companies' Thomson identifiers included in our analysis to ease comparability and replication.

Wagner (2020) and starting after the strict lockdown that Italy imposed in Lombardy. In robustness tests, we show that our main results are unchanged if we use the *fever* period or the period from February 3 to March 23, which corresponds to the collapse period in Fahlenbrach et al. (2020).

Our main independent variable is a firm's environmental score measured as of 2018, the last available year prior to the COVID-19 outbreak. The environmental score is composed of information on three subcomponents: i) Resource Use, ii) Emission Reduction, and iii) Green Innovation. The resource use subcomponent reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management. The Emission Reduction subcomponent measures a company's commitment and effectiveness towards reducing environmental emissions in the production and operational processes. The Green Innovation subcomponent reflects a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products.¹⁴ A key feature of the Asset4 ESG's scoring methodology is that the scores are based on relative performance with the company's sector.¹⁵ Moreover, the scoring methodology accounts for the fact that the importance of ESG factors differ industries by using ESG magnitude (materiality). In our empirical analysis, we use either the overall environmental score or the three subcomponents.

Our set of control variables include three proxies for financial flexibility: cash over assets, short-term debt over assets, and long-term debt over assets. Fahlenbrach, Rageth, and Stulz (2020) and Ramelli and Wagner (2020) show that companies with higher financial flexibility (i.e., more cash and less debt) did significantly better during the COVID-19 crisis. We further control for firm characteristics known to be related to stock returns. Specifically, we control for the firm's factor loadings based on the Fama-French three-factor model, momentum (the firm's raw return over the period November 2019 to

¹⁴These three subcomponents aggregate data from numerous individual indicators:

https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf

¹⁵ Asset4 ESG's scoring methodology defines a company's sector based on TRBC industry groups.

January 2020), firm size (the logarithm of total assets), and profitability (the ratio of EBITDA to total assets).

Moreover, we include industry fixed effects in all regressions. Prior studies document significant differences in stock returns during the COVID-19 crisis across industries (e.g., Mazur et al. 2020; Ramelli and Wagner 2020).

2.3 Summary Statistics

Table 1, Panel A provides descriptive statistics for our main variables. All continuous variables are winsorized at the 1st and 99th percentiles. Unsurprisingly, returns during the COVID-19 crisis are negative and large with a mean of -40.5% and a median of -39.7%. There is however substantial cross-sectional variation in stock price reactions to the COVID-19 crisis as the interquartile difference is 23.3% and the standard deviation of stock returns is 18.11%. These figures are in line with other studies investigating the determinants of the cross-section of returns during the COVID-19 crisis (e.g., Fahlenbrach et al. 2020; Ramelli and Wagner 2020). The environmental score has a mean value of 20.91 with a standard deviation of 25.7, indicating substantial cross-sectional variation. A significant portion of companies has an environmental score of 0, indicating that several firms have not taken any responsible initiatives on environmental issues. A closer look indicates that most companies with environmental score of 0 are concentrated in industries in which reporting on environmental issues remains scarce (e.g., Healthcare Equipments & Providers, Software & IT).¹⁶ The average firm in our sample has total assets of \$8.85 billion, an equity beta of 1.12, a ratio of long-term debt to total assets of 26%, a profitability of 3%, and a ratio of cash to total assets of 22%.

[Insert Table 1 about here]

3. Results

¹⁶ In unreported tests, we find that all results hold if we exclude firms with an environmental score equal to zero.

3.1 Environmental score and stock returns during the COVID-19 crisis

We start by providing graphical evidence on the relationship between environmental scores and stock returns during the COVID-19 shock. Figure 2 shows the average industry-adjusted returns during the COVID-19 shock by quartiles of environmental scores. It suggests that firms with high environmental score performed better during the crisis.

We then formally investigate whether environmental score explains the cross-section of returns to the COVID-19 shock. In Table 2, we estimate regressions of stock returns during the COVID-19 crisis (i.e., over the period February 20-March 20) on pre-crisis environmental score and control variables. All regressions include industry fixed effects¹⁷ to account for the fact that firms in some industries may have been differentially affected by the COVID-19 crisis. Columns 1 and 2 show that, both with and without controls, the coefficient on *environmental score* is positive and statistically significant at the 1% level, indicating that companies with responsible strategies on environmental issues experience better returns during the COVID-19 shock. The effect of environmental score is economically sizeable. According to Column 2, a one-standard deviation higher environmental score is associated with a 1.41% ($=25.7 \times 0.055$) higher stock returns during the COVID-19 crisis. By comparison, a one-standard-deviation increase in cash holdings (long-term debt) is associated with a 2.7% (1.9%) higher return. The economic significance of the environmental score in explaining the cross-section of returns represents respectively 52% of the economic significance of cash holdings and 75% of the economic significance of long-term debt, which are two well-established determinants of the cross-section of returns during the COVID-19 crisis (Fahlenbrach et al. 2020; Ramelli and Wagner 2020).

In Columns 3 and 4, we reproduce the regression of Column 2 using two alternative dependent variables: stock returns over the collapse period (i.e., February 3 to March 23) used by Fahlenbrach et al.

¹⁷ We include industry fixed effects based on TRBC industry groups because they are the ones used by Asset4 to calculate the environmental score of companies relative to their industry peers. In robustness tests, we check that our results hold when we use industry fixed effects based on other industry classifications.

(2020) and the fever period (i.e., February 24 to March 20) used by Ramelli and Wagner (2020). The results show that the environmental score has a positive and significant effect on stock returns over these two alternative periods, indicating that our results are not driven by our choice to use February 20, the day in which major stock indices started to decline, as the start of the COVID-19 shock. Overall, these results are inconsistent with the COVID-19 shock distracting investors' attention away from environmental issues. On the contrary, they support the notion that the COVID-19 crisis has renewed the focus on climate change, acting as a wake-up call for decision makers and investors.

[Insert Figure 2 and Table 2 about here]

Our results from Table 2, Panel A are equally consistent with investors penalizing companies with poor environmental performance and with investors rewarding firms with superior environmental performance during the COVID-19 crisis. In Panel B, therefore, we analyze whether there are asymmetries in the relation between environmental score and returns during the COVID-19 crisis. We split firms into quartiles based on their environmental score and create indicator variables for each of the four groups. *Env score 1* contains all observations whose environmental score is among the 25% lowest. Panel B reports results of regressions in which we replace the environmental score with the quartile indicators. The omitted group is *Env score 1*, the quartile of firms that have the lowest environmental scores. The results from Column 1, which does not include control variables, show that only the coefficient on *Env score 4* is statistically significant, and it is much larger than the other coefficients. The difference in returns during the COVID-19 crisis between firms in the best and worst quartile in terms of environmental score is statistically significant and equal to about 4.3 percentage points. Adding control variables attenuates the effect to a certain extent. However, in Column 2, which includes the same control variables as in Panel A, the coefficient on *Env score 4* is still statistically significant at the 1% level and equal to 3.3. In Columns 3 and 4, we reproduce the same analysis for stock returns computed over the collapse period (i.e., February 3 to March 23) used by Fahlenbrach et al. (2020) and the fever period (i.e., February 24 to March 20)

used by Ramelli and Wagner (2020). In both cases, the results show that firms with superior environmental score experience higher stock returns during the COVID-19 crisis.

We complement this analysis of the cross-section of stock returns with difference-in-differences regressions of daily stock returns. Table 2, Panel C presents regressions of daily stock returns on the interaction between *High Environmental Score* (i.e., a dummy variable that takes the value of one if a firm has an environmental score in the top quartile of the distribution) and *COVID Crisis* (i.e., a dummy variable that takes the value of one for the crisis period)¹⁸ and control variables. The results in Columns 1 and 2 show that, both with and without control variables, the coefficient on the interaction *COVID Crisis X High Environmental Score* is positive and statistically significant at the 5% level, indicating that firms with high environmental score have better daily stock returns during the COVID crisis. Importantly, the coefficient on *High Environmental Score* is not statistically significant, indicating that firms with high environmental score do not have better stock returns before the COVID crisis.¹⁹ In Column 3, we further include interactions between *High Environmental Score* and all the other control variables. In Columns 4 and 5, we replace industry fixed effects with firm fixed effects. Firm fixed effects absorb the effect of all control variables as well as of *High Environmental Score*. In Column 4, we include day fixed effects. In Column 5, we include the *COVID Crisis* dummy rather than day fixed effects. In both columns, the results show that the coefficient on the interaction *COVID Crisis X High Environmental Score* is positive and statistically significant at the 1% level, indicating that firms with high environmental score have better daily stock returns during the COVID crisis. The results of the difference-in-differences analysis confirm our baseline results and further indicate that firms with greater environmental score have better stock returns during the COVID-19 crisis.

3.2 Environmental subcomponents, social responsibility, and corporate governance

¹⁸ The crisis period corresponds to the period February 20-March 20 and we consider the same number of days for the pre-crisis period.

¹⁹ Both regressions include day fixed effects which absorb the effect of the dummy variable *COVID Crisis*.

So far, our analysis suggests that the COVID-19 outbreak has not distracted investors' attention away from environmental issues but has rather reinforced the extent to which investors reward responsible strategies on environmental issues. However, it could be that investors rewarded firms with high ESG scores in general and not environmental responsibility. Lins, Servaes, and Tamayo (2017) show firms with high CSR intensity experience better stock returns during the 2008 global financial crisis. As they explain, their evidence suggests that the trust between a firm and its stakeholders, built through investments in CSR, pays off when the overall level of trust in corporations suffers a negative shock. In Table 3, we reproduce our regressions from Table 2 replacing the environmental score by the social score. Column 2 shows that the coefficient on *social score* is positive but statistically not significant. In Column 3, we find similarly that the coefficient on *governance score* is positive but statistically not significant. The results from Column 4 show that the environmental score has a positive effect on stock returns during the COVID-19 shock after controlling for the social score and the governance score.

Several factors may contribute to explain the predominant role played by environmental responsibility during the COVID-19 crisis. First, as stressed by Reinhart (2020) among others, the causes and scope of COVID-19 crisis are fundamentally different from the ones of the 2008 global financial crisis (GFC). Contrary to the GFC, the COVID-19 crisis started outside the financial sector and was not produced by financial imbalances and risks growing over many years. Moreover, while the GFC affected firms through its impact on financial intermediaries and credit markets, the COVID-19 crisis has much more severe direct consequences as many firms experience a sudden stop in their ability to generate revenues. From this perspective, it is not clear whether the COVID-19 crisis represents a negative shock in the level of trust in corporations which investments in social capital have not paid off in this shock. Second, investor awareness on environmental and climate issues are much more pronounced today than it was in 2008. In particular, the COP 21 Paris agreement in 2015 played an important part in raising awareness on climate issues (Andersson, Bolton, Samama 2016). Recent survey evidence confirms that institutional investors have growing concerns about climate risks and that they

believe these risks have already begun to materialize (Krueger et al. 2020). Given that many investors seem to view pandemics and environmental risks as similar in terms of impact, the COVID-19 crisis is likely to have led investors to revise the value they attach to responsible initiatives aiming at tackling environmental and risks. On the contrary, while social responsibility, in particular when it relates to employees, has clear implications for stock returns (e.g., Edmans 2011; Green et al. 2019), the COVID-19 crisis does not necessarily trigger a revision of investor awareness and concerns about social risks.²⁰

[Insert Table 3 about here]

Next, we examine whether specific components of the environmental score are more important for stock returns. Given the emphasis placed on climate change and the large financial risks it imposes on companies, we expect that responsible initiatives specifically addressing firms' climate performance are more likely to be rewarded by investors. As explained in section 2, the environmental score is composed of three subcomponents: i) Resource Use, ii) Emission Reduction, and iii) Green Innovation. Given that concerns over global warming linked to CO2 emissions have become salient, the Emission Reduction is the subcomponent that most specifically addresses climate responsibility. To a lower extent, the Resource Use subcomponent may also capture initiatives addressing climate responsibility (e.g., water use and energy use in the supply chain).

In Table 4, we estimate regressions of stock returns during the COVID-19 crisis (i.e., over the period February 20-March 20) on the different subcomponents of the environmental score and control variables. The results from Column 1 show that the coefficient on *Emission Reduction* is positive and statistically significant at the 5% level, suggesting a firm's capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management is associated with better stock returns during the COVID-19 crisis. The results from Column 2 show that the coefficient on *Emission Reduction* is positive and statistically significant at the 1% level,

²⁰ Some aspects of a firm's relationships with its customers and workers are likely to play an important role during the COVID-19 crisis. For example, using measures recently introduced in labor economics, Pagano, Wagner, and Zechner (2020) show firms that are more resilient to social distancing significantly outperformed those with lower resilience during the COVID-19 outbreak. However, these aspects of employee or customer-related responsibility are not covered by traditional ESG databases such as Asset 4.

suggesting that companies with responsible strategies to reduce emissions experience better stock returns during the COVID-19 crisis. This result is consistent with prior studies documenting that carbon emissions increase downside risk (Ilhan et al. 2019). Finally, the results in Column 3 show that the green innovation subcomponent is not statistically associated with stock returns during the COVID-19 crisis. The green innovation subcomponent captures a firm's ability to create new market opportunities through new environmental technologies or eco-designed, dematerialized products with extended durability. Contrary to the other two subcomponents, it does not capture a firm's effort and ability to tackle environmental risks. A non-mutually exclusive explanation for the insignificant results of the green innovation component is that this component is more intangible and therefore harder to value for investors when comparing to the other two components. Recent studies indicate that when investors care about climate risks, they mainly focus on carbon emissions (e.g., Bolton and Kacperczyk 2020; Ilhan et al. 2020).

Overall, the results from Table 4 indicate that the effect of the environmental score on the stock returns during the COVID-19 crisis is mainly driven by initiatives that specifically address climate responsibility. These results further indicate that the COVID-19 outbreak has renewed the focus on climate change and that investors anticipate that issues related to climate change will be more important than ever with the COVID-19 crisis.

[Insert Table 4 about here]

3.3 Environmental score and stock returns before the COVID-19 crisis

Our results that environmental score is positively associated with stock returns during the COVID-19 crisis are consistent with the view that the COVID-19 has renewed the focus on climate change with investors drawing a parallel between pandemics and environmental risks. If the COVID-19 outbreak indeed served as a wake-up call for environmental and climate risks, we do not expect to find a similar effect of environmental scores on stock returns in January 2020 when attention to the COVID-19 was

still limited.²¹ To explore this issue, in Table 5, we examine whether environmental scores affect stock returns in January 2020 as well as during the periods from January 2 to January 17 and from January 20 to February 21, corresponding respectively to the *incubation* period and the *outbreak* period in Ramelli and Wagner (2020). During these periods, attention to the COVID-19 among U.S. firms was still very low. Ramelli and Wagner (2020) highlight that the first conference call discussing the COVID-19 took place on January 22 (i.e., the one of United Airlines).

[Insert Table 5 about here]

The results show that a firm's environmental score is not statistically associated with its stock returns during these three periods, suggesting that the COVID-19 shock has reinforced the extent to which investors reward companies with responsible strategies on environmental issues. Ramelli and Wagner's (2020) find that cash holdings and debt only started to affect stock returns during the fever period, suggesting that the health crisis has morphed into a possible financial crisis. The results therefore indicate that investors started to reward firms with good environmental score only when it became clear that the COVID-19 crisis would have severe financial consequences.

3.4 Do all investors reward environmental responsibility during the COVID-19 crisis?

Investors differ in the importance they place on environmental responsibility. It is therefore unlikely that all investors will reward environmental responsibility to the same extent. In this section, we explore whether some investors are more likely than others to reward environmental responsibility. Prior evidence suggests that investors with a long-term orientation are more concerned with climate responsibility (e.g., Gibson and Krueger 2018; Ramelli et al. 2018). Moreover, prior studies show that investors with short-term horizons sell their stockholdings to a larger extent than investors with long-term horizons during episodes of market turmoil (Cella et

²¹ The results from the difference-in-differences regressions reported in Table 2, Panel C already suggest that environmental scores are associated with better stock returns during the COVID-19 crisis but not before. We nonetheless further examine the effect of environmental score on stock returns in the pre-crisis periods focusing on the cross-section of returns.

al. 2013). From this perspective, we expect that investors with long-term horizons are more likely to reward environmental responsibility.

In Table 6, we examine whether the effect of environmental score on stock returns during the COVID-19 crisis is more pronounced for firms with greater ownership by investors with long-term horizon. We use two alternative proxies for investor horizons. First, following common approach in the literature (e.g., Gaspar et al. 2005; Derrien et al. 2013), we capture an institutional investor's investment horizon through its portfolio turnover. Although investor horizons are not directly observable, the rationale behind this approach is that an investor which changes very frequently the composition of its portfolio is more likely to have a shorter investment horizon. In line with existing literature, we compute measures of investor horizons only for institutional investors covered by the 13F Thomson Files, for which data on stock portfolio composition is available over time. Following Derrien et al. (2013), we start by computing the portfolio turnover of each institutional investor. At the firm level, we then compute the weighted average of the portfolio turnover ratios of a firm's investors. Higher values of the average turnover therefore indicate shorter investor horizons. Second, as an alternative measure of long-term investor ownership, we sum the ownership by institutional investors which are likely to have a long-term orientation (i.e., pension funds, endowment funds, foundation funds, insurance companies, sovereign funds, venture capital funds, and private equity funds).²² The rationale for this alternative measure is that investor horizons may be better captured by their orientation than their turnover (Edmans and Holderness 2017).

Table 6 reports regressions of stock returns during the COVID-19 crisis on pre-crisis environmental score and control variables estimated separately for subsamples sorted by our two proxies for long-term investor ownership. The results from Columns 1 and 2 indicate that the positive and significant association between environmental score and stock returns during the COVID-19

²² The universe of investor types as identified by Thomson Reuters consists of: *Bank and Trust, Corporation, Endowment Fund, Foundation, Hedge Fund, Holding Company, Individual Investor, Insurance Company, Investment Advisor, Investment Advisor/Hedge Fund, Other Insider Investor, Pension Fund, Private Equity, Research Firm, Sovereign Wealth Fund, and Venture Capital*.

crisis is driven by the group of firms with below-median average investor turnover (i.e., with greater long-term investor ownership). The Wald test of coefficient equality shows that the difference between coefficients is statistically significant. Similarly, the results from Columns 3 and 4 show that the effect of environmental score on stock returns during the COVID-19 crisis is more pronounced for the group of firms with above-median ownership by institutional investors with a long-term orientation. The Wald test of coefficient equality shows that the difference between coefficients is again statistically significant.

[Insert Table 6 about here]

Overall, the results from Table 6 indicate that responsible strategies on environmental issues are rewarded to a larger extent when investors have a long-term orientation. This result is consistent with the evidence in Ramelli et al. (2018) that although Donald Trump's election and his nomination of Scott Pruitt, a climate skeptic, to lead the Environmental Protection Agency drastically downshifted expectations on U.S. climate-change policy, long-term investors actually rewarded climate-responsible companies. In both cases, long-term institutional investors reward firms with responsible strategies on environmental issues presumably because they are anticipating the long-term consequences of environmental responsibility (Ramelli et al. 2018).

3.5 Environmental score, EPS revisions during the COVID-19 crisis, and stock reaction to policy responses

The evidence that firms with responsible strategies on climate change experience better stock returns during the COVID-19 crisis is consistent with the idea that investors, in particular those with a long-term orientation, have started to reward to larger extent responsible initiatives on environmental issues and expect firms with good environmental scores to do better in the long run. It could however be that the greater stock returns of firms with responsible initiatives on

environmental issues reflect the fact that investors consider these firms to be better able to generate short-term profits or to access to financial resources.²³

In this section, we provide two additional tests suggesting that firms with responsible initiatives on environmental issues are rewarded during the COVID-19 crisis because investors expect them to do better in the long-run rather than because they are in a better position to improve their immediate financial conditions. First, we examine whether environmental score is related to financial analysts' forecast revisions.²⁴ In Table 7, we estimate regressions of the analysts' median forecast revision of one-year ahead EPS (Column 1), two-year ahead EPS (Column 2), and EPS long-term growth (Column 3) between January 2020 and March 2020 on pre-crisis environmental score and control variables. The results from Columns 1 and 2 show that the coefficient on *Environmental score* is very small and not statistically significant, indicating that financial analysts do not expect firms with responsible strategies on environmental issues to generate higher earnings at a one-year or two-year horizon. On the contrary, the results from Column 3 show the coefficient on *Environmental score* is positive and statistically significant, indicating that financial analysts expect firms with responsible strategies on environmental issues to generate higher earnings over the long run. In Columns 1 and 2, we restrict our analysis of one-year ahead EPS and two-year ahead EPS to the subsample of firms for which information on EPS long-term growth is available. In Columns 4 and 5, we relax this restriction and estimate regressions of the analysts' median forecast revision of one-year ahead EPS or two-year ahead EPS on environmental score and control variables for the full sample. We continue to find that environmental score is not statistically associated with short-term earnings forecasts.

[Insert Table 7 about here]

Second, we investigate the possibility that investors may have rewarded firms with high environmental score for their superior access to finance. To do so, we examine whether firms with high

²³ Cheng, Ioannou, and Serafeim (2013) show that superior performance on corporate social responsibility (CSR) strategies leads to better access to finance.

²⁴ Landier and Thesmar (2020) assess the economic impact of the COVID-19 crisis using analyst forecasts which provide a direct measure of revisions in beliefs at the firm level.

environmental score benefit from the news concerning policy responses to the COVID-19 crisis on March 24. As explained by Fahlenbrach et al. (2020), on March 24th, once the approval of a large-scale stimulus became likely, the stock market responded positively with the best one-day performance since 2008.²⁵ If firms with high environmental score had better returns during the COVID-19 crisis because they have more financial flexibility or better access to finance, one would expect those firms to benefit less from the policy changes associated with the stimulus package. Fahlenbrach et al. (2020) show that firms with more cash and less debt experience higher returns during the COVID-19 crisis and benefit less from the policy responses on March 24.

In Table 8, we estimate regressions of the stock return from March 23 to March 24, 2020 on pre-crisis environmental score and control variables. The results show that the coefficient on *Environmental score* is positive but not statistically significant, indicating that companies with responsible strategies on environmental issues do not benefit from the news concerning policy responses to the COVID-19 crisis on March 24. This finding does not support the notion that firms with high environmental score experience better returns during the COVID-19 crisis because they have more financial flexibility or better access to finance. On April 9, the Fed announced that it took additional actions to provide up to \$2.3 trillion in loans to support the economy. In Column 2, we run a regression of the stock return on April 9 on pre-crisis environmental score and control variables. The results show that the coefficient on *Environmental score* is again not statistically significant, further indicating that environmental scores do not affect stock price reactions to the announcement of news concerning policy responses to the COVID-19 crisis.²⁶

[Insert Table 8 about here]

²⁵ The Fed stated that it would buy Treasuries “in the amounts needed to support smooth market functioning and effective transmission of monetary policy to broader financial conditions and the economy” and opened new facilities designed to provide credit to employers and to support the corporate bond market (Fahlenbrach et al. 2020).

²⁶ In unreported tests, we find that our results are similar if we extend the set of control variables to include R&D expenses, advertising expenses, SG&A expenses, capital expenditures, and a dividend dummy.

Overall, the results from this section provide evidence to suggest that investors reward firms with responsible initiatives on environmental issues because they expect them to do better in the long-run rather than because these firms are able to generate short-term profits or enjoy a better access to finance.

3.6 Robustness tests

In this section, we present robustness tests we have conducted to demonstrate that the results of our main analysis are not driven by the set of control variables or the empirical specification. First, all regressions include industry fixed effects based on TRBC industry groups because they are the ones used by Asset 4 to calculate the environmental score of companies relative to their sector. In Table 9, Panel A, we reproduce our main regression from Table 2, Panel A including industry fixed effects based on different classifications. Specifically, we consider SIC industry dummies, GICS industry dummies, and NAICS industry dummies. The results show that the coefficient on *Environmental score* is positive and statistically significant in all specifications, indicating that our results are not sensitive to the choice of industry classifications.

Second, the results from Table 3 show that the effect of environmental score on stock returns during the COVID-19 crisis is robust to controlling for the governance score. Previous studies show that a firm's ownership and corporate governance structure affect stock returns in periods of market turmoil (e.g., Cella et al. 2013; Erkens et al. 2012; Ding et al. 2020). Table 9, Panel B presents the results of estimating our main regression from Table 2, Panel A with additional governance variables. Specifically, we control for several governance variables including institutional ownership, antitakeover devices, board size, board independence, and CEO duality dummy. The results indicate that institutional ownership (CEO duality) is negatively (positively) associated with stock returns during the COVID-19 crisis. Most importantly for our purpose, the coefficient on *Environmental score* remains statistically significant at the 1% level in all specifications.

Third, we further control for product market competition to alleviate the concern that firms operating in less competitive environments may be better able to both adopt responsible strategies on environmental issues and to resist the COVID-19 shock. Table 9, Panel C presents the results of estimating our main regression from Table 2, Panel A including Hoberg and Phillips' (2010) text-based measures of product market competition as additional control variables.²⁷ These measures are based on web crawling and text parsing algorithms that process the text in the business descriptions of 10-K annual filings. *HP HHI* and *HP SIM* are measures of market structure and market power respectively. The results show that these two measures of product market competition are not statistically associated with stock returns during the COVID-19 crisis. Most importantly for our purpose, the coefficient on *Environmental score* remains statistically significant at the 1% level in all specifications.

Fourth, we estimate our main regression from Table 2, Panel A including additional control variables, namely R&D expenses, advertising expenses, SG&A expenses, CAPEX, and a dividend dummy. The results show that except for the dividend dummy, the coefficients on those variables are not statistically significant and that the coefficient on *Environmental Score* continues to be positive and statistically significant with a strong stability across the specifications.

Next, we check that our results are not driven by the inclusion of some sectors that are likely to have been particularly affected by the COVID-19 shock. The environment scores provided by Asset 4 are based on relative performance with the company's sector, which mitigates the concern that some industries that were severely hit by the COVID-19 shock drive our results. However, in Panel E, we estimate our baseline regressions excluding the firms in the energy, transportation, automobile, and personal services sector, respectively.²⁸ The results show that our main results hold in all subsamples.

²⁷ The latest available year for data on product market competition is 2017.

²⁸ The energy sector corresponds to the TRBC sectors "*Energy - Fossil Fuels*" and "*Renewable Energy*", the transportation sector corresponds to the TRBC sector "*Transportation*", the automobile sector corresponds to the TRBC sector "*Automobiles & Auto Parts*", and the personal services sector corresponds to the TRBC sectors "*Cyclical Consumer Services*" and "*Personal & Household Products & Services*".

Finally, we check that our results hold when computing environmental scores based on an alternative data source. Based on KLD ratings, we construct two alternative measures of environmental responsibility. The first one corresponds to the number of strengths pertaining to the environment (i.e., the number of positive environmental policies). The second one is the number of KLD strengths minus the number of KLD concerns pertaining to the environment. We replace our main measure of environmental score by these two measures and we reestimate our main regressions. The results from Panel F show that the coefficients on the two alternative measures of environmental responsibility computed with KLD ratings are positive and statistically significant at the 1% level.

[Insert Table 9 about here]

4. Conclusion

In recent years, environmental issues and climate change have increasingly become a daily preoccupation for many companies. While climate change and the large financial risks it imposes were receiving growing attention, the COVID-19 outbreak came as a complete surprise for investors, corporate leaders, and policy makers. Although the near-economic standstill induced by the COVID-19 has immediate positive effects on the environment with levels of pollution and carbon emission dropping everywhere, the need for economic recovery potentially threatens climate actions as governments may be tempted to postpone stricter environmental actions.

While there is still vast uncertainty concerning the financial consequences and the future of climate actions, our work looks at stock price reactions to the COVID-19 crisis, which capture the views and expectations regarding future consequences of the virus. The evidence that firms with good environmental scores have significantly higher returns during the COVID-19 crisis indicates that investors have started to reward companies with responsible strategies on climate change to a larger extent. The view provided by the stock market on what investors expect for the future therefore suggests that companies with responsible strategies on climate issues will do better in the long run.

Future research should examine the realized consequences of the COVID-19 shock regarding environmental issues: Will there be a surge in shareholder activism on environmental issues? Will companies react to the COVID-19 crisis by fostering responsible initiatives on environmental and climate issues? Will customers favor environment-friendly products? Empirical analysis of these questions will be informative on the commitment of different stakeholders to tackle environmental issues and climate change.

References

- Albuquerque, R., Koskinen, Y., & Zhang, C. (2019). Corporate social responsibility and firm risk: Theory and empirical evidence. *Management Science*, 65(10), 4451-4469.
- Albuquerque, R., Koskinen, Y., Yang, S., & Zhang, C. (2020). Resiliency of environmental and social stocks: an analysis of the exogenous COVID-19 market crash. *Review of Corporate Finance Studies*, 9(3), 593-621.
- Andersson, M., Bolton, P., & Samama, F. (2016). Governance and climate change: A success story in mobilizing investor support for corporate responses to climate change. *Journal of Applied Corporate Finance*, 28(2), 29-33.
- Capelle-Blancard, G., & Desroziers, A. (2020). The stock market is not the economy? Insights from the COVID-19 crisis. *Insights from the COVID-19 Crisis (June 16, 2020)*. CEPR Covid Economics.
- Capelle-Blancard, G., & Laguna, M. A. (2010). How does the stock market respond to chemical disasters?. *Journal of Environmental Economics and Management*, 59(2), 192-205.
- Carney, M. (2015). Breaking the Tragedy of the Horizon—climate change and financial stability. *Speech given at Lloyd's of London*, 29, 220-230.
- Cella, C., Ellul, A., & Giannetti, M. (2013). Investors' horizons and the amplification of market shocks. *Review of Financial Studies*, 26(7), 1607-1648.
- Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, 60(9), 2223-2247.
- Cheng, B., Ioannou, I., & Serafeim, G. (2014). Corporate social responsibility and access to finance. *Strategic Management Journal*, 35(1), 1-23.
- Choi, D., Gao, Z., & Jiang, W. (2020). Attention to global warming. *The Review of Financial Studies*, 33(3), 1112-1145.
- De Angelis, T., Tankov, P., & Zerbib, O. D. (2020). Environmental Impact Investing. *Available at SSRN 3562534*.
- De Vito, A., & Gómez, J. P. (2020). Estimating the COVID-19 cash crunch: Global evidence and policy. *Journal of Accounting and Public Policy*, 106741.
- Demers, E., Hendrikse, J., Joos, P., & Lev, B. (2020). ESG Didn't Immunize Stocks Against the Covid-19 Market Crash. *Available at SSRN 3675920*.
- Derrien, F., Kecskés, A., & Thesmar, D. (2013). Investor horizons and corporate policies. *Journal of Financial and Quantitative Analysis*, 48(6), 1755-1780.
- Ding, W., Levine, R., Lin, C., & Xie, W. (2020). Corporate immunity to the covid-19 pandemic (No. w27055). National Bureau of Economic Research.
- Dyck, A., Lins, K. V., Roth, L., & Wagner, H. F. (2019). Do institutional investors drive corporate social responsibility? International evidence. *Journal of Financial Economics*, 131(3), 693-714.

- Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*, 101(3), 621-640.
- Edmans, A., & Holderness, C. G. (2017). Blockholders: A survey of theory and evidence. In *The Handbook of the Economics of Corporate Governance* (Vol. 1, pp. 541-636). North-Holland.
- Eichholtz, P., Holtermans, R., Kok, N., & Yönder, E. (2019). Environmental performance and the cost of debt: Evidence from commercial mortgages and REIT bonds. *Journal of Banking & Finance*, 102, 19-32.
- Erkens, D. H., Hung, M., & Matos, P. (2012). Corporate governance in the 2007–2008 financial crisis: Evidence from financial institutions worldwide. *Journal of Corporate Finance*, 18(2), 389-411.
- Fahlenbrach, R., Rageth, K., & Stulz, R. M. (2020). How valuable is financial flexibility when revenue stops? Evidence from the COVID-19 crisis. *Review of Financial Studies*.
- Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal*, 56(3), 758-781.
- Gabaix, X. 2012. Variable rare disasters: An exactly solved framework for ten puzzles in macro-finance. *Quarterly Journal of Economics* 127:645--700.
- Gaspar, J. M., Massa, M., & Matos, P. (2005). Shareholder investment horizons and the market for corporate control. *Journal of Financial Economics*, 76(1), 135-165.
- Gibson, R., & Krueger, P. (2018). The sustainability footprint of institutional investors. *Swiss Finance Institute Research Paper*, (17-05).
- Ginglinger, E., & Moreau, Q. (2019). Climate risk and capital structure. *Université Paris-Dauphine Research Paper*, (3327185).
- Gonenc, H., & Scholtens, B. (2017). Environmental and financial performance of fossil fuel firms: A closer inspection of their interaction. *Ecological Economics*, 132, 307-328.
- Gourio, F. 2012. Disaster risk and business cycles. *American Economic Review* 102:2734--66
- Green, T. C., Huang, R., Wen, Q., & Zhou, D. (2019). Crowdsourced employer reviews and stock returns. *Journal of Financial Economics*, 134(1), 236-251.
- Hoberg, G., & Phillips, G. (2010). Product market synergies and competition in mergers and acquisitions: A text-based analysis. *Review of Financial Studies*, 23(10), 3773-3811.
- Huynh, T. D., Nguyen, T. H., & Truong, C. (2020). Climate risk: The price of drought. *Journal of Corporate Finance*, 65, 101750.
- Ilhan, E., Krueger, P., Sautner, Z., & Starks, L. T. (2019). Institutional investors' views and preferences on climate risk disclosure. *Available at SSRN 3437178*.
- Ilhan, E., Sautner, Z., & Vilkov, G. (2019). Carbon tail risk. *Available at SSRN 3204420*.
- J.P. Morgan (2020). Why COVID-19 Could Prove to Be a Major Turning Point for ESG Investing. URL: <https://www.jpmorgan.com/insights/research/covid-19-esg-investing>
- Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. *Review of Financial Studies*, 33(3), 1067-1111.

- Landier, A., & Thesmar, D. (2020). Earnings Expectations during the COVID-19 Crisis. *Review of Asset Pricing Studies*.
- Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *Journal of Finance*, 72(4), 1785-1824.
- Litterman, B. (2017). *Climate Risk: Tail Risk and the Price of Carbon Emissions-Answers to the Risk Management Puzzle*. John Wiley & Sons.
- Loughran, T., & McDonald, B. (2020). Management disclosure of risk factors and COVID-19. *Available at SSRN 3575157*.
- Mazur, M., Dang, M., & Vega, M. (2020). COVID-19 and the march 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, 101690.
- Monasterolo, I., & De Angelis, L. (2020). Blind to carbon risk? An analysis of stock market reaction to the Paris Agreement. *Ecological Economics*, 170, 106571.
- Nguyen, J. H., & Phan, H. V. (2020). Carbon risk and corporate capital structure. *Journal of Corporate Finance*, 64, 101713.
- Nordhaus, W. (2019). Climate change: The ultimate challenge for Economics. *American Economic Review*, 109(6), 1991-2014.
- Pagano, M., Wagner, C., & Zechner, J. (2020). Disaster Resilience and Asset Prices. *Available at SSRN 3603666*.
- Ramelli, S., Wagner, A. F., Zeckhauser, R., & Ziegler, A. (2018). Stock price rewards to climate saints and sinners: Evidence from the Trump election. National Bureau of Economic Research.
- Ramelli, S., Ossola, E., & Rancan, M. (2020). Climate Sin Stocks: Stock Price Reactions to Global Climate Strikes. *Available at SSRN*.
- Ramelli, S., & Wagner, A. F. (2020). Feverish stock price reactions to covid-19. *Review of Corporate Finance Studies*, 9(3), 622-655.
- Reinhart, C. (2020). This Time Is Truly Different. URL: <https://www.project-syndicate.org/commentary/covid19-crisis-has-no-economic-precedent-by-carmen-reinhart-2020-03>
- Schoenfeld, J. (2020). The invisible risk: Pandemics and the financial markets. *Available at SSRN 3567249*.
- Seltzer, L., Starks, L. T., & Zhu, Q. (2020). Climate Regulatory Risks and Corporate Bonds. *Available at SSRN 3563271*.
- Wachter, J. A. (2013). Can time-varying risk of rare disasters explain aggregate stock market volatility? *The Journal of Finance*, 68, 987-1035.

Table 1. Descriptive statistics

This table presents descriptive statistics for the main variables used in the empirical analysis. The main sample consists of 1,626 firms. Variable definitions are in Appendix A. All variables are winsorized at the 1st and 99th percentile.

Variables	Summary Statistics					
	#Obs.	Mean	SD.	P25	P50	P75
<i>COVID-19 Crisis Return (%)</i>	1,626	-40.55	18.11	-52.43	-39.69	-29.16
<i>Environmental Score</i>	1,626	20.91	25.73	0.00	8.57	35.48
<i>Beta MKT</i>	1,626	1.12	0.62	0.73	1.08	1.47
<i>Beta HML</i>	1,626	0.81	0.96	0.20	0.67	1.31
<i>Beta SMB</i>	1,626	0.07	0.98	-0.44	0.10	0.59
<i>Total Assets (\$Billion)</i>	1,626	8.85	30.25	0.59	1.69	5.37
<i>Long-Term Debt</i>	1,626	0.26	0.22	0.06	0.23	0.39
<i>Short-Term Debt</i>	1,626	0.01	0.02	0.00	0.00	0.00
<i>Profitability</i>	1,626	0.03	0.19	0.02	0.07	0.11
<i>Cash Holdings</i>	1,626	0.22	0.26	0.03	0.10	0.29
<i>Momentum</i>	1,626	5.65	20.83	-5.58	4.42	13.65
<i>Institutional Ownership</i>	1,626	83.78	21.56	72.94	89.29	98.92
<i>Nb. Antitakeover Devices</i>	1,621	6.67	1.98	5.00	7.00	8.00
<i>Ln(Board Size)</i>	1,615	2.16	0.24	1.95	2.20	2.30
<i>% Independent Board Members</i>	1,626	79.61	12.15	75.00	83.33	88.89
<i>CEO Duality Dummy</i>	1,618	0.54	0.50	0.00	1.00	1.00
<i>Governance Score</i>	1,626	45.48	22.97	26.47	44.93	63.83
<i>Social Score</i>	1,626	39.93	20.56	23.57	36.09	52.63
<i>Resource Use Score</i>	1,626	24.38	31.21	0.00	4.82	46.69
<i>Emission Score</i>	1,626	20.81	28.75	0.00	3.88	35.29
<i>Green Innovation Score</i>	1,418	17.89	27.68	0.00	0.00	35.29
<i>Crisis Return (Fahlenbrach et al., 2020)</i>	1,626	-39.06	19.24	-52.06	-38.67	-27.27
<i>Incubation (Ramelli and Wagner, 2020)</i>	1,626	2.29	8.85	-2.05	1.70	5.95
<i>Outbreak (Ramelli and Wagner, 2020)</i>	1,626	-1.89	12.76	-9.09	-2.14	5.30
<i>Fever (Ramelli and Wagner, 2020)</i>	1,626	-37.95	18.34	-49.90	-36.75	-26.12
<i>Aid Plan</i>	1,626	10.70	8.18	5.43	9.56	14.56
<i>Fed Intervention</i>	1,626	3.84	4.72	0.75	3.32	6.14
<i>Investor Turnover (%)</i>	1,626	40.03	10.79	32.49	37.74	45.38
<i>Pct. LT Ownership (%)</i>	1,626	5.74	7.18	2.76	4.10	5.57
<i>Median LTG Forecast Revision (%)</i>	697	-1.02	8.42	-1.51	0.00	0.80
<i>Median EPS Forecast Revision 1</i>	1,568	0.12	0.89	-0.12	0.07	0.35
<i>Median EPS Forecast Revision 2</i>	1,562	0.17	0.65	-0.07	0.10	0.37
<i>HP HHI</i>	1,449	0.28	0.25	0.10	0.19	0.37
<i>HP SIM</i>	1,449	7.25	14.80	1.12	1.56	3.31
<i>KLD environmental strengths</i>	1,409	0.35	0.73	0.00	0.00	0.00
<i>KLD environmental strengths minus concerns</i>	1,409	0.33	0.70	0.00	0.00	0.00

Table 2. Environmental score and stock returns during the COVID-19 crisis

Panel A presents regression estimates of stock returns during the COVID-19 crisis on environmental score and control variables. Panel B presents regression estimates of stock returns during the COVID-19 crisis on dummy variables denoting whether a firm's environmental score is in the second, third, or top quartile and control variables. In both tables, we use different definitions of the COVID-19 crisis period. In columns 1 and 2, we use the February-20 to March-20 period (based on the observation of stock market index returns in Figure 1). In columns 3 and 4, we use the crisis period definitions of Fahlenbrach et al. (2020) and Ramelli and Wagner (2020), respectively. Panel C reports the results of difference-in-differences estimation of daily stock returns. The crisis period corresponds to the period February 20-March 20 and we consider the same number of days for the pre-crisis period. The main independent variable is the interaction between *High Environmental Score* (i.e., a dummy variable that takes the value of one if a firm has an environmental score in the top quartile of the distribution) and *COVID Crisis* (i.e., a dummy variable that takes the value of one for the crisis period). Variables are winsorized at the 1st and 99th percentiles. All regressions in Panels A and B include industry fixed effects based on TRBC industry group classifications. Regressions in Panel C include day fixed effects and industry or firm fixed effects. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

Panel A: Environmental score and stock returns in the COVID-19 crisis				
<i>Crisis Return (%)</i>	(1) COVID-19 crisis returns (February 20- March 20)	(2) COVID-19 crisis returns (February 20- March 20)	(3) Fahlenbrach et al.'s (2020) collapse period (February 3-March 23)	(4) Ramelli and Wagner's (2020) fever period (February 24-March 20)
<i>Environmental Score</i>	0.068*** (0.016)	0.055*** (0.019)	0.045** (0.020)	0.053*** (0.019)
<i>Beta MKT</i>		-3.788*** (0.755)	-3.535*** (0.808)	-3.231*** (0.755)
<i>Beta HML</i>		-2.175*** (0.565)	-1.631*** (0.611)	-2.090*** (0.563)
<i>Beta SMB</i>		-1.163** (0.590)	-1.310** (0.640)	-1.241** (0.581)
<i>Ln(Total Assets)</i>		-0.158 (0.385)	-0.158 (0.401)	-0.014 (0.382)
<i>Long-Term Debt</i>		-8.630*** (2.471)	-9.565*** (2.508)	-9.454*** (2.491)
<i>Short-Term Debt</i>		-22.469 (14.677)	-23.489 (14.803)	-27.123* (14.995)
<i>Cash Holdings</i>		10.401*** (2.780)	13.181*** (2.896)	12.131*** (2.696)
<i>Profitability</i>		19.373*** (3.549)	19.487*** (3.703)	20.788*** (3.430)
<i>Momentum</i>		-0.018 (0.025)	0.011 (0.025)	-0.013 (0.024)
Observations	1,626	1,626	1,626	1,626
Industry Dummies	Yes	Yes	Yes	Yes
Adjusted R-squared	0.195	0.266	0.276	0.262

Panel B: Environmental score quartiles and stock returns in the COVID-19 crisis

<i>Crisis Return (%)</i>	(1) COVID-19 crisis returns (February 20- March 20)	(2) COVID-19 crisis returns (February 20- March 20)	(3) Fahlenbrach et al.'s (2020) collapse period (February 3-March 23)	(4) Ramelli and Wagner's (2020) fever period (February 24-March 20)
<i>Env. Score 2</i>	0.727 (1.470)	0.713 (1.408)	0.006 (1.433)	0.782 (1.434)
<i>Env. Score 3</i>	1.635 (1.224)	1.598 (1.193)	1.245 (1.274)	1.686 (1.210)
<i>Env. Score 4</i>	4.306*** (1.171)	3.313** (1.332)	2.580* (1.409)	3.278** (1.335)
<i>Beta MKT</i>		-3.829*** (0.755)	-3.561*** (0.809)	-3.272*** (0.756)
<i>Beta HML</i>		-2.191*** (0.566)	-1.642*** (0.612)	-2.105*** (0.564)
<i>Beta SMB</i>		-1.157* (0.590)	-1.306** (0.641)	-1.234** (0.581)
<i>Ln(Total Assets)</i>		-0.047 (0.370)	-0.072 (0.386)	0.092 (0.367)
<i>Long-Term Debt</i>		-8.614*** (2.494)	-9.599*** (2.528)	-9.432*** (2.515)
<i>Short-Term Debt</i>		-20.908 (14.757)	-22.408 (14.858)	-25.509* (15.063)
<i>Cash Holdings</i>		10.818*** (2.787)	13.399*** (2.920)	12.583*** (2.715)
<i>Profitability</i>		19.250*** (3.559)	19.433*** (3.712)	20.658*** (3.443)
<i>Momentum</i>		-0.018 (0.025)	0.011 (0.025)	-0.013 (0.024)
Observations	1,626	1,626	1,626	1,626
Industry Dummies	Yes	Yes	Yes	Yes
Adjusted R-squared	0.193	0.264	0.274	0.261

Panel C: Difference-in-differences regressions of daily stock returns

<i>Daily Returns (%)</i>	(1)	(2) + Controls	(3) + Interactions with controls	(4) + Firm fixed effects	(5) + Firm fixed effects
<i>High Environmental Score</i>	0.005 (0.024)	0.030 (0.031)	-0.291 (0.516)	- -	- -
<i>COVID-19 Crisis</i>	- -	- -	- -	- -	-1.951*** (0.032)
<i>COVID-19 Crisis X High Environmental Score</i>	0.113** (0.052)	0.110** (0.052)	0.110** (0.052)	0.109** (0.055)	0.109** (0.055)
<i>Beta MKT</i>		-0.100*** (0.020)	-0.090*** (0.021)	- -	- -
<i>Beta HML</i>		0.016*** (0.003)	0.015*** (0.003)	- -	- -
<i>Beta SMB</i>		-0.046*** (0.009)	-0.042*** (0.010)	- -	- -
<i>Ln(Total Assets)</i>		0.000 (0.011)	-0.013 (0.014)	- -	- -
<i>Long-Term Debt</i>		-0.139** (0.061)	-0.140** (0.068)	- -	- -
<i>Short-Term Debt</i>		-0.725** (0.369)	-0.755* (0.452)	- -	- -
<i>Cash Holdings</i>		0.234*** (0.087)	0.175* (0.093)	- -	- -
<i>Profitability</i>		0.164* (0.088)	0.138 (0.092)	- -	- -
<i>Momentum</i>		0.003*** (0.001)	0.003*** (0.001)	- -	- -
Observations	64,442	64,442	64,442	64,442	64,442
Industry Fixed Effects	Yes	Yes	Yes	No	No
Firm Fixed Effects	No	No	No	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	No
Interaction with Controls	No	No	Yes	Yes	Yes
Adjusted R-squared	0.505	0.505	0.505	0.509	0.05

Table 3. ESG pillars and stock returns during the COVID-19 crisis

This table presents regression estimates of stock returns during the COVID-19 crisis (i.e., February 20-March 20, 2020) on environmental score, social score, governance score, and control variables. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

COVID-19 crisis returns (February 20-March 20)	(1)	(2)	(3)	(4)
<i>Environmental Score</i>	0.055*** (0.019)			0.060** (0.025)
<i>Social Score</i>		0.035 (0.024)		-0.011 (0.032)
<i>Governance Score</i>			0.016 (0.021)	0.001 (0.022)
<i>Beta MKT</i>	-3.788*** (0.755)	-3.842*** (0.755)	-3.874*** (0.756)	-3.789*** (0.755)
<i>Beta HML</i>	-2.175*** (0.565)	-2.257*** (0.562)	-2.289*** (0.563)	-2.175*** (0.566)
<i>Beta SMB</i>	-1.163** (0.590)	-1.147* (0.590)	-1.153* (0.592)	-1.164** (0.591)
<i>Ln(Total Assets)</i>	-0.158 (0.385)	0.131 (0.395)	0.324 (0.357)	-0.132 (0.410)
<i>Long-Term Debt</i>	-8.630*** (2.471)	-8.886*** (2.473)	-8.950*** (2.481)	-8.630*** (2.478)
<i>Short-Term Debt</i>	-22.469 (14.677)	-21.617 (14.578)	-21.268 (14.662)	-22.459 (14.714)
<i>Cash Holdings</i>	10.401*** (2.780)	10.763*** (2.775)	10.793*** (2.784)	10.363*** (2.781)
<i>Profitability</i>	19.373*** (3.549)	19.273*** (3.558)	19.036*** (3.570)	19.367*** (3.559)
<i>Momentum</i>	-0.018 (0.025)	-0.017 (0.025)	-0.017 (0.025)	-0.018 (0.025)
Observations	1,626	1,626	1,626	1,626
Industry Dummies	Yes	Yes	Yes	Yes
Adjusted R-squared	0.266	0.263	0.263	0.265

Table 4. Subdimensions of environmental score stock returns during the COVID-19 crisis

This table presents regression estimates of stock returns during the COVID-19 crisis (i.e., February 20-March 20, 2020) on the subdimensions of the environmental score (i.e., resource use, emission reduction, and green innovation) and control variables. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

COVID-19 crisis returns (February 20-March 20)	(1)	(2)	(3)
<i>Resource Use Score</i>	0.037** (0.015)		
<i>Emission Reduction Score</i>		0.046*** (0.017)	
<i>Green Innovation Score</i>			0.012 (0.016)
<i>Beta MKT</i>	-3.810*** (0.754)	-3.795*** (0.753)	-4.713*** (0.850)
<i>Beta HML</i>	-2.209*** (0.565)	-2.185*** (0.565)	-2.803*** (0.623)
<i>Beta SMB</i>	-1.166** (0.591)	-1.175** (0.590)	-1.036 (0.680)
<i>Ln(Total Assets)</i>	-0.044 (0.379)	-0.116 (0.388)	0.260 (0.348)
<i>Long-Term Debt</i>	-8.724*** (2.472)	-8.630*** (2.468)	-9.998*** (2.449)
<i>Short-Term Debt</i>	-21.164 (14.697)	-22.019 (14.568)	-26.523* (14.565)
<i>Cash Holdings</i>	10.506*** (2.783)	10.344*** (2.782)	12.303*** (2.953)
<i>Profitability</i>	19.403*** (3.555)	19.335*** (3.546)	21.061*** (4.665)
<i>Momentum</i>	-0.017 (0.025)	-0.018 (0.025)	-0.013 (0.030)
Observations	1,626	1,626	1,418
Industry Dummies	Yes	Yes	Yes
Adjusted R-squared	0.265	0.266	0.293

Table 5. Environmental score and stock returns before the COVID-19 crisis

This table presents regression estimates of stock returns during the pre-COVID-19 crisis period on environmental score and control variables. In Column 1, the dependent variable is the stock return over January 2020. In Column 2, the dependent variable is the stock return over the period January 2 to January 17, which corresponds to the incubation period in Ramelli and Wagner (2020). In Column 3, the dependent variable is the stock return over the period January 20 to February 21, which corresponds to the outbreak period in Ramelli and Wagner (2020). All variables are winsorized at the 1st and 99th percentiles. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

<i>Crisis Return (%)</i>	(1) January 2020	(2) Ramelli and Wagner (2020): Incubation (02/01/2020 – 17/01/2020)	(3) Ramelli and Wagner (2020): Outbreak (20/01/2020 – 21/02/2020)
<i>Environmental Score</i>	0.007 (0.010)	0.008 (0.008)	0.010 (0.014)
Observations	1,626	1,626	1,626
Control Variables	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes
Adjusted R-squared	0.410	0.259	0.132

Table 6. Environmental score and stock returns during the COVID-19 crisis: cross-sectional tests based on long-term investor ownership

This table presents regression estimates of stock returns during the COVID-19 crisis (i.e., February 20-March 20, 2020) on environmental score and control variables. In columns 1 and 2, we split the sample according to median share-weighted average investor turnover. In column 3 and 4, we split the sample according to the median of ownership by investors with a long-term orientation. The group of investors with a long-term orientation consists of pension funds, endowment, foundation, insurance companies, and sovereign funds. Investor variables are measured as of end of 2019. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
COVID-19 crisis returns (February 20-March 20)	Low Investor Turnover	High Investor Turnover	Low % Investors with long- term orientation	High % Investors with long- term orientation
<i>Environmental Score</i>	0.074*** (0.023)	0.002 (0.034)	0.010 (0.031)	0.075*** (0.025)
Observations	813	813	813	813
Control Variables	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Adjusted R-squared	0.346	0.202	0.257	0.284
P-value of Wald test (1) > (2)	0.040			
P-value of Wald test (4) > (3)			0.045	

Table 7. Environmental score and one-year-ahead EPS consensus forecast revision

This table presents regression estimates of EPS consensus forecast revision between end of January and end of March 2020 on environmental score and control variables. *Median EPS Forecast Revision 1* is the difference between the latest consensus forecast for one-year-ahead EPS in January and the latest consensus forecast for one-year-ahead EPS in March. *Median EPS Forecast Revision 2* is the difference between the latest consensus forecast for two-year-ahead EPS in January and the latest consensus forecast for one-year-ahead EPS in March. *Median LTG Forecast Revision* is the difference between the latest consensus forecast for EPS long-term growth in January and the latest consensus forecast for EPS long-term growth in March. In columns 1 to 3, we restrict the regressions to observations for which we can compute *Median LTG Forecast Revision*. In columns 4 to 5, we relax this restriction. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

	(1) Median EPS Forecast Revision 1	(2) Median EPS Forecast Revision 2	(3) Median LTG Forecast Revision	(4) Median EPS Forecast Revision 1	(5) Median EPS Forecast Revision 2
<i>Environmental Score</i>	-0.000 (0.002)	-0.001 (0.001)	0.033** (0.016)	0.001 (0.001)	-0.000 (0.001)
Observations	697	697	697	1,568	1,562
Control Variables	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.114	0.177	0.0201	0.0911	0.133

Table 8. Environmental score and stock reaction to policy responses to the COVID-19 crisis

This table presents regression estimates of stock returns from March 23 to March 24, 2020 (in column 1) and of April 9, 2020 (column 2) on environmental score and control variables. All variables are winsorized at the 1st and 99th percentiles. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

<i>Return</i>	Aid Plan 24 March 2020 (1)	Fed Announcement 9 April 2020 (2)
<i>Environmental Score</i>	0.005 (0.010)	-0.002 (0.006)
<i>Beta MKT</i>	0.081 (0.363)	0.442* (0.227)
<i>Beta HML</i>	0.458* (0.235)	0.222 (0.157)
<i>Beta SMB</i>	-0.545** (0.255)	0.631*** (0.173)
<i>Ln (Total Assets)</i>	0.335* (0.184)	-0.625*** (0.108)
<i>Long-Term Debt</i>	3.773*** (1.110)	1.496** (0.608)
<i>Short-Term Debt</i>	3.960 (8.472)	0.536 (5.047)
<i>Cash Holdings</i>	-0.370 (1.204)	-2.601*** (0.683)
<i>Profitability</i>	-3.470** (1.407)	-2.154** (0.915)
<i>Momentum</i>	0.003 (0.010)	-0.009 (0.007)
Observations	1,626	1,626
Industry Dummies	Yes	Yes
Adjusted R-squared	0.130	0.158

Table 9. Robustness tests*Panel A. Alternative definitions of industry fixed effects*

This table presents regression estimates of stock returns during the COVID-19 crisis (i.e., February 20-March 20, 2020) on environmental score and control variables (Table 2, Panel A, Column 2) using different industry classifications. Columns 1 to 3 reports results of our baseline regression with industry dummies based on alternative industry group classifications: 2-digit SIC codes, NAICS industry groups and GICS industry groups, respectively. Variables are defined in Appendix A. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively. Constants are not reported.

COVID-19 crisis returns (February 20-March 20)	SIC Industry Dummies (1)	GICS Industry Dummies (2)	NAICS Industry Dummies (3)
<i>Environmental Score</i>	0.053*** (0.020)	0.040** (0.019)	0.055*** (0.020)
Observations	1,626	1,626	1,626
Control Variables	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes
Adjusted R-squared	0.277	0.277	0.256

Panel B. Additional controls for corporate governance

This table presents regression estimates of stock returns during the COVID-19 crisis on environmental score and control variables (Table 2, Panel A, Column 2) including additional governance variables. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

COVID-19 crisis returns (February 20-March 20)	(1)	(2)	(3)	(4)	(5)	(6)
<i>Environmental Score</i>	0.052*** (0.019)	0.053*** (0.019)	0.061*** (0.019)	0.057*** (0.019)	0.057*** (0.019)	0.057*** (0.020)
<i>Institutional Ownership</i>	-0.045** (0.020)					-0.035* (0.021)
<i>Nb. Antitakeover Devices</i>		-0.309 (0.206)				-0.242 (0.209)
<i>Ln(Board Size)</i>			-2.462 (2.091)			-2.003 (2.082)
<i>% Independent Board Members</i>				-0.031 (0.034)		0.011 (0.036)
<i>CEO Duality Dummy</i>					1.616** (0.802)	1.405* (0.804)
Observations	1,626	1,621	1,615	1,626	1,618	1,608
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.268	0.266	0.266	0.266	0.267	0.268

Panel C. Controlling for product market competition

This table presents regression estimates of stock returns during the COVID-19 crisis on environmental score and control variables (Table 2, Panel A, Column 2) including product market competition variables from Hoberg and Phillips (2010). All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

COVID-19 crisis returns (February 20-March 20)	(1)	(2)	(3)
<i>Environmental Score</i>	0.052*** (0.019)	0.053*** (0.019)	0.061*** (0.019)
<i>HP HHI</i>	0.922 (1.789)		0.585 (1.827)
<i>HP SIM</i>		-0.060 (0.065)	-0.056 (0.067)
Observations	1,449	1,449	1,449
Control Variables	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes
Adjusted R-squared	0.244	0.244	0.244

Panel D. Other controls

This table presents regression estimates of stock returns during the COVID-19 crisis on environmental score and control variables (Table 2, Panel A, Column 2) including additional control variables: R&D expenses, Advertising expenses, SG&A expenses, Capital Expenditures, and Dividends. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

COVID-19 crisis returns (February 20-March 20)	(1)	(2)	(3)	(4)	(5)	(6)
<i>Environmental Score</i>	0.052*** (0.019)	0.055*** (0.019)	0.057*** (0.019)	0.055*** (0.019)	0.048** (0.019)	0.048** (0.019)
<i>R&D Expenses</i>	9.743 (7.283)					10.540 (7.247)
<i>Advertising Expenses</i>		-1.745 (16.320)				3.667 (16.594)
<i>SG&A Expenses</i>			-3.168 (2.969)			-3.862 (3.063)
<i>CAPEX</i>				-1.617 (11.475)		-2.456 (11.478)
<i>Dividend Dummy</i>					2.195** (1.003)	2.261** (1.002)
Observations	1,626	1,626	1,626	1,626	1,626	1,626
Control as in Table2	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.266	0.265	0.266	0.265	0.268	0.268

Panel E. Controlling for the influence of specific sectors

This table presents regression estimates of stock returns during the COVID-19 crisis on environmental score and control variables (Table 2, Panel A, Column 2) for subsamples excluding the energy, personal services, and transportation related companies, in columns 1, 2, and 3, respectively. The energy sector corresponds to the TRBC sector “Energy - Fossil Fuels” and “Renewable Energy”, the transportation sector corresponds to the TRBC sector “Transportation”, the automobile sector corresponds to the TRBC sector “Automobiles & Auto Parts”, and the personal services sector corresponds to the TRBC sector “Cyclical Consumer Services” and “Personal & Household Products & Services”. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

<i>Crisis Return (%)</i>	(1) Excluding Energy Sector	(2) Excluding Transportation Sector	(3) Excluding Automobile Sector	(4) Excluding Personal Services Sector
<i>Environmental Score</i>	0.049** (0.019)	0.055*** (0.019)	0.055*** (0.019)	0.045** (0.020)
Observations	1,512	1,575	1,594	1,484
Control Variables	Yes	Yes	Yes	Yes
Industry Dummies	Yes	Yes	Yes	Yes
Adjusted R-squared	0.243	0.260	0.265	0.249

Panel F. Measures of environmental scores using KLD

This table presents regression estimates of stock returns during the COVID-19 crisis on environmental scores computed using data from KLD and control variables (Table 2, Panel A, Column 2) and control variables. In Column 1, the main independent variable is the number of KLD strengths related to the environment. In Column 2, the main independent variable is the number of strengths minus the number of concerns related to the environment. All regressions include industry fixed effects based on TRBC industry group classifications. Variables are defined in Appendix A. Constants are not reported. Heteroskedasticity-consistent standard errors are presented in parentheses. ***, **, and * indicate that the parameter estimate is significantly different from zero at the 1%, 5%, and 10% level, respectively.

COVID-19 crisis returns (February 20-March 20)	(1)	(2)
<i>KLD environmental strengths</i>	2.120*** (0.603)	
<i>KLD environmental strengths minus concerns</i>		2.286*** (0.621)
<i>Beta MKT</i>	-4.928*** (0.780)	-4.938*** (0.780)
<i>Beta HML</i>	-2.558*** (0.579)	-2.548*** (0.579)
<i>Beta SMB</i>	-0.913 (0.630)	-0.913 (0.630)
<i>Ln(Total Assets)</i>	0.042 (0.381)	0.046 (0.375)
<i>Long-Term Debt</i>	-10.064*** (2.501)	-10.062*** (2.501)
<i>Short-Term Debt</i>	-19.410 (13.984)	-18.973 (13.920)
<i>Cash Holdings</i>	11.267*** (2.786)	11.304*** (2.782)
<i>Profitability</i>	20.628*** (3.560)	20.542*** (3.562)
<i>Momentum</i>	-0.014 (0.026)	-0.014 (0.026)
Observations	1,409	1,409
Industry Fixed Effects	Yes	Yes
Adjusted R-squared	0.313	0.313

Figure 1: U.S. stock market performance in the COVID crisis

Main U.S. indices over 01/2020-04/2020, based at 100 as of the 01/01/2020.

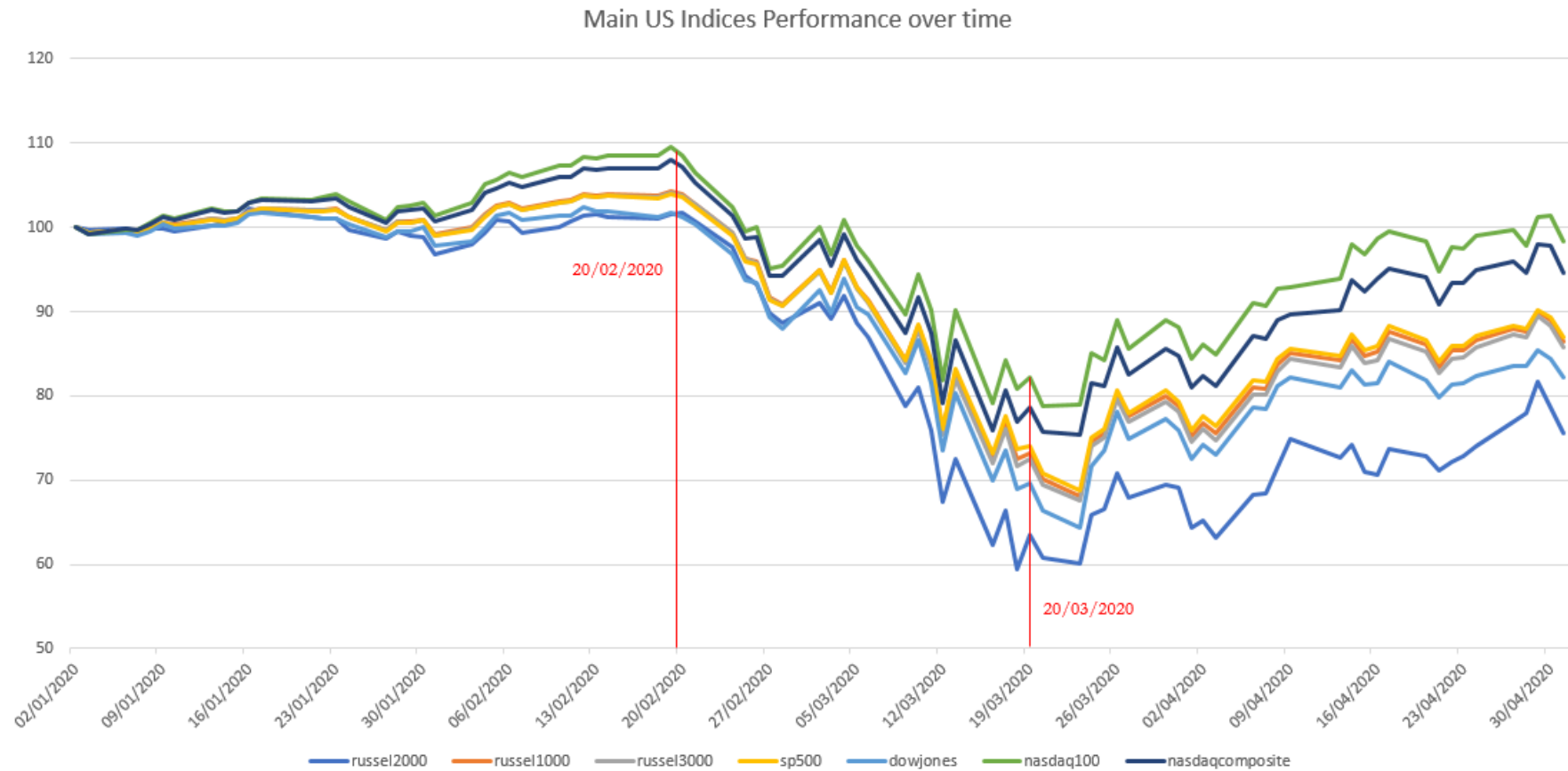
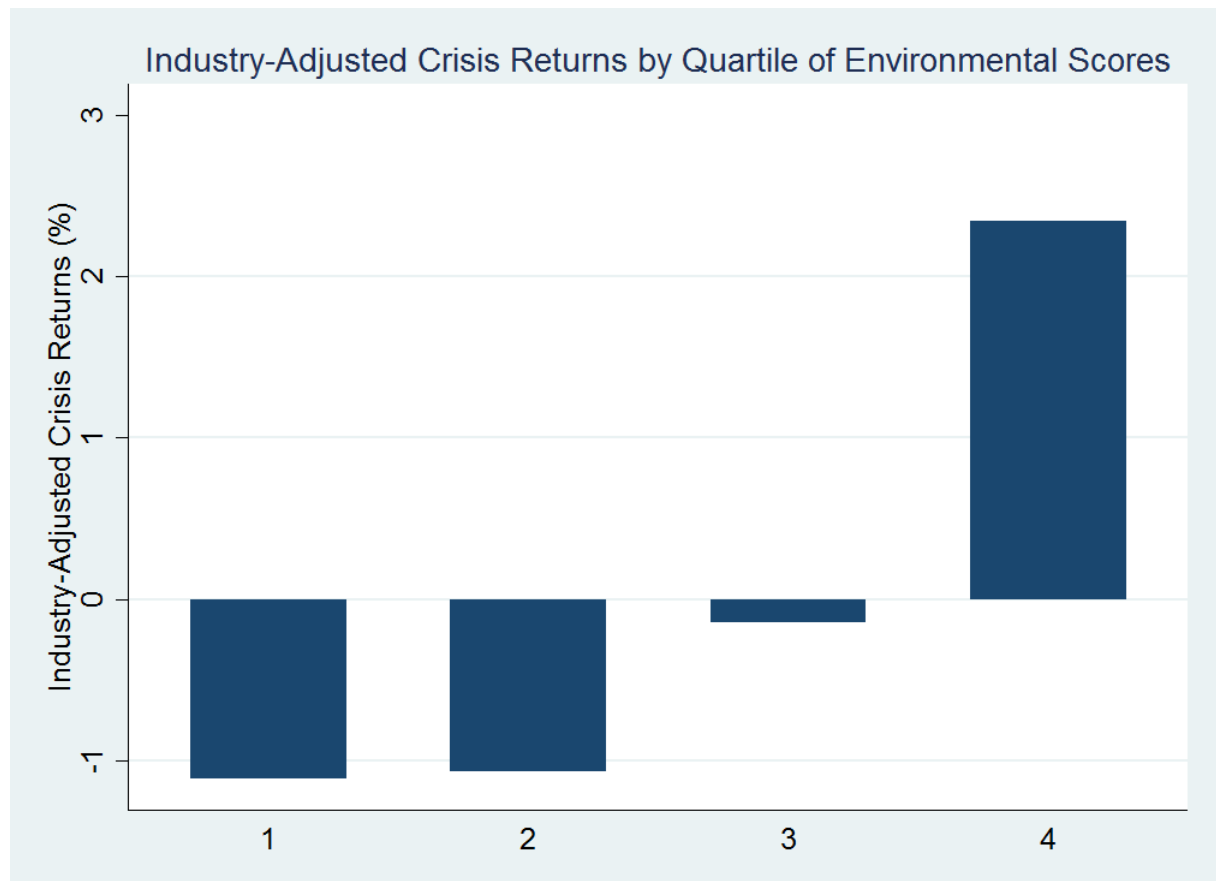


Figure 2: Industry-Adjusted Crisis Returns by Quartile of Environmental Score

This figure shows average crisis returns by quartile of environmental scores. Crisis returns are computed over the February-20 to March-20 period. Returns are computed in excess of companies' industry returns (TRBC industry groups).



Appendix A. Variable definitions

Variables	Definition	Source
% <i>Independent Board Members</i>	Proportion of independent directors sitting on the board	TR Asset 4
<i>Advertising Expenses</i>	Advertising expenses scaled by total assets.	TR Fundamentals
<i>Beta HML</i>	Loading on the HML premium based on the Fama-French three factors model estimated over 60 months prior to the crisis. We require at least 12 months of data available.	TR and Kenneth French's Website
<i>Beta MKT</i>	Loading on the market premium based on the Fama-French three factors model estimated over 60 months prior to the crisis. We require at least 12 months of data available.	TR and Kenneth French's Website
<i>Beta SMB</i>	Loading on the SMB premium based on the Fama-French three factors model estimated over 60 months prior to the crisis. We require at least 12 months of data available.	TR and Kenneth French's Website
<i>CAPEX</i>	Capital expenditures scaled by total assets.	TR Fundamentals
<i>Cash Holdings</i>	as cash and marketable securities scaled by total assets	TR Fundamentals
<i>CEO Duality Dummy</i>	Dummy variable coding for whether the CEO is also the chairman of the board.	TR Asset 4
<i>COVID-19 Crisis Return</i>	Buy-and-hold stock return over the period February 20-March 20	TR
<i>Dividend Dummy</i>	Dummy variables coding for whether a company pays dividends.	TR Fundamentals
<i>Emission Reduction</i>	The Emission Reduction Score measures a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes.	TR Asset 4
<i>Environmental Score</i>	<i>Environmental Score</i> aggregates information on a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management (<i>Resource Use Score</i>), a company's commitment and effectiveness towards reducing environmental emission in the production and operational processes (<i>Emission Reduction Score</i>), and a company's capacity to reduce the environmental costs and burdens for its customers, thereby creating new market opportunities through new environmental technologies and processes or eco-designed products (<i>Green Innovation Score</i>).	TR Asset 4
<i>Governance Score</i>	<i>Governance Score</i> aggregates information a company's commitment and effectiveness towards following best practice corporate governance principles (<i>Management Score</i>), a company's effectiveness towards equal treatment of shareholders and the use of anti-	TR Asset 4

	takeover devices (<i>Shareholders Score</i>), and a company's practices to communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes (<i>CSR Strategy Score</i>).	
<i>Green Innovation</i>	The Green innovation Score reflects a company's capacity to reduce the environmental costs and burdens for its customers, and thereby creating new market opportunities through new environmental technologies and processes or eco-designed products	TR Asset 4
<i>HP HHI</i>	This data is based on web crawling and text parsing algorithms that process the text in the business descriptions of 10-K annual filings on the SEC Edgar website from 2017. HHI is a measure of concentration within TNIC industry classification.	Hoberg's website
<i>HP SIM</i>	This data is based on web crawling and text parsing algorithms that process the text in the business descriptions of 10-K annual filings on the SEC Edgar website from 2017. SIM is a measure of product differentiation within TNIC industry classification.	
<i>Institutional Ownership</i>	Percentage of a firm's common shares outstanding held by institutional investors.	TR
<i>Investor Turnover</i>	The shares-weighted average portfolio turnover of a firm's investor, whereby portfolio turnover is the average investor holding period calculated based on the previous 12 quarters (36 months) of portfolio holdings.	TR
<i>KLD environmental strengths</i>	Sum of KLD environmental strengths (as of end 2018).	MSCI
<i>KLD environmental strengths minus concerns</i>	Sum of KLD environmental strengths minus the sum of JKD environmental concerns (as of end 2018).	MSCI
<i>Ln(Board Size)</i>	Natural logarithm of the number of board members	TR Asset 4
<i>Ln(Total Assets)</i>	Natural logarithm of total assets	TR Fundamentals
<i>Long-Term Debt</i>	Long-term debt scaled by total assets	TR Fundamentals
<i>Median EPS Forecast Revision 1</i>	Difference between the latest consensus forecast for one-year-ahead EPS in January 2020 and the latest consensus forecast for one-year-ahead EPS in March 2020.	IBES
<i>Median EPS Forecast Revision 2</i>	Difference between the latest consensus forecast for one-year-ahead EPS in January 2020 and the latest consensus forecast for one-year-ahead EPS in March 2020.	IBES
<i>Median LTG Forecast Revision</i>	Difference between the latest consensus forecast for EPS long-term growth in January 2020 and the latest consensus forecast for EPS long-term growth in March 2020.	IBES

<i>Momentum</i>	Buy-and-hold return over the period November 2019 – January 2020	TR
<i>Nb. Antitakeover Devices</i>	Number of anti-takeover devices in place	TR Asset 4
<i>Pct. Long-term Investors</i>	Ownership by investors with a long-term orientation, defined based on shareholder types (pension funds, endowment, foundation, insurance companies, sovereign funds, private equity, venture capital).	
<i>Profitability</i>	EBITDA scaled by total assets	TR Fundamentals
<i>R&D Expenses</i>	R&D expenses scaled by total assets.	TR Fundamentals
<i>Resource Use</i>	The Resource Use Score reflects a company's performance and capacity to reduce the use of materials, energy or water, and to find more eco-efficient solutions by improving supply chain management.	TR Asset 4
<i>SG&A Expenses</i>	SG&A expenses scaled by total assets.	TR Fundamentals
<i>Short-Term Debt</i>	Short-term debt scaled by total assets	TR Fundamentals
<i>Social Score</i>	<i>Social Score</i> aggregates information on the extent to which firms enhance employee welfare (<i>Workforce Score</i>), promote human rights (<i>Human Rights Score</i>), engage in community development (<i>Community Score</i>), and fulfill their responsibilities to consumers (<i>Product Responsibility Score</i>).	TR Asset 4

Internet Appendix

Table IA.1. List of firms included in our analysis (Thomson Reuters' RIC)

This table reports the list of Thomson Reuters' RIC identifiers of the firms used in our empirical analysis

A	ALLK.O	ASN4.O	BKD	CCK	CNX
AA	ALLO.O	ASRT.O	BKE	CCMP.O	CNXN.O
AAAL.O	ALNY.O	ASTE.O	BKI	CCO	COG
AAAN	ALRM.O	ATEN.K	BKNG.O	CCOI.O	COHR.O
AAOI.O	ALSN.K	ATEX.O	BKR	CCRN.O	COHU.O
AAON.O	ALTR.O	ATGE.K	BL.O	CCS	COKE.O
AAP	ALV	ATI	BLBD.O	CCXI.O	COLD.K
AAPL.O	ALXN.O	ATKR.K	BLCM.O	CDAY.K	COLL.O
AAWW.O	AMAG.O	ATNI.O	BLD	CDE	COLM.O
AAXN.O	AMAT.O	ATNX.O	BLDR.O	CDEV.O	COMM.O
ABBV.K	AMC	ATR	BLKB.O	CDK.O	CONE.O
ABC	AMCX.O	ATRA.O	BLL	CDLX.O	CONN.O
ABEO.O	AMD.O	ATRC.O	BLMN.O	CDNA.O	COO
ABG	AME	ATRI.O	BLUE.O	CDNS.O	COP
ABM	AMED.O	ATRO.O	BMCH.O	CDW.O	CORE.O
ABMD.O	AMEH.O	ATRS.O	BMI	CDXS.O	CORT.O
ABR	AMGN.O	ATSG.O	BMRN.O	CE	COST.O
ABT	AMKR.O	ATUS.K	BMV	CEIX.K	COTY.K
ACA	AMN	ATVI.O	BNFT.O	CENT.O	COUP.O
ACAD.O	AMOT.O	AVAV.O	BOOM.O	CENX.O	CPB
ACCO.K	AMPH.O	AVD	BOOT.K	CERN.O	CPE
ACHC.O	AMRC.K	AVGO.O	BOX	CERS.O	CPRT.O
ACIA.O	AMRS.O	AVLR.K	BPMC.O	CEVA.O	CPRX.O
ACIW.O	AMRX.K	AVNS.K	BR	CF	CPS
ACLS.O	AMSWA.O	AVRO.O	BRC	CFX	CPSI.O
ACM	AMWD.O	AVT.O	BREW.O	CGNX.O	CR
ACOR.O	AMZN.O	AVY	BRKR.O	CHD	CR4I.O
ACRS.O	AN	AVYA.K	BRKS.O	CHDN.O	CRBP.O
ADBE.O	ANAB.O	AWI	BRY.O	CHE	CRC
ADI.O	ANDE.O	AXDX.O	BSET.O	CHEF.O	CREE.O
ADM	ANET.K	AXGN.O	BSTC.O	CHGG.K	CRI
ADMS.O	ANF	AXL	BXX	CHH	CRK
ADP.O	ANGI.O	AXNX.O	BTU	CHK	CRL
ADRO.O	ANGO.O	AXSM.O	BV	CHRS.O	CRMT.O
ADSK.O	ANIK.O	AYT	BW	CHRW.O	CRNX.O
ADSW.K	ANIP.O	AYX	BWA	CHS	CROX.O
ADT	ANSS.O	AZO	BWXT.K	CHTR.O	CRS
ADTN.O	AOBC.O	AZPN.O	BXG	CHUY.O	CRUS.O
ADUS.O	AOS	AZZ	BYD	CIEN.K	CRVL.O
ADV.M.O	APA	B	BZH	CIR	CRY
AEGN.O	APD	BA	CABO.K	CKH	CSCO.O
AEIS.O	APEI.O	BAH	CACL.K	CL	CSGP.O
AERI.O	APH	BAND.O	CAG	CLAR.O	CSGS.O
AFI	APLS.O	BAX	CAH	CLDX.O	CSII.O
AGCO.K	APPF.O	BBBY.O	CAI	CLF	CSL
AGEN.O	APPN.O	BBSI.O	CAKE.O	CLGX.K	CSLT.K
AGIO.O	APPS.O	BBY	CAL	CLH	CSOD.O
AGS	APT.X.O	BC	CALA.O	CLNE.O	CSU
AGX	APY	BCC	CALM.O	CLR	CSV
AGYS.O	AQB.O	BCEI.K	CALX.K	CLVS.O	CSWI.O
AIMC.O	AQUA.K	BCO	CAMP.O	CLW	CSX.O
AIMT.O	AR	BCPC.O	CAR.O	CLX	CTAS.O
AIN	ARA	BCRX.O	CARA.O	CLXT.O	CTB
AIR	ARAV.O	BDC	CARG.O	CMC	CTL
AIT	ARAY.O	BDSI.O	CARS.K	CMCO.O	CTLT.K
AJRD.K	ARCB.O	BDX	CASA.O	CMCSA.O	CTMX.O
AKAM.O	ARCH.K	BEAT.O	CASI.O	CMD	CTS
AKBA.O	ARLO.K	BECN.O	CASY.O	CMG	CTSH.O
AKCA.O	ARMK.K	BERY.K	CAT	CMI	CTXS.O
AKRX.O	ARNA.O	BFAM.K	CATO.K	CMP	CUB
AL	AROC.K	BFb	CBAY.O	CMTL.O	CUBE.K
ALB	ARVN.O	BGG	CBB	CNC	CULP.K
ALBO.O	ARW	BGS	CBRL.O	CNCE.O	CUTR.O
ALEC.O	ARWR.O	BH	CBT	CNDT.O	CVA
ALG	ASGN.K	BHE	CBZ	CNK	CVCO.O
ALGN.O	ASH	BIIB.O	CC	CNMD.K	CVET.O
ALGT.O	ASIX.K	BIO	CCF	CNNE.K	CVGW.O
ALK	ASMB.O	BJRI.O	CCI	CNSL.O	CVI

CVLA.K	EGHT.K	FGEN.O	GPK	HVT	JOUT.O
CVLT.O	EGOV.O	FICO.K	GPOR.O	HWKN.O	JW ^a
CVNA.K	EGRX.O	FISV.O	GPRE.O	HWM	K
CVS	EHC	FIT	GPRO.O	HXL	KAI
CVTL.O	EIDX.O	FIVN.O	GPX	HY	KALA.O
CVX	EIGLO	FIX	GRA	HZN	KALU.O
CW	EL	FIXX.O	GRBK.O	HZO	KAMN.K
CWH	ELAN.K	FIZZ.O	GRC	LAC.O	KAR
CWST.O	ELF	FL	GRPN.O	LART.O	KBAL.O
CXO	ELGX.O	FLDM.O	GRTS.O	IBM	KBH
CXW	ELOX.O	FLJR.O	GRUB.K	IBP	KBR
CYH	ELY	FLNT.O	GT.O	ICFL.O	KDMN.K
CYRX.O	EME	FLO	GTE	ICPT.O	KDP
CYTK.O	EMN	FLOW.K	GTHX.O	ICUL.O	KE.O
CZR.O	EMR	FLR	GTL.S.O	IDCC.O	KELYA.O
DAKT.O	ENPH.O	FLS	GTN	IDXX.O	KEM
DAL	ENR	FLWS.O	GTT	IESC.O	KEX
DAN	ENS	FLXN.O	GTX	IEX	KEYS.K
DAR	ENSG.O	FLXS.O	GVA	IFF	KFRC.O
DBD	ENT4.O	FMC	GWRE.K	IIIN.O	KFY
DBI	ENTG.O	FND	GWV	IIVI.O	KHC.O
DBX.O	ENV	FNKO.O	H	ILMN.O	KIDS.O
DCI	ENZ	FOE	H4.O	IMGN.O	KIN.O
DCO	EOG	FOLD.O	HAE	IMKT4.O	KLAC.O
DCPH.O	EOLS.O	FORM.O	HAIN.O	IMMR.O	KMB
DDD	EPAC.K	FORR.O	HAL	INCY.O	KMT
DE	EPAM.K	FOSL.O	HALO.O	INFN.O	KN
DECK.K	EPAY.O	FPRX.O	HAS.O	INGN.O	KNL
DELL.K	EPC	FRGI.O	HAYN.O	INGR.K	KNX
DENN.O	EPZM.O	FRPT.O	HBI	INOV.O	KO
DFIN.K	EQIX.O	FRT4.O	HCA	INSM.O	KOD.O
DGX	EQT	FSCT.O	HCC	INSP.K	KODK.K
DHC.O	ERI.O	FSLR.O	HCKT.O	INT	KOP
DHI	ERIL.O	FSS	HCSG.O	INTC.O	KOS
DHR	ESE	FTDR.O	HDS.O	INTU.O	KPTI.O
DIN	ESI	FTNT.O	HEES.O	INV4.O	KRA
DIOD.O	ESPR.O	FTSLK	HEI	INWK.O	KRO
DIS	ESTE.K	FTV	HES	IONS.O	KSU
DISC4.O	ETH	FUL	HFC	IOSP.O	KTOS.O
DISH.O	ETM	FWON4.O	HGV	IOV4.O	KUR4.O
DK	ETSY.O	FWRD.O	HI	IP	KWR
DLB	EVBG.O	GBT.O	III	IPAR.O	KZR.O
DLTR.O	EV ^C	GBX	HL	IPG	LAD
DLX	EVH	GCI	HLJO.O	IPGP.O	LANC.O
DMRC.O	EVI	GCP	HLJT.O	IPHK	LASR.O
DNKN.O	EVOP.O	GD	HLT	IPJ	LAUR.O
DNLI.O	EW	GDDY.K	HLX	IQV	LB
DNOW.K	EX4S.O	GDEN.O	HMHC.O	IR	LBRD4.O
DNR	EXEL.O	GE	HMSY.O	IRBT.O	LBRT.K
DOCU.O	EXLS.O	GEF	HMTV.O	IRDM.O	LCI
DORM.O	EXP	GERN.O	HNGR.K	IRM	LCIL.K
DOV	EXPD.O	GFF	HNI	IRTC.O	LDL
DPZ	EXPE.O	GGG	HOG	IRWD.O	LE.O
DRI	EXPR.K	GH.O	HOLX.O	ISEE.O	LEA
DRN4.O	EXR	GHC	HOME.K	ISRG.O	LECO.O
DRQ	EXTN.K	GILD.O	HON	IT	LEG
DS	EXTR.O	GIS	HP	ITCL.O	LEN
DSKE.O	EYE.O	GKOS.K	HPE	ITGR.K	LFUS.O
DVA	F	GLDD.O	HPQ	ITRI.O	LGIH.O
DVAX.O	FANG.O	GLT	HPR	ITT	LGND.O
DVN	FARM.O	GLUU.O	HRB	ITW	LH
DXC	FARO.O	GLW	HRC	IVC	LHCG.O
DXCM.O	FAST.O	GLYC.O	HRI	J	LHX
DXPE.O	FATE.O	GM	HRL	JACK.O	LII
E4.O	FB.O	GME	HRTX.O	JBHT.O	LIND.O
EAF	FBHS.K	GMED.K	HSIC.O	JBL	LITE.O
EAT	FBM	GMS	HSII.O	JBLU.O	LJPC.O
EB	FC	GNC	HSK4.O	JBSS.O	LKQ.O
EBAY.O	FCN	GNMK.O	HSTM.O	JB ^T	LL
EBIX.O	FCX	GNRC.K	HSY	JCOM.O	LLNW.O
EBS	FDS	GNTX.O	HTLD.O	JELD.K	LLY
ECHO.O	FDX	GOGO.O	HTZ	JILL.K	LMAT.O
ECL	FELE.O	GOLF.K	HUBB.K	JJSF.O	LMNR.O
EDIT.O	FET	GOOGL.O	HUBG.O	JKHY.O	LMNX.O
EEX	FEYE.O	GOSS.O	HUBS.K	JNCE.O	LMT
EFX	FF	GPC	HUN	JNJ	LNDC.O
EGAN.O	FFIV.O	GPI	HURN.O	JNPR.K	LNG

LNN	MODN.K	NLOK.O	PACB.O	PRSC.O	RRGB.O
LNTH.O	MOGa	NLS	PAG	PRSP.K	RRR.O
LOCO.O	MOH	NNBR.O	PAGP.K	PRTK.O	RS
LOGM.O	MOS	NNI	PAHC.O	PRTY.K	RSG
LOPE.O	MOV	NOC	PANW.K	PS.O	RYT
LORLO	MPA4.O	NOG	PAR	PSA	RTIX.O
LPI	MPC	NOV	PARR.K	PSMT.O	RTRX.O
LPSN.O	MPWR.O	NOW	PATK.O	PSX	RTX
LPX	MPX	NP	PAYC.K	PTC.O	RUBLK
LRCX.O	MR	NPK	PAYX.O	PTCT.O	RUBY.O
LRN	MRC	NPO	PBF	PTEN.O	RUN.O
LSCC.O	MRCY.O	NR	PBH	PTGX.O	RUTH.O
LSI	MRK	NRC.O	PBI	PTLA.O	RVNC.O
LSTR.O	MRNA.O	NSA	PBPB.O	PUMP.K	RXN
LTRPA.O	MRO	NSC	PBYI.O	PVAC.O	RYAM.K
LUV	MRSN.O	NSIT.O	PCAR.O	PWR	RYI
LVS	MRTN.O	NSP	PCH.O	PXD	RYTM.O
LW	MSA	NSSC.O	PCR.X.O	PZZA.O	SABR.O
LXRX.O	MSCLK	NSTG.O	PCTY.O	QCOM.O	SAFM.O
LZB	MSFT.O	NTAP.O	PDCE.O	QDEL.O	SAGE.O
MAN	MSGN.K	NTCT.O	PDCO.O	QEP	SAH
MANH.O	MSG.S.K	NTGR.O	PDFS.O	QLYS.O	SALA.O
MANT.O	MSI	NTLA.O	PDLI.O	QNST.O	SAIL.K
MAR.O	MSM	NTNX.O	PDSB.O	QRTEA.O	SAM
MAS	MSTR.O	NTRA.O	PE	QRV.O.O	SANM.O
MASI.O	MTCH.O	NTUS.O	PEGA.O	QTRX.O	SATS.O
MAT.O	MTD	NUAN.O	PEN	QTWO.K	SAVE.K
MATW.O	MTDR.K	NUE	PENN.O	QUAD.K	SBGL.O
MATX.K	MTH	NUS	PEP.O	QUOT.K	SBH
MBUU.O	MTN	NUVA.O	PETQ.O	R	SBUX.O
MCD	MTOR.K	NVAX.O	PETS.O	RAMP.K	SCCO.K
MCFT.O	MTRN.K	NVEC.O	PFE	RARE.O	SCHL.O
MCHP.O	MTRX.O	NVEE.O	PFGC.K	RBBN.O	SCHN.O
MCK	MTSC.O	NVR	PFPT.O	RBC	SCI
MCO	MTSL.O	NVRO.K	PG	RCII.O	SCL
MCRB.O	MTW	NVT4.K	PGEN.O	RCKT.O	SCOR.O
MCRI.O	MTX	NWL.O	PGNX.O	RCM.O	SCSC.O
MCS	MTZ	NWSA.O	PGTL.K	RCUS.K	SCWX.O
MD	MU.O	NX	PH	RDI.O	SD
MDC	MUR	NXGN.O	PHM	RDNT.O	SEAS.K
MDGL.O	MUSA.K	NXST.O	PHX	RDUS.O	SEB
MDLZ.O	MWA	NYT	PI.O	REGI.O	SEE
MDP	MXIM.O	OAS.O	PICO.O	REGN.O	SELB.O
MDRX.O	MXL	OC	PII	REI	SEM
MED	MYE	ODFL.O	PINC.O	REPL.O	SFIX.O
MEDP.O	MYGN.O	ODP.O	PKE	RES	SFM.O
MEI	MYOK.O	ODT.O	PKG	RETA.O	SGC.O
MELI.O	MYRG.O	OFIX.O	PKI	REV	SGEN.O
MG	NATH.O	OFLX.O	PKOH.O	REV.G.K	SGMO.O
MGLN.O	NATI.O	OI	PLAB.O	REZIK	SGMS.O
MGM	NAV	OII	PLCE.O	RGEN.O	SGRY.O
MGNX.O	NBIX.O	OIS	PLNT.K	RGLD.O	SHAK.K
MGPI.O	NBL.O	OKE	PLOW.K	RGNX.O	SHEN.O
MGT4.O	NC	OLED.O	PLPC.O	RGP.O	SHOO.O
MHK	NCMI.O	OLLI.O	PLT	RGR	SHW
MHO	NCR	OLN	PLUG.O	RGS	SIBN.O
MIC	NCSM.O	OMC	PLUS.O	RH	SIEN.O
MIDD.O	NDLS.O	OMCL.O	PLXS.O	RHI	SIGA.O
MIK.O	NDSN.O	OMER.O	PM	RIGL.O	SIRI.O
MIN.O	NEM	OMI	PODD.O	RL	SITE.K
MITK.O	NEO.O	ON.O	POL	RMBS.O	SIX
MKC	NEOG.O	ONTO.K	POOL.O	RMD	SJM
MKSI.O	NERV.O	OPCH.O	POST.K	RMNI.O	SKX
MLAB.O	NES	OPK.O	POWT.O	RMTI.O	SKY
MLHR.O	NEU	OPTN.O	POWL.O	RNG	SKYW.O
MLJ	NEW.R.K	ORBC.O	PPC.O	ROAD.O	SLAB.O
MLM	NEX	ORCL.K	PPG	ROCK.O	SLCA.K
MMM	NFLX.O	ORLY.O	PQG	ROG	SLDB.O
MMS	NGVC.K	OSG	PR4H.O	ROK	SLGN.O
MMSI.O	NGVT.K	OSIS.O	PRDO.O	ROKU.O	SLP.O
MNLO.O	NH.O	OSK	PRFT.O	ROLL.O	SM
MNRO.O	NHC	OSPN.O	PRGS.O	ROP	SMCI.O
MNST.O	NINE.K	OSTK.O	PRIM.O	RP.O	SMG
MNT4.O	NK.O	OSUR.O	PRLB.K	RPD.O	SMHLK
MO	NKE	OTIC.O	PRNB.O	RPM	SMP
MOBL.O	NKTR.O	OXM	PRO	RRC	SMP.L.O
MOD	NL	OXY	PRPL.O	RRD	SNA

SNAP.K	TENB.O	UIS	WGO
SNBR.O	TER.O	ULH.O	WH
SNCR.O	TEX	UNF	WHD
SNDR.K	TFX	UNFL.K	WHR
SNPS.O	TG	UNIT.O	WTFI.O
SNX	TGI	UNP	WTNA.O
SOI	TGNA.K	UNVR.K	WTNG.O
SON	TGTX.O	UPLD.O	WTRE.O
SONO.O	THC	UPS	WK
SP.O	THO	UPWK.O	WLDN.O
SPAR.O	THR	URI	WLK
SPB	THRM.O	USCR.O	WLL
SPGL.K	THS	USFD.K	WM
SPN	TILE.O	USLM.O	WMK
SPPI.O	TISI.K	USM	WMS
SPR	TIVO.O	USNA.K	WNC
SPSC.O	TKR	USPH.K	WOR
SPTN.O	TMHC.K	USX	WOW
SPWR.O	TMO	UTHR.O	WPX
SPXC.K	TMST.K	UTMD.O	WRK
SRDX.O	TMUS.O	UVV	WSM
SRI	TNC	VAC	WSO
SRNE.O	TNDM.O	VAR	WST
SRPT.O	TNET.K	V.C.O	WTI
SRRK.O	TOL	VCEL.O	WTS
SSD	TPB	VCR.A.K	WTTR.K
SSNC.O	TPC	VCYT.O	WW.O
SSP.O	TPCO.O	VEC	WWD.O
SSI.O	TPH	VECO.O	WWE
SSTK.K	TPIC.O	VEEV.K	WWW
STAY.O	TPR	VFC	WY
STIM.O	TPX	V.G.O	WYND.K
STLD.O	TR	VGR	WYNN.O
STML.O	TREX.K	VHC	X
STMP.O	TRHC.O	VHI	XEC
STRA.O	TRIP.O	VJAC.O	XENT.O
SUM	TRMB.O	VJAV.O	XERS.O
SUP	TRN	VICR.O	XLRN.O
SUPN.O	TRS.O	VIV.O.O	XNCR.O
SURF.O	TRU	VKT.X.O	XOG.O
SVMK.O	TRUE.O	VLGE.A.O	XOM
SWCH.K	TRXC.K	VLO	XPER.O
SWI	TSCO.O	VMC	XPO
SWK	TSLA.O	VMI	XRAY.O
SWKS.O	TSN	VMW	XRX
SWM	TTC	VND.A.O	XYL
SWN	TTD.O	VPG	YELP.K
SXC	TTEC.O	VRAY.O	YETI.K
SXI	TTEK.O	VREX.O	YEXT.K
SXT	TTGT.O	VRNS.O	YMAB.O
SYK	TTI	VRRM.O	YRCW.O
SYKE.O	TTMI.O	VRS	YUM
SYNA.O	TTWO.O	VRSN.O	YUMC.K
SYNH.O	TUP	VRTU.O	ZAGG.O
SYRS.O	TVTY.O	VRTV.K	ZBH
SYX	TWI	VRTX.O	ZBR.A.O
SYZ	TWLO.K	V.SAT.O	ZEN
T	TWNK.O	VSEC.O	ZGNX.O
TACO.O	TWOU.O	VSH	ZIOP.O
TALO.K	TWST.O	VSTM.O	ZIXI.O
TAP	TWTR.K	VSTO.K	ZNG.A.O
TAST.O	TXMD.O	VVI	ZS.O
TBI	TXN.O	VVV	ZTS
TBIO.O	TXRH.O	VYGR.O	
TCD.A.O	TYL	VZ	
TCMD.O	UAA	W	
TCS	UAL.O	WAB	
TCX.O	UBX.O	WAT	
TDC	UCTT.O	WATT.O	
TDG	UEIC.O	WBA.O	
TDOC.K	UFI	WBC	
TDS	UFPI.O	WBT	
TDW	UFS	WCC	
TDY	UGI	WDC.O	
TECH.O	UHAL.O	WDFC.O	
TELL.O	UHS	WEN.O	
TEN	UI	WERN.O	