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Resilience of Environmental and Social Stocks under Stress: Lessons from the COVID-19 Pandemic

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Abstract

This paper examines whether environmental and social (ES) activities affect the resiliency of firms during the COVID-19 crisis. We study a sample of 330 firms operating in five developed countries: Canada, France, Japan, the UK and the US. Our analysis shows that US firms with a high ES ranking experienced a significantly lower stock price range volatility during the Covid stock market rundown of February-March 2020. Such findings also hold for Japanese firms but only later on after the introduction of government support. In terms of returns, compared to their peers with a low ES ranking, Japanese and UK stock prices with a high ES ranking suffered more during and after the market rundown. For other countries, we do not find significant differences in stock price behavior based on ES ratings. Our findings suggest that engaging with ES activities is not associated with a better or worse performance during crisis times, which has important implications for investors and managers.

KEYWORDS
COVID-19, ESG Investing, Environmental and Social activities, Resiliency

JEL CLASSIFICATION
G12, G32, M14

1 | INTRODUCTION

At the beginning of 2020, the bull run at stock markets around the world, which lasted for almost a decade, was suddenly interrupted. The novel Coronavirus spread from China across the world and initiated a global pandemic. To contain the virus, international borders were closed, and global trade came to a standstill. Three months after the first case became known, public uncertainty grew across the globe, and stock markets started to crash on the 24th of February 2020. This date marks the beginning of a "*fever period*" (Ramelli & Wagners, 2020), the most intense time for stock markets. As during all major stock market crashes before, investors once again raised the question as to how one could best protect a portfolio against such shocks. In particular, CSR (Corporate Social Responsibility), which is also referred to as ESG (Environmental, Social and Governance) engagement, received higher attention due to its potential role as a resiliency factor.

The reader should first note that there is no standardized definition of ESG criteria commonly adopted (Baier et al., 2020). As such, previous ESG literature rely either on ESG data produced by third party organizations, e.g., ESG rating agencies, ESG information produced by the firm, e.g., annual reports, or outside the firm, e.g., credit rating agencies. For instance, Baier et al. (2020) use a textual analysis and find that ESG words represent 4% of the total words of 10-K reports and proxy statements of the 25 largest companies in the S&P 100 index. Most of these ESG words are about the "G" or governance. Kiesel and Lücke (2019) also use a textual analysis to examine the extent to which credit rating agencies integrate ESG issues in their rating decisions. They find a limited integration of ESG issues in rating decisions with a particular focus on governance. Although limited, higher ESG integration is negatively associated with market reaction (negative abnormal returns and positive abnormal CDS spreads). Kiesel and Lücke (2019) argue that investors are more interested in ESG risks and credit rating agencies tend to focus on those risks when they make rating decisions.

Numerous studies use ESG data produced by rating agencies and report a positive relationship between ESG and financial performance (Waddock & Graves, 1997; Orlitsky et al., 2003; Hull & Rothenberg, 2008; Margolis et al., 2010; and Busch & Friede, 2018). Carroll and Shabana (2010) argue that CSR reduces risk and cost, through tax savings for instance, but also strengthens reputation and builds competitive advantage, all of which positively impact the valuation of the company. Ambec and Lanoie (2008) find that expenses incurred to reduce pollution can be partially or entirely offset by potential revenue increase or cost reduction, creating a win-win for investors and the environment. Clarkson et al. (2011) find that improvements in environmental performance lead to an increase in financial performance in subsequent periods. Albuquerque et al. (2019) argue that firms use ESG investments and policies as a signaling strategy. This policy increases customer loyalty, which results in higher profit margins and firm value. During crises periods, high ESG companies should therefore display better stock performance and higher resiliency than low ESG companies. Barauskaite and Streimikiene (2021) carry out an exhaustive literature review and conclude that CSR (or ESG engagement) has hardly any harmful effects on firms and that most studies report a positive relationship between CSR and financial performance.

The stakeholder view of corporate social responsibility -doing well by doing good- suggests that social responsibility acts as a resilience factor against uncertainty (Ansoff, 1965; Freeman, 1984). This view assumes that shareholders benefit from CSR commitment of companies (McWilliams & Siegel, 2001). The academic literature has provided supporting evidence for this assumption by mainly using US data (Becchetti & Ciciretti, 2009; Lins et al., 2017; Bouslah et al., 2018; Albuquerque et al., 2020)[i]. For instance, Lins et al. (2017) find that firms with high CSR scores significantly outperform firms with low CSR scores in profitability, growth, and sales during the 2007- 2008 global financial crisis. They argue that companies with high ESG ratings benefit from higher investor confidence during uncertain times such as shocks. This is supported by Guiso et al. (2008) from a shareholder perspective, who claim that financial ratios typically used to assess companies, are no longer trusted during distress times. Investors, therefore, switch to other methods and assign a higher value to companies with higher ESG rankings.

The crisis triggered by the Coronavirus pandemic is different from the 2007–2008 financial crisis and offers a unique setting to test the CSR resiliency hypothesis. To date, there is only limited evidence on how pandemics affect financial markets (Goodell, 2020). Only vague parallels can be drawn with natural disasters, as nothing comparable has ever occurred except for the 1918 influenza pandemic in the distant past. Some scholars started examining whether ESG engagement is a resiliency factor during and following the Covid crisis (Albuquerque et al., 2020; Ding et al., 2020; Selmi et al., 2021; Umar & Gubareva, 2021).

One strand of the recent literature shows that ESG portfolios and funds exhibit lower risk, higher returns and receive more inflows relatively to benchmarks during the Covid period (Singh, 2020; Ferriani & Natoli, 2020; Kanamura, 2021; Hasaj & Scherer, 2021; Omura et al., 2021; Rubbany et al., 2021). Moreover, Pastor and Vorsatz (2020) show that the higher the Morningstar Sustainability ranking, the more pronounced the effect is. However, some studies do not find such an effect for Exchange Traded Funds (Folger-Laronde et al., 2020; Omura et al., 2021; Pavlova & de Boyrie, 2021). Appendix A1 provides a review of the literature on ESG investing and sustainable finance during the COVID 19 pandemic.

Another strand of the recent literature examines the impact of the Coronavirus pandemic on the risk and return at the company level during the period of market crash (24th February - 30th March 2020). The evidence is rather mixed. Albuquerque et al. (2020) and Yoo et al. (2021) find higher returns and lower volatility for US firms with higher ESG ratings. Some papers also show that high ESG firms exhibit lower volatility for a sample of Chinese (Broadstock et al., 2021) and European firms (Hoang et al., 2021). Palma-Ruiz et al. (2020) and Selmi et al. (2021) study Spain and the US markets, respectively, and find that a company that focuses on ESG outperforms others and enjoys greater investor confidence. In economies where ESG activities were already prominent, the decline in stock prices, during the market crash in the first quarter of 2020, was less severe (Ding et al., 2020). However, Demers et al. (2021) and Tampakoudis et al. (2021) find that US firms with high ESG ratings were not immune to the downturn in the first quarter of 2020, and higher ESG ratings did not act as a resiliency enhancing factor. Similar evidence is shown by Takahashi and Yamada (2021) who study Japanese firms and find no evidence that high ESG scores lead to higher returns during the covid stock market crash.

This paper contributes to the literature on the impact of adopting ESG policies on firms' resiliency in a severe market downturn. We use the COVID-19 pandemic as an exogenous shock, and examine whether firms with a high ES rating outperform comparable firms with a low ES rating. This paper contributes to this literature by examining whether the evidence from the US can be generalized to other countries. We study a sample of 330 firms from five countries (Canada, France, Japan, the UK, and the US) during 2020. We split the study period into three windows. The first time-window, which we call *covid*, starts on 24th February and ends on 18th March, when President Trump introduced the first fiscal stimulus package. The second time-window, hereinafter *"fiscal"* starts on 18th March and lasts until 31st March. The period after that, hereinafter *"postc"*, continues until the end of the year 2020. We consider the three event windows to capture the effects of the stock market collapse, the aggressive fiscal and monetary response, and the recovery period, respectively.

The results show that Japanese firms with a high ES ranking experienced significantly negative abnormal returns during the *covid* period. During the fiscal period, we do not find significant results for any of the countries under investigation. In the *postc* period, we find negative abnormal returns for UK firms with higher ES ranking.

We repeat the same analysis for volatility. We find that the stock price volatility for US firms with higher ES rating is lower than those firms with lower ES rating. For other countries, we do not find a significant relationship between ES rating and volatility, except for a significantly negative relationship between high ES rating and volatility for Japanese firms during the *postc* period.

Next, we examine the operating performance of firms with a higher ES rating relative to those with a lower ES rating. The results do not show a persistent and significant relationship between ES rating and operating performance. The only exception is the significantly negative association between operating profit margin and ES rating for US firms.

This study shows that more engagement with ES activities is not associated with more resiliency during crisis time. Indeed, we only uncover such resiliency for US firms. At the same time, we do not observe that firms with higher ES

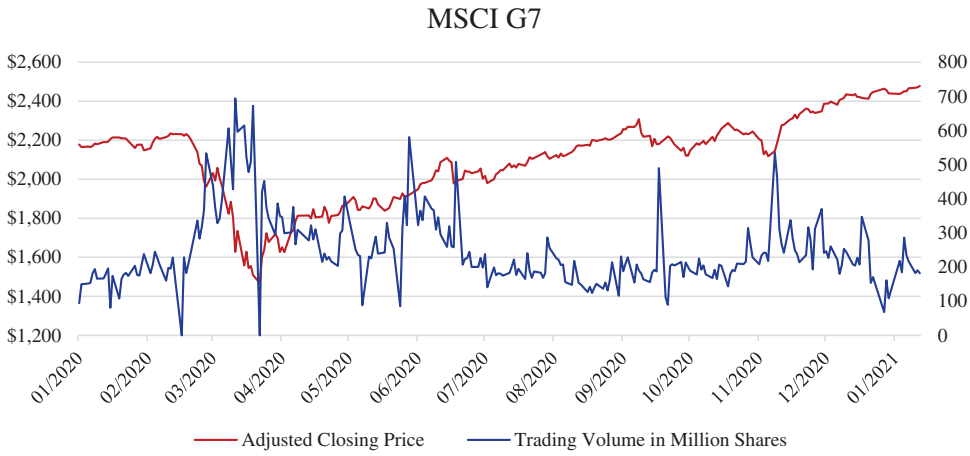

FIGURE 1 Performance of the MSCI G7 Index The graph shows the adjusted closing price of the MSCI G7 Index from January 2020 to January 2021, including the corresponding daily trading volume. On 19 February 2020, the index closed at an all-time high and then went down by almost 30% the following days. On 1st April 2020, the index closed at $1,627. In the subsequent recovery phase, however, the index exceeded its previous peak values again [Color figure can be viewed at wileyonlinelibrary.com]

activities have poorer performance during the market turmoil. The findings have important implications for managers and investors, for instance whether investors should pay a premium for well-rated companies with the hope that they are better prepared for a crisis, or whether investors with social responsibility concerns should consider a discount for their investment as it might be adversely affected in crises times.

The remainder of this paper is structured as follows. Section two lays out the research design, data and summary statistics and empirical methodology. Section three presents and discusses the results. Lastly, section four provides concluding remarks.

2 | RESEARCH DESIGN

2.1 | The COVID-19 pandemic as an exogenous shock

The example of the MSCI G7 Index in Figure 1 illustrates the high levels of uncertainty in financial markets. Within one month, the index plunges by almost 30% from its peak on the 19th of February 2020. Trading volume also increases sharply during this period as investors seek to shield their assets from the impacts of the pandemic.

The unanticipated and exogenous character of the pandemic and the speed at which it unfolded made it almost impossible for companies and investors to appropriately manage the shock. With only limited reaction time at hand, companies had to deal with factory closings through government guidelines and suffer from consequent losses in sales. Therefore, Albuquerque et al. (2020) conclude that "*the stock market reacted primarily to firms' pre-existing conditions that affect their ability to endure the crisis*".

2.2 | Sample construction

The sample is constructed based on the Thomson Reuter Refinitiv ESG database and DataStream. Refinitiv collects its data on an annual basis from a variety of sources such as annual reports, NGO websites, or CSR reports[ii] and has

TABLE 1 . Number of Firms in our Sample

Types of Firms	CA	FR	GB	JP	US	Total
ES_low	10	7	9	32	50	108
ES_high	21	12	24	58	107	222
Total	31	19	33	90	157	330

This table presents the number of firms in our sample after matching the firms in top quartile of ES ratings with those in the lowest quartile based on size, leverage and industry.

been used by researchers in various studies (Albuquerque et al., 2020, Ding et al., 2020 and Demers et al., 2021 among others). Following previous literature, we exclude the G score from the main tests as governance is usually not part of the CSR engagement of a company (e.g. Lins et al., 2017 and Albuquerque et al., 2020). We obtain accounting data as well as daily stock return data for the 2017–2020 period from the Thomson Reuters DataStream database.

We follow the literature and remove financial firms from the sample due to their specific balance sheet structures (e.g. Albuquerque et al., 2020, and Lins et al., 2017). In addition, firms with a lack of data coverage due to mergers, delisting or bankruptcy are removed. The remaining sample with non-missing ESG data in 2019 consists of 1,240 firms from G7 countries[iii].

For each country, we classify firms into four quartiles based on their ES score in 2019. We remove firms in the second and third quartiles. Next, we match the firms in the first quartiles (*ES_high*) with those in the fourth quartiles (*ES_low*). Matching is with replacement and it is performed based on firm size, leverage and industry in 2019. The propensity score matching enables us to have a set of comparable firms as benchmark for our analysis, and thereby avoids an implicit extrapolation in our regression estimates. Due to lack of sufficient data we are unable to find an appropriate match for the firms in Italy and Germany.[iv] The final sample includes 330 firms (222 firms with *ES_high* and 108 firms with *ES_low*) from five countries: Canada, France, Japan, the UK, and the US. Table 1 demonstrates the number of firms in each country.

2.3 | Empirical Methodology

2.3.1 | Performance of ESG Firms under the COVID-19 Pandemic – Market-Based Analysis

We follow Albuquerque et al. (2020) and adopt the following regression model:

$$Performance_{i,t} = \alpha + \beta_1 ES\_high_i + \beta_2 ES\_high_i * covid\_d_t + \beta_3 ES\_high_i * fiscal\_d_t + \beta_4 ES\_high_i * postc\_d_t + \beta_4 Industry\ FE_i + \beta_5\ Time\ FE_t + \varepsilon_{i,t} \quad (1)$$

Where *i* and *t* subscripts represent firm and day;

We use two variables for *Performance*: abnormal returns and return volatility. As illustrated in Equation 2, we compute daily abnormal returns as the difference between the actual return of a share and its expected return. The expected return is computed using the CAPM equation. The corresponding country stock market index is used as the market return in the CAPM equation[v]. We use the daily data of the last six months of 2019 for parameters' estimation. The descriptive statistics of the sample is presented in appendix A3.

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (2)$$

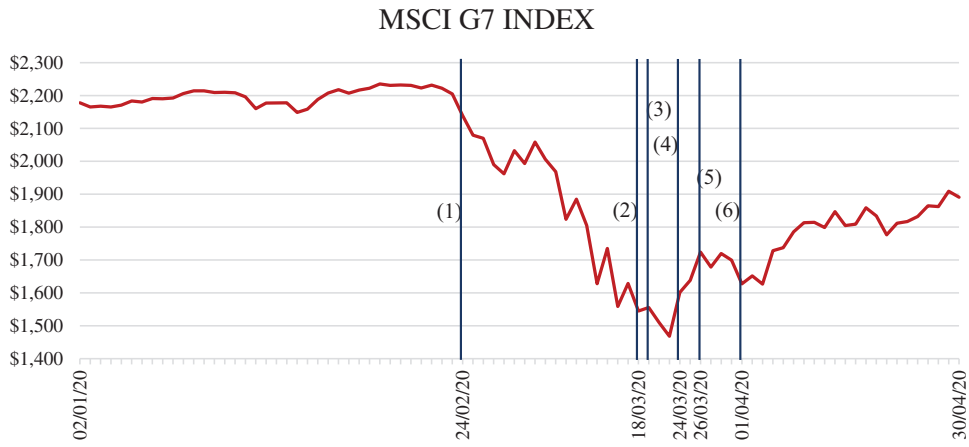

FIGURE 2 MSCI G7 Index during the Critical Phase of the COVID-19 Pandemic This graph shows the performance of the MSCI G7 Index from the beginning of January 2020 to the end of April 2020. It has been created from a combination of historical data from investing.com (2021), press releases from the G7 (2020) and the BAF (2020). The vertical lines 1 to 4 represent important days in the unfolding of the Coronavirus pandemic in Europe. Line 1 represents the beginning of the "fever" period (Ramelli and Wagner, 2020), on the first trading day following the first lockdown in Europe, in Northern Italy, on 24 February 2020. Lines 2, 3, 4, and 5 represent the announcement of the US stimulus package on 18 March 2020, the most extensive relief package in Germany's history on 19 March 2020, the declaration of the G7 to support the economy with all means available on 24 March 2020 and the G20's decision to invest more than 5 trillion dollars in strengthening the economy on 26 March 2020, respectively. Lastly, line 6 represents the start of the recovery period [Color figure can be viewed at wileyonlinelibrary.com]

For return volatility, we follow Albuquerque et al. (2020) and use a "*range-based measure of daily volatility*" calculated as the daily high price minus the daily low price divided by the mid-price as the dependent variable.

ES_high is a dummy variable equal to one for firms with high ES score (top quartile) and to zero for *ES_low* firms (the lowest quartile). Its coefficient shows the difference between these two groups of firms during the pre-*covid* period (01 January 2020 until 23 February). *covid_d* is a dummy variable that takes the value of one during *covid* and zero otherwise. The coefficient of the interaction term between *ES_high* and *covid_d* captures whether the pandemic had a significant impact on abnormal returns of companies with high ESG rankings.

Fiscal-d is a dummy variable equal to one during the *fiscal*, and to zero otherwise. The interaction term *ES_high***fiscal_d* controls for the period after the announcement of the first stimulus packages to support companies in the US, EU countries, the G7 and G20. This interaction term is included to isolate the pandemic shock period and its impact from the period of when government interventions started to take place. We introduce the third interaction term between *ES_high* and the dummy variable, *postc_d*, which equals one for *postc* period and zero otherwise.

Figure 2 supports the dates chosen for the *covid*, *fiscal* and *postc* event windows in our analysis. The 24th of February (line 1) marks the start of the pandemic in Europe and is, therefore, the date from which onward the *covid_d* is set to one. The second dummy *fiscal_d* takes the value one from the 18th of March until the 31st of March 2020. It comprises the dates on which governments enacted support policies for corporations. Starting day, is the day when President Trump announced the first stimulus package for the United States (line 2). Shortly after, the German Federal Ministry of Finance announced its €820 billion relief package (line 3), €600 billions of which was to help German firms recover from the COVID shock (BMF, 2020).

The figure also includes the press release of the G7 Finance Ministers and Central Bank Governors (line 4) which states that they will do everything possible to restore confidence in the economy and foster economic growth. In addition, they planned to protect jobs and businesses from the broader consequences of the shock (G7, 2020). Line 5 marks the G20's decision to invest over $5 trillion in the global economy to offset the economic impact of the Pandemic

(BMF, 2020). The last period of interest, *postc*, starts on 1st April and lasts until the end of the year to cover the recovery period (line 6).

To control for unobservable effects, we include industry ($IndustryFE_i$) and day ($TimeFE_t$) fixed effects. We cluster standard errors by firm.

2.3.2 | Performance of ESG Firms under the COVID-19 Pandemic – Accounting-Based Analysis

Given that accounting-based measures of performance are not available for our three time windows, we use the following simple cross-sectional regression model:

$$Performance_i = \beta_0 + \beta_1 ES\_high_i + \beta_2 Controls_i + \beta_3 Industry\ FE_i + \beta_4 Time\ FE_i + \varepsilon_i \quad (3)$$

In the previous regression model, our objective is to take advantage of market data. However, unlike equity returns, accounting figures are not forward-looking and take longer to reflect change in circumstances. This is especially true when a shock such as the COVID-19 pandemic is still unfolding (Albuquerque et al., 2020). As we are further along in the pandemic than Albuquerque et al. (2020) at the time of writing, we can get a more holistic view of the response of accounting metrics to the pandemic. We measure the change in operating performance from 2019 to the whole crisis year of 2020.

In line with Gompers et al. (2003), we estimate median regressions to observe changes in operating performance. For the dependent variables, we follow Albuquerque et al. (2020) and use three different metrics as specified in Table A2: The return on assets (ROA), the operating profit (OPM), and the asset turnover (AT). To reduce the impact of outliers in the accounting data, we use the smallest absolute deviation method. For this specification, we follow Gompers et al. (2003) and control for book-to-market ratio, cash holdings, and leverage. We also include industry ($IndustryFE_i$) and time ($TimeFE_t$) fixed effects in our model. The standard errors are robust to heteroscedasticity.

3 | EMPIRICAL RESULTS

3.1 | Descriptive statistics

Tables 2 and 3 present the descriptive statistics of all variables for both firms with high ES ratings and firms with low ES ratings, respectively. The mean (median) ES score is 0.305 (0.298) for firms in the lowest quartile of the ES score distribution, whereas it is 0.831 (0.827) for firms in the highest quartile of the distribution.

Financial variables can be grouped into three categories: daily market data, annual market data, and accounting data. Tables 2 and 3 show no systematic differences in daily and annual market data between the two types of firms. The daily abnormal return and price range volatility are similar for both types of firms during 2020. The mean (median) value of the daily abnormal return is zero for both types of firms, with slightly higher volatility of daily abnormal returns for firms with low ES ratings (3.2% versus 2.6%). Similarly, the mean (median) values of the price range volatility are similar for both types of firms (0.034 and 0.026 versus 0.039 and 0.028, respectively).

A similar pattern is also observed in annual abnormal return, idiosyncratic volatility, and total volatility. The mean value of the annual abnormal return is negative and of the same magnitude for both types of firms (−4.1% and −4.3%). However, the median value of the annual abnormal return is higher for firms with high ES ratings (−3.1% compared to −9.6%). The annual idiosyncratic and total volatility are similar for both types of firms. For example, the mean values are 2.4% and 3.1% compared to 2.8% and 3.4%, respectively.

TABLE 2 Descriptive Statistics for firms with high ES ratings

Variable	Mean	Median	SD	Min.	Max	Skewness	Kurtosis	N
Daily abnormal return	0	0	0.026	−0.631	0.709	−0.193	42.549	58164
Daily price range	0.034	0.026	0.029	0	0.712	4.451	43.885	55341
ES	0.831	0.827	0.066	0.704	0.97	0.095	2.196	222
Annual abnormal return	−0.041	−0.031	0.315	−1.338	1.437	0.123	6.735	222
Annual idiosyncratic volatility	0.024	0.02	0.011	0.011	0.084	2.102	8.356	222
Annual volatility	0.031	0.027	0.012	0.005	0.088	1.843	7.149	222
ΔROA	−0.013	−0.008	0.042	−0.194	0.09	−1.465	7.066	220
ΔOPM	−0.004	0	0.07	−0.421	0.335	−1.82	16.565	220
ΔAT	−0.073	−0.037	0.127	−0.681	0.145	−2.073	8.245	220
BM	0.953	0.011	3.004	0	20.934	4.33	23.26	214
Size	16.315	16.362	1.034	13.855	18.51	−0.077	2.299	222
Cash holdings	0.127	0.094	0.118	0.002	0.579	1.645	5.531	220
Leverage	0.257	0.249	0.153	0	0.812	0.374	3.132	222
ROE	0.178	0.127	0.236	−0.509	1.293	2.157	11.728	215
Historical volatility	0.018	0.016	0.006	0.007	0.05	1.442	7	222

This table presents the descriptive statistics of our sample of 222 firms with high ES ratings. The variable definitions are presented in the appendix A2.

Regarding the operating performance, both firms with high ES ratings and firms with low ES ratings have comparable mean (median) values of the changes in return on assets (ROA), and asset turnover (AT). However, firms with high ES ratings seem to have higher change in operating profit (OPM). Both types of firms have comparable size, leverage, cash holdings, and historical volatility. However, firms with high ES ratings have lower book-to-market value and higher return on equity (ROE) compared to firms with low ES ratings.

To avoid the influence of outliers, we winsorise all accounting variables at the 1st and 99th percentiles. Table 4 shows the pairwise correlation coefficients, revealing no serious multicollinearity issues in our model.

Figure 3 depicts daily abnormal returns of *ES_high* and *ES_low* for the study period. The red vertical line refers to the start of the *covid* period. The graphs show a fairly stable trend for both groups of firms prior to the *covid* period, and a volatile trend afterwards. The volatility of the abnormal returns is higher for *ES_low* than those of *ES_high* in Canada, France, Japan and the US. For the UK sample, the patterns look similar for both groups of firms.

3.2 | Stock returns

Table 5 presents the results of Equation (1) when the dependent variable is the abnormal returns. During the pre-*covid* period, the coefficient of *ES_high* is not statistically significant. Hence, differences between actual returns and those explained by the CAPM are not influenced by variations in ES ratings. The only exception is Japan but the coefficient is positive only at the 10% significance level.

During the *covid* period, the table shows that the coefficient associated with the interaction between the variable *ES_high* and the variable *covid_d* is positive and marginally significant for US (at the 10% level), whereas this coefficient is negative and significant at the 5% level for Japan[vi]. However, this coefficient is not statistically significant for Canada, France and the UK. Therefore, the impact of ES ratings on abnormal return varies across countries.

TABLE 3 Descriptive Statistics for firms with low ES ratings

Variable	Mean	Median	SD	Min.	Max	Skewness	Kurtosis	N
Daily abnormal return	0	0	0.032	−0.836	0.497	−0.372	45.714	28296
Daily price range	0.039	0.028	0.035	0	0.756	4.254	39.275	26960
ES	0.305	0.298	0.147	0.013	0.764	0.548	3.878	108
Annual abnormal return	−0.043	−0.096	0.343	−0.818	1.124	0.705	4.305	108
Annual idiosyncratic volatility	0.028	0.023	0.015	0.012	0.101	2.142	8.679	108
Annual volatility	0.034	0.029	0.016	0.016	0.108	1.875	7.289	108
ΔROA	−0.016	−0.007	0.046	−0.24	0.251	0.281	17.265	108
ΔOPM	−0.016	−0.002	0.077	−0.481	0.193	−2.582	15.411	108
ΔAT	−0.065	−0.036	0.117	−0.757	0.088	−3.014	15.88	108
BM	1.892	0.018	5.36	0	25.618	3.617	15.57	104
Size	15.952	15.884	1.062	12.41	18.281	−0.158	3.405	108
Cash holdings	0.114	0.072	0.126	0.002	0.59	1.935	6.749	108
Leverage	0.242	0.235	0.172	0	0.812	0.75	3.659	108
ROE	0.115	0.1	0.176	−0.731	1.293	2.075	25.502	104
Historical volatility	0.018	0.016	0.008	0.008	0.05	1.853	6.766	108

This table presents the descriptive statistics of our sample of 108 firms with low ES ratings. The variable definitions are presented in the appendix A2.

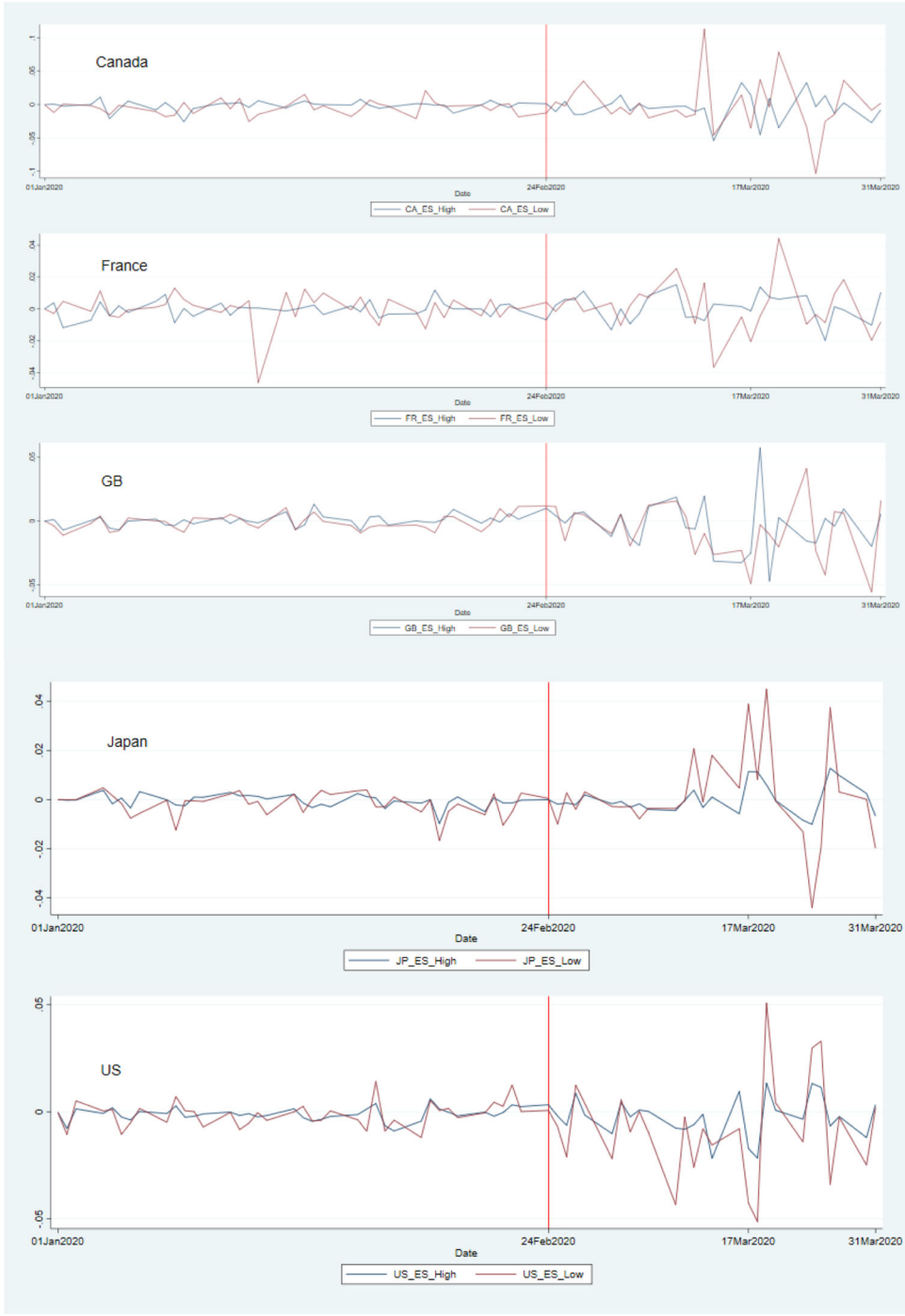

FIGURE 3 Daily Abnormal Return of ES_high and ES_low firms (Con't). Daily Abnormal Return of ES_high and ES_low firms This graph shows the mean daily abnormal returns from the beginning of January 2020 to the end of the fiscal period (31 March 2020). For each country, we plot the mean daily abnormal returns for ES_High firms (blue line) and ES_Low firms (pink line). The red vertical line refers to the start of the covid period (24 February 2020). The period before the red vertical line is the pre-covid period (1st January – 23 February 2020). The period after the red vertical line is the covid period (24 February to 17 March 2020) and the fiscal period (18 to 31 March 2020) [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 4 Correlation Coefficients

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
ES	(1)	1						
BM	(2)	−0.2131*	1					
Size	(3)	0.2203*	−0.0672	1				
Cash holdings	(4)	0.0218	0.2097*	−0.1815	1			
Leverage	(5)	0.1132	−0.0976	0.2870*	−0.3429*	1		
ROE	(6)	0.1694	−0.1489	0.1575	0.0569	0.1654	1	
Hist. Volatility	(7)	−0.0388	−0.102	−0.3025*	−0.0036	−0.0211	−0.2783*	1

This table presents the pair-wise correlation coefficients among our control variables.

TABLE 5 Regression for Daily Abnormal Returns

Dependent Variable: Daily abnormal returns	US	JP	GB	FR	CA
ES_high	−0.000	0.001*	0.001	−0.000	0.000
	(−0.24)	(1.74)	(1.57)	(−0.27)	(0.06)
*ES_high *covid_d*	0.008*	−0.005***	0.001	0.000	−0.006
	(1.92)	(−3.63)	(0.18)	(0.02)	(−0.77)
*ES_high * fiscal_d*	0.000	0.001	0.004	−0.001	−0.007
	(0.08)	(0.58)	(0.54)	(−0.26)	(−1.30)
*ES_high * postc_d*	−0.001	−0.001	−0.002***	0.000	−0.002
	(−0.75)	(−0.83)	(−2.84)	(0.29)	(−0.88)
Constant	−0.002**	−0.001	−0.001*	0.001	−0.003**
	(−2.57)	(−1.61)	(−1.94)	(0.87)	(−2.13)
Observations	41,134	23,580	8,646	4,978	8,122
Number of firms	157	90	33	19	31
Industry FE	YES	YES	YES	YES	YES
Day FE	YES	YES	YES	YES	YES
R-squared	0.06	0.07	0.08	0.05	0.05

This table presents the results of the regressions of daily abnormal returns during the year 2020 for the five countries. We divided the year into three parts beginning with the start of the Pandemic. The variable covid equals one from February 24 to March 17, 2020, and zero otherwise. The variable fiscal equals one from March 18 to March 31, 2020, and zero otherwise. The variable postc equals one from April 1 until December 31, 2020, and zero in the time period before. Industry and day fixed effects are included in the specification. Standard errors are clustered by firm. The t-statistics are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

These results suggest that US firms benefit from a higher ES ranking during the covid period, while Japanese firms with higher ES ranking suffer more than those with lower ES rankings. These effects are economically meaningful. US (Japanese) firms in the highest ES quartile – in comparison with *ES_low* firms - experience an average daily abnormal return of 0.008% (−0.005%) during the *covid* period, translating to a cumulative effect of 0.136% (−0.085%) for 17 trading days during the *covid* period.

During the *fiscal* period, the coefficient associated with the interaction between the variable *ES_high* and the variable *fiscal_d* is insignificant for all five countries. In the *postc* period, the coefficient associated with the interaction

TABLE 6 Regression for Daily Price Range Volatility

Dependent Variable: Price range volatility	US	JP	GB	FR	CA
ES_high	−0.002	0.002***	0.001	0.004	0.013**
	(−1.00)	(3.15)	(0.26)	(0.95)	(2.27)
*ES_high *covid_d*	−0.010**	−0.000	0.006	0.005	−0.003
	(−2.28)	(−0.22)	(0.83)	(0.97)	(−0.32)
*ES_high *fiscal_d*	−0.014**	−0.000	0.009	−0.008	0.001
	(−2.28)	(−0.14)	(0.59)	(−0.56)	(0.06)
*ES_high *postc_d*	−0.004**	−0.003***	−0.004	−0.001	−0.007
	(−2.26)	(−2.93)	(−0.93)	(−0.32)	(−1.60)
Constant	−0.000	0.046***	0.056***	0.056***	0.054***
	(−0.00)	(27.95)	(6.00)	(4.09)	(7.50)
Observations	39,722	21,539	8,377	4,883	7,780
Number of firms	157	90	33	19	31
Industry FE	YES	YES	YES	YES	YES
Day FE	YES	YES	YES	YES	YES
R-squared	0.52	0.54	0.36	0.60	0.47

This table presents the results of the regressions of daily price range volatility during the year 2020 for the five countries. We divided the year into three parts beginning with the start of the Pandemic. The variable covid equals one from February 24 to March 17, 2020, and zero otherwise. The variable fiscal equals one from March 18 to March 31, 2020, and zero otherwise. The variable *postc* equals one from April 1 until December 31, 2020, and zero in the time period before. Industry and day fixed effects are included in the specification. Standard errors are clustered by firm. The t-statistics are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

between the variable *ES_high* and the variable *postc_d* is also insignificant, except for the UK. UK firms with high ES ranking experienced significantly lower abnormal returns compared to their peers with a low ES ranking during the *postc* period.

We also compute cumulative abnormal returns (CARs) for *ES_high* and *ES_low* firms during *covid* and *fiscal* periods, and test their significance. Table A3 illustrates the results. During *covid*, the CARs of both groups of firms are statistical insignificant for Canada, France and UK. For Japanese firms, we observe that the CARs are significantly positive for *ES_low* firms, whereas the CARs of *ES_high* firms are insignificant. In the US, CARs are significantly negative for both groups of firms. However, the economic magnitude is larger for *ES_low* firms, implying that such firms are more adversely affected by the crisis.

The table also reports the mean equality test of the CARs of the two groups of firms. We observe that the difference in CARs of the two groups is insignificant for Canada, France and the UK in both *covid* and *fiscal* periods. For Japan, the CARs of *ES_low* are significantly larger than those of *ES_high* during the *covid* period. For the US, we find an opposite result for the *covid* period. In both countries, we do not find a significant difference during *fiscal* period.

3.3 | Volatility of stock returns

To explore the resiliency of high ES firms, we use the range-based measure of daily volatility as the performance measure and re-estimate Equation (1). The price range volatility is calculated as the difference between the daily high price and the daily low price divided by the midpoint of high and low daily prices. Table 6 displays the results.

TABLE 7 Cross-sectional regressions for operating performance – Asset Turnover

Dependent variable: Asset turnover	US	JP	GB	FR	CA
ES_high	−0.031	−0.024	0.096	−0.058	−0.006
	(−1.33)	(−1.40)	(1.47)	(−0.29)	(−0.15)
BM	−0.046	−0.001	2.749	−2.001	−0.044
	(−0.30)	(−0.84)	(0.17)	(−0.06)	(−0.05)
Cash holdings	0.037	0.070	0.343	−0.001	−0.371
	(0.82)	(1.28)	(0.50)	(−0.00)	(−0.82)
Leverage	0.160***	−0.012	−0.168	0.709	0.058
	(2.75)	(−0.30)	(−0.48)	(0.29)	(0.56)
Constant	−0.111**	−0.047	−0.017	−0.106	−0.025
	(−2.37)	(−1.17)	(−0.08)	(−0.07)	(−0.43)
Observations	148	88	30	18	30
Industry FE	YES	YES	YES	YES	YES
Pseudo-R-sq	0.0921	0.0616	0.24	0.624	0.576

This table shows the results of the cross-sectional regression for the annual change in asset turnover between the years 2020 and 2019. The control variables are defined in Table A2. Standard errors are heteroscedasticity robust. The t-statistics are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

During the pre-*covid* period, the coefficient associated with *ES_high* is not statistically significant for France, UK and US indicating there is no systematic differences between price range volatility of firms with *ES_high* and firms with *ES_low* in these three countries. However, Japanese and Canadian firms with *ES_high* have higher price range volatility than firms with *ES_low* during the pre-*covid* period.

During the *covid* period, the coefficient of the interaction term between the variable *ES_high* and the variable *covid_d* is negative and significant at the 5% level for the US only. This coefficient is not statistically significant for other countries, i.e. Canada, France, Japan and the UK.

The results during the *fiscal* period are similar to those of the *covid* period. The coefficient of the interaction term between *ES_high* and *fiscal_d* is insignificant for all countries, except the US.

In the *postc* period, the coefficient associated with the interaction between *ES_high* and *postc_d* is negative and significant at the 5% level in two countries: US and Japan. However, it is not statistically significant for Canada, France and the UK.

In sum, the results in Table 6 suggest that the impact of ES ratings on daily price range volatility differs across countries. In particular, we find reduced daily price range volatility for US firms with higher ES rating – in comparison with US *ES_low* firms- during all periods of interest. On average, daily price range volatility decreases by 0.01%, 0.014% and 0.004% during the *covid*, *fiscal* and *postc* periods, respectively. In addition, we observe a significant reduction (0.003%) in daily price range volatility of Japanese firms with high ES rating – in comparison with *ES_low* firms- during the *postc* period. Overall, the resiliency hypothesis of firms with high ES ratings, as proxied by abnormal stock returns and volatility, is not observed persistently in all countries.

3.4 | Operating performance

In this sub-section, we study the performance of firms with high ES ratings based on accounting measures. Tables 7, 8 and 9 present the estimation results of Equation (3). The analysis shows that the coefficient of our variable interest,

TABLE 8 Cross-sectional regressions for operating performance – Operating Profit Margin

Dependent variable: Operating profit margin	US	JP	GB	FR	CA
ES_high	−0.013**	0.007	−0.012	−0.031	−0.083
	(−2.00)	(1.03)	(−0.62)	(−0.46)	(−1.71)
BM	−0.127	0.000	−0.392	0.105	−0.065
	(−1.27)	(0.20)	(−0.25)	(0.06)	(−0.02)
Cash holdings	0.042	−0.012	0.121	0.011	−1.145
	(1.10)	(−0.35)	(0.30)	(0.02)	(−0.90)
Leverage	0.030	−0.006	0.007	0.219	0.130
	(1.16)	(−0.19)	(0.12)	(0.98)	(0.42)
Constant	−0.055**	−0.000	0.049	−0.021	−0.086
	(−2.55)	(−0.00)	(0.99)	(−0.21)	(−0.40)
Observations	148	88	30	18	30
Industry FE	YES	YES	YES	YES	YES
Pseudo-R-sq	0.0852	0.0818	0.233	0.346	0.346

This table shows the results of the cross-sectional regression for the annual change in operating profit margin between the years 2020 and 2019. The control variables are defined in Table A2. Standard errors are heteroscedasticity robust. The t-statistics are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

that is *ES_high*, is mostly insignificant. The only exception is the significant and negative operating profit margin for US firms. These results are not in line with those found by Albuquerque et al. (2020) for US firms. Our findings suggest no significant difference between the operating performances of firms with a high ES rating relative to firms with a lower ES rating during 2020. The different results that we obtain compared to Albuquerque et al. (2020) could be explained by our different dataset which is constructed using propensity score matching procedure in order to have a comparable benchmark for firms with high ES ratings.

4 | CONCLUSION

During the year 2020, stock markets around the world experienced enormous ups and downs. At the beginning of the year, markets were booming. By the end of February, an unexpected exogenous shock triggered by the outbreak of the novel Coronavirus led to the fastest stock market collapse in history. However, markets recovered quickly few weeks later and have been regularly reaching new highs ever since. We use this unprecedented period to study the performance of firms with ES activities during turmoil. The unexpected nature of the event provides scholars with a unique opportunity as firms have not had any time to adjust to the sudden changes, and their resiliency is merely dependent on past strategic decisions.

Our research focuses on a sample of 330 non-financial firms listed on the stock markets of five countries during 2020 and with high differences in terms of ES ratings. We find that the impact of ES ratings on daily abnormal return and price range volatility significantly differs across countries. In particular, the resiliency hypothesis according to which firms with higher commitment and involvement in environmental and social activities are expected to show better resilience during crisis times does not hold for all countries. Our analysis shows that US firms with a high ES ranking experienced a significantly lower price range volatility during the Covid market rundown period. Such findings also hold for Japanese firms but only later on after the introduction of government support. In terms of returns, compared to their peers with a low ES ranking, Japanese and UK stock prices with a high ES ranking suffered more during

TABLE 9 Cross-sectional regressions for operating performance – Return on Assets

Dependent variable: Return on assets	US	JP	GB	FR	CA
ES_high	−0.005	0.001	0.004	−0.017	0.006
	(−0.63)	(0.21)	(0.18)	(−0.23)	(0.38)
BM	−0.027	0.000	0.713	−0.340	−0.086
	(−0.70)	(0.42)	(0.07)	(−0.22)	(−0.06)
Cash holdings	0.036*	−0.018	0.105	−0.073	0.059
	(1.87)	(−0.89)	(0.21)	(−0.09)	(0.19)
Leverage	0.051**	0.006	−0.028	0.169	0.008
	(2.26)	(0.34)	(−0.32)	(1.22)	(0.11)
Constant	−0.069***	−0.005	0.010	−0.014	−0.023
	(−3.70)	(−0.34)	(0.06)	(−0.11)	(−0.41)
Observations	148	88	30	18	30
Industry FE	YES	YES	YES	YES	YES
Pseudo-R-sq	0.0728	0.0552	0.238	0.65	0.436

This table shows the results of the cross-sectional regression for the annual change in return on assets between the years 2020 and 2019. The control variables are defined in Table A2. Standard errors are heteroscedasticity robust. The t-statistics are given in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

and after the market rundown. For other countries, we do not find significant differences in stock price behavior based on ES ratings.

Our analysis shows that higher ES ratings are not always a guarantee for better performance during a crisis period. This finding has implications for market participants, for instance, whether investors should pay a premium for well-rated companies with the hope that they are better prepared for a crisis. Such evidence merely holds for the US market. For the other countries in our sample (Canada, France, Japan and the UK) higher ES ratings are not associated with a better or worse performance vis-à-vis firms with lower ES ratings. Overall, the results suggest that investors with more social responsibility concerns are, at least, not more adversely affected than those who are less concerned.

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Notes

[i] Practitioners also share the opinion that ESG activities generate benefits for the company and its shareholders (Albuquerque et al. 2020). For instance, the 2009 and 2019 Global Survey on ESG programs produced by McKinsey show that practitioners in the industrial and the financial sector reported that engagement in ESG activities leads to an increase in shareholder value (Delevingne et al. 2020).

[ii] Other data sources include company websites, stock exchange filings and news sources which are analysed by more than 150 content research analysts and aggregated to the Refinitiv ESG database (Refinitiv, 2021).

[iii] The G7 countries consist of Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

[iv] There are a few listed firms with ES rankings in these two countries and we are unable to find appropriate pairs in our very small samples.

[v] CAC40 for France, Nikkei 225 for Japan, FTSE 100 for UK, S&P500 for US, and S&P/TSX for Canada.

[vi] We conduct a deeper analysis to explore whether variations in industries in our sample can explain this result. Specifically, we re-run our regression for Equation (1) using triple interaction terms between *ES_high*, *covid_d* and a dummy for each of the 9 industries in our sample: (1) oil and gas, (2) basic material, (3) industrials, (4) consumer goods, (5) health care, (6) consumer

services, (7) telecommunication, (8) utilities, and (9) technology. The results, which are not reported here, do not provide any consistent explanation of what could be driving our main findings.

CONFLICT OF INTEREST

none

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APPENDICES

TABLE A1 Literature

Research Question	Level	Reference	Sample	ESG Data Source	Result
How do firms with high ES ratings perform during Q1-2020 compared to other firms?	Firm level	Albuquerque et al. (2020)	2171 US firms	Refinitiv ESG	High ES stocks have higher returns, lower volatility, and higher operating profit margins during Q1-2020.
Do stocks with high ESG performance show resilience in times of crisis?	Firm level	Broadstock et al. (2021)	300 Chinese firms	SynTao Green Finance	ESG scores are positively associated with short-term cumulative returns around the Wuhan lockdown. ESG matters less (more) during 'normal' ('crisis') times.
Can ESG act as a resilience factor and explain returns during the Q1-2020 crisis period?	Firm level	Demers et al. (2021)	1642 US firms	Refinitiv EIKON ESG	ESG did not immunize stocks during the COVID-19 crisis. ESG scores are not related to firm's returns during Q1-2020.
Can ESG be a risk factor, in addition to the Fama-French factors, in explaining industry returns during the pandemic?	Portfolio level	Díaz et al. (2021)	1700 US firms	Sustainalytics	An ESG factor (difference in returns between firms in the top and bottom quartiles) explains industry portfolio returns during the Covid period (January to April, 2020). The ESG effect varies across industries and ESG pillars.
Which characteristics make some companies more "immune" to the COVID-19 shock than others?	Firm level	Ding et al. (2020)	6744 firms from 61 countries	Thomson Reuters ASSET4	The COVID-induced drop in stock returns was milder among high-ESG firms.

(Continues)

TABLE A1 (Continued)

Research Question	Level	Reference	Sample	ESG Data Source	Result
How sensitive is investor demand for SRI to cyclical fluctuations in economic conditions, especially negative economic shocks?	Portfolio level	Döttling and Kim (2021)	2720 US equity retail funds and 2421 US equity institutional funds	Morningstar sustainability ratings	High-ESG funds experienced a higher decline in fund flows from retail investors during the COVID period (February 22 to April 25, 2021). SRI demand is highly sensitive to real economic conditions.
Can the new Morningstar ESG risk scores contribute to explain the significant variations in fund flows during the COVID period?	Portfolio level	Ferriani and Natoli (2020)	2120 US equity mutual funds	Morningstar ESG risk indicators	Investors prefer low-ESG-risk funds, in particular those with low governance and environmental risks during the COVID period (February 24 to May 1st, 2021). Sustainability is perceived as a valuable hedge in uncertain conditions.
Is there a significant return difference between different levels of Eco-Fund ratings of ETFs during the COVID period?	Portfolio level	Folger-Laronde et al. (2020)	278 Canadian ETFs	Corporate Knights Eco-fund ratings	Canadian ETFs with high sustainability scores do not perform better during the COVID period.
Are smart beta and ESG returns impacted by a crisis specific industry rotation?	Portfolio level	Hasaj and Scherer (2021)	10 MSCI US indices (6 smart beta and 4 ESG indices)	MSCI	ESG portfolios outperformed benchmarks during COVID period. A substantial part can be explained by the industry rotation induced by COVID.

(Continues)

TABLE A1 (Continued)

Research Question	Level	Reference	Sample	ESG Data Source	Result
Is there any performance difference between High and Low ESG firms before and during the COVID period?	Firm level	Hoang et al. (2021)	344 European firms	MSCI; Sustainalytics	High ESG firms have lower volatility before and during COVID period. There is no difference between the financial performance of High and Low ESG firms.
Do high yield bond ETFs benefit from an ESG component?	Portfolio level	Kanamura (2021)	2 ESG and 1 conventional high yield bond ETFs	Bloomberg	ESG high yield bond ETFs have lower risk and higher returns compared to conventional counterpart during the COVID period crisis.
What are the characteristics of the literature, themes, and key areas of future research on CG in the COVID-19 era?	Literature	Koutoupis et al. (2021)	62 studies published in 2020	N.A.	The impact of COVID has been studied mainly in developed countries. The results regarding the relevance of ESG to financial performance are mixed.
Do SRI/ESG investments outperform conventional investments during the COVID pandemic?	Portfolio level	Omura et al. (2021)	4 SRI indices and 24 ESG ETFs.	MSCI SRI Indices, ESG ETFs	SRI indices outperform benchmarks before and during COVID period. ESG ETFs did not outperform benchmarks.

(Continues)

TABLE A1 (Continued)

Research Question	Level	Reference	Sample	ESG Data Source	Result
Did companies that announced donations during the pandemic have better stock market performance?	Firm level	Palma-Ruiz et al. (2020)	35 Spanish firms	Companies' press releases and news.	Companies that made donations outperform companies that did not make donations.
Did actively managed funds outperform the S&P 500 during the pandemic and do good sustainability ratings have a positive impact on performance?	Portfolio level	Pastor and Vorsatz (2020)	3626 US equity mutual funds	Morningstar	Mutual funds with higher Morningstar sustainability rating perform better and received more inflows during the COVID-period (February 20 - April 30, 2020). Sustainability rating is a strong predictor of fund performance and flows during the COVID-19 crisis.
Are higher sustainability ratings associated with better performance during the COVID-19 market crash?	Portfolio level	Pavlova and de Boyrie (2021)	62 ESG ETFs	Morningstar; MSCI	Before the COVID crash, lower-ESG ETFs outperformed higher-ESG ETFs. During the COVID crash, there is no difference in risk adjusted returns between higher and lower-ESG ETFs.
Can ESG stocks be considered a safe haven during a pandemic?	Portfolio level	Rubbaniy et al. (2021)	4 global ESG indices	MSCI	The result is mixed as it depends on the choice of proxy for COVID uncertainty.

(Continues)

TABLE A1 (Continued)

Research Question	Level	Reference	Sample	ESG Data Source	Result
Does the growing COVID related anxiety affect investors' attitudes and choices towards responsible investing?	Firm level	Selmi et al. (2021)	Firms from S&P 500	S&P 500 Environmental and Socially Responsible Index; Thomson Reuters ESG database	Growing COVID related anxiety has strengthened investors' interests towards social and environmental issues.
What is the relative performance of the three different safer investment strategies (defensive, ESG and EAFE portfolios) during the pandemic? Are there spillover effects across the three investment strategies?	Portfolio level	Singh (2020)	3 safer portfolios: defensive portfolio; EAFE portfolio, and ESG portfolio	MSCI	The ESG portfolio receives most capital inflows and outperforms the other safer portfolios during the COVID period (1st January - 1st May 2022). ESG portfolio serve as a flight to safety investment: capital flows away from the defensive and EAFE portfolios to the ESG portfolio.
Do investors prefer ESG equities, ESG high yield (HY) bonds or ESG investment grade (IG) bonds during the COVID period?	Portfolio level	Singh (2021)	3 MSCI ESG leaders' indices (in equity, HY bonds, and IG bonds) in the US market.	MSCI	During COVID period, investors prefer ESG IG bonds over ESG HY bonds and ESG equities. Capital flows away from HY bond and equity markets to IG bond market.
Is ESG engagement associated with abnormal returns during the COVID outbreak?	Firm level	Takahashi and Yamada (2021)	360 Japanese firms	Refinitiv ESG	There is no relationship between the ESG scores and abnormal returns.

(Continues)

TABLE A1 (Continued)

Research Question	Level	Reference	Sample	ESG Data Source	Result
How does ESG performance affect abnormal returns of acquiring firms during the COVID period?	Firm level	Tampakoudis et al. (2021)	889 M&A US deals	SDC	ESG scores are negatively related to abnormal returns of acquiring firm. During economic downturn (COVID period), ESG is not a resilience factor.
What is the impact of COVID-19 social media coverage on the volatility of the MSCI ESG Leaders indices?	Portfolio level	Umar and Gubareva (2021)	MSCI ESG Leaders Indices for 7 equity Markets: world, US, EU, CN, EM worldwide, EM Latin America, and EM Asia	MSCI	ESG investments have some diversification potential during a systemic event such as COVID. Investors can benefit by diversifying across various geographic regions.
Are ESG equity indices connected during turbulent periods (e.g., COVID)? Are there spillover effects? Does the connectedness influence portfolio diversification?	Portfolio level	Umar et al. (2020)	MSCI ESG Leaders Indices for 10 equity Markets: US, AU, CA, CN, EU, IN, JP, RU, ZA, UK	MSCI	ESG markets are closely linked. The connectedness increases during uncertain times (e.g., COVID), and diversification benefits diminish.
How does ESG performance affect stock returns and volatility during the COVID pandemic?	Firm level	Yoo et al. (2021)	2887 firms worldwide	Arabesque S-Ray	Higher E score is correlated with higher returns and lower volatility.

TABLE A2 Variable Definition – Dependent Variables

Variable	Definition	Source
Abnormal Return	Daily abnormal return is calculated as the difference between the daily return of firm i and its expected return calculated using CAPM model. The betas of the CAPM model are estimated using historical daily returns for the last six months (June-December) of 2019. The cumulative abnormal return is calculated as the sum of daily abnormal returns over the corresponding period.	Thomson Reuter DataStream
Daily Price Range	(Daily High Price - Daily Low Price) scaled by the midpoint of high and low daily prices during the year 2020.	Thomson Reuter DataStream
ΔROA	Yearly change in ROA (2020-2019). Return on Assets = Operating Income before Depreciation / Book Value of Assets.	Thomson Reuter DataStream
ΔOPM	Yearly change in OPM (2020-2019). Operating Profit Margin (OPM) = Operating Income before Depreciation / Sales.	Thomson Reuter DataStream
ΔAT	Yearly change in AT (2020-2019). Asset Turnover (AT) = Sales / Book Value of Assets.	Thomson Reuter DataStream
ES score	Average value of the Environment Pillar Score and Social Pillar Score, divided by 100 and measured in 2019.	Thomson Reuter's Refinitiv ESG
ES_high	A dummy variable equals one for firms in the top quartile and zero for firms in the lowest quartile of the ES score's distribution.	Own calculation
Covid_d	A dummy variable that equals one for the period from 24 February to 17 March 2020, the day before the stimulus packages were announced and zero otherwise.	

(Continues)

TABLE A2 (Continued)

Variable	Definition	Source
Fiscal_d	A dummy variable that equals one for the period from 18 March 2020, with the announcement of the US stimulus package, to 31 March 2020 and zero otherwise.	
Postc_d	A dummy variable that equals one from 1 April 2020 until 31 December 2020 and zero in the time period before.	
Cash holdings	(Cash + Marketable Securities) / Book value of Assets, measured in $US (2019)	Thomson Reuter DataStream
Leverage	Book Value of Debt (Sum of Debt in Current Liabilities (DLC) + Book Value of Long-Term Debt (DLTT)) / Book value of Assets, measured in $US (2019)	Thomson Reuter DataStream
ROE	Net Income / Book Equity, measured in $US (2019)	Thomson Reuter DataStream
Size	Natural logarithm of book value of Assets, measured in $US (2019)	Thomson Reuter DataStream
BM	Book Value of Equity/ Market Value of Equity, measured in $US (2019)	Thomson Reuter DataStream
Historical Volatility	The volatility of daily returns during 2019.	Thomson Reuter DataStream

TABLE A3 Cumulative Abnormal Returns during the Covid-19 Crisis

	ES_high					*ES_low*					
Countries	Mean	SD	Min	Max	N	Mean	SD	Min	Max	N	Mean Equality Test
Canada											
covid	−0.061	0.414	−0.795	0.795	21	−0.003	0.241	−0.318	0.369	10	0.6818
fiscal	(−0.073)**	0.141	−0.413	0.246	21	−0.034	0.123	−0.293	0.173	10	0.4623
France											
covid	0.003	0.18	−0.251	0.367	12	0.006	0.207	−0.322	0.283	7	0.9735
fiscal	0.012	0.082	−0.086	0.18	12	0.025	0.07	−0.059	0.118	7	0.725
UK											
covid	−0.065	0.408	−1.285	0.389	24	−0.112	0.274	−0.611	0.318	9	0.7517
fiscal	−0.027	0.198	−0.535	0.559	24	−0.085	0.201	−0.481	0.19	9	0.4637
Japan											
covid	−0.012	0.131	−0.434	0.278	58	(0.049)***	0.08	−0.088	0.213	32	(0.0172)**
fiscal	0.018	0.082	−0.215	0.202	58	−0.003	0.062	−0.113	0.139	32	0.2122
US											
covid	(−0.058)**	0.266	−1.044	0.321	107	(−0.192)**	0.414	−1.263	0.938	50	(0.0153)**
fiscal	−0.004	0.116	−0.389	0.393	107	−0.007	0.17	−0.56	0.515	50	0.8933

This table reports cumulative abnormal returns of *ES_high* and *ES_low* firms during the *covid* and *fiscal* periods. The last column shows the results of mean equality test for *ES_high* and *ES_low* firms. Please refer to Table A2 for variable definition. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.