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Responsible Investment and Stock Market Shocks: Short-Term Insurance without Persistence

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We investigate the differential effect of the COVID-19 shock on the share prices of firms with different levels of ESG (environmental, social and governance) scores. Thereby, we analyse whether and to what extent higher ESG ratings provided insurance for investors in the stocks of those firms during this shock. We focus our analysis on the European market, in which ESG investment plays a particularly important role. Using a broad sample of listed firms, we provide mixed evidence. On the one hand, we show that immediately after the start of the shock, firms with a higher ESG score outperformed their peers. On the other hand, this effect faded less than 6 weeks later. Given the quick recovery of the market, our findings support the idea that ESG stocks provide limited insurance and act as a risk-mitigating device in severe crises.

Introduction

Incorporating environmental, social and governance (ESG) measures into investment strategies has become a decisive factor of investment behaviour for retail as well as institutional investors.¹ The level and growth of ESG-related investment, also often referred to as socially responsible (see e.g. Cheah *et al.*, 2011; Trinks and Scholtens, 2017) or sustainable investment (see e.g. Liang and Renneboog, 2021; Pástor, Stambaugh and Taylor, 2021), has led this investment strategy to become a key force in financial markets. Against this back-

ground, the direction of the relationship between ESG and corporate financial performance is a crucial, yet disputed, aspect.² Theoretical arguments point potentially in a positive as well as a negative direction (see e.g. Bénabou and Tirole, 2010; Galbreath, 2010). Recent empirical studies have pointed in different directions too. While Hong and Kacperczyk (2009) show that ESG investments are associated with lower financial returns (see also Bolton and Kacperczyk, 2021; Pástor, Stambaugh and Taylor, 2021), Edmans (2011) argues in favour of a positive return for ESG factors. Pedersen, Fitzgibbons and Pomorski (2021) provide a more nuanced, balanced view. On theoretical grounds, McWilliams and Siegel (2001)

¹According to the United Nation's-supported Principles for Responsible Investment Initiative, global investors with assets under management of more than 100 trillion USD had committed to the ESG investment approach by 2020. In 2020, current ESG assets under management amounted to close to 40 trillion USD and hence to almost a third of the entire market, with Europe accounting for half of global ESG assets (Bloomberg, 2021).

²There are also ample studies on the relationship between CSR and firm operative performance (see e.g. Han, Kim and Yu, 2016 and Orlitzky, Schmidt and Rynes, 2003) as well as on the industry-specificity of the relationship between ESG and firm financial performance (see e.g. Apaydin *et al.*, 2021).

A free video abstract to accompany this article can be found online at: <https://youtu.be/U1BzP-AxdFo>

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reinforce this balanced view by stressing that corporate social responsibility (CSR) is most likely to be associated with higher costs as well as higher revenues.

We aim to contribute to this discussion on the relationship between ESG and financial performance of the firm by looking at this relationship from a different angle. Rather than looking into potential value-generating aspects of ESG, we aim to investigate a potential risk-mitigating insurance effect of ESG. In a nutshell, we focus on whether ESG preserves rather than generates value (Godfrey, Merrill and Hansen, 2009). In order to do so, we investigate the performance of ESG stocks when being exposed to an unprecedented systematic shock. We particularly rely on the stock market reaction to the COVID-19 pandemic in the spring of 2020. Thereby, we investigate direct effects of the health crisis on ESG stocks as well as the indirect effect via the anticipated economic consequences of countermeasures such as lockdowns. Thereby, we focus not only on the performance of ESG stocks in a severe crisis environment but also attach particular weight to a key aspect of ESG investment: the higher potential resilience of ESG firms to a very substantial systematic shock. Furthermore, paying tribute to the fact that ESG investment is particularly prominent in Europe, we use a sample of European firms to investigate the stock performance during the COVID-19 crisis (Bloomberg, 2021).

We build on previous literature to form hypotheses about the relationship between ESG characteristics of firms and their stock performance during the peak of the COVID-19 crisis as well as afterwards. The literature has identified two channels for why ESG matters for returns during crises. First, a number of studies have identified the insurance-like aspect of a firm's social responsibility and that of its investors (see Gardberg and Fombrun, 2006; Godfrey, 2005; Godfrey, Merrill and Hansen, 2009; Kanamura, 2021). The main underlying mechanism is considered to be the build-up of goodwill and moral capital, which acts as a basis for the insurance-like mechanism of ESG strategies. Second, management scholars have argued that social responsibility is one of the primary mechanisms through which a firm fosters trust in stakeholder relationships (Barnett and Salomon, 2012). We summarize them as the risk-mitigation, insurance-like effect of ESG stocks.

We aim to bring these risk-mitigation, insurance-like mechanisms to the data. In particular, we ask to what extent is investing in socially responsible stocks associated with investors trusting these stocks more in severe crises. In other words, are investors less prone to sell them in the course of a systematic crisis? We aim to answer these questions with the help of stock market developments in the course of the COVID-19 crisis. In particular, we use the initial COVID-19 outbreak as a crisis setting. The COVID-19 outbreak in early 2020 was without doubt a very severe crisis event, which has led informed observers such as Carmen Reinhart to claim that 'this time it is indeed different' (Reinhart, 2020). As the initial shock in its origin was unrelated to economic developments and resulted from anticipated measures taken to combat medical concerns, the COVID-19 crisis represents a more straightforward natural experiment to isolate the non-obfuscated effect of ESG scores than any past, slowly unfolding crisis that resulted from economic conditions or financial anomalies (Albuquerque *et al.*, 2020). Hence, we use the time of the outbreak of the pandemic in February 2020 as an exogenous crisis event to investigate our hypotheses. In a next step, we investigate the persistence of the potential effects by looking into the relative stock returns of companies with pronounced ESG scores in the longer periods after February 2020. We consider this as a further test of our insurance-type hypothesis.

We find that companies with a one standard deviation higher ESG score are, on average, associated with a two percentage point outperformance in stock returns at the very beginning of the COVID-19 outbreak, that is during the sharp market downturn. We show that these patterns are driven by the E and S factors, while the G factor seems to have no effect. The effect during the immediate market drop faded away right after the disappearance of the systematic shock. Five weeks after the start of the crisis, higher ESG scores did not lead to any cumulative abnormal returns. Hence, we find that there is no persistence of the insurance effect beyond the immediate crisis.

In our analysis, we use a classic event-study approach and complement it with a difference-in-differences estimation. We not only control for firm characteristics, but also for Fama–French risk factors, the momentum factor and factor loadings, as well as industry and country fixed effects, and in the difference-in-differences analysis for firm fixed

effects and even country-day fixed effects. Thereby we aim to take other drivers of abnormal returns in the crisis period extensively into account. Both approaches lead to the same conclusion: our results support the risk-mitigation insurance hypothesis. The results indicate that considering stakeholders' interests pays off immediately during crises but not beyond. We interpret this latter result as an indication that the relative outperformance of ESG firms in the downturn does not reflect an ex-ante undervaluation of ESG stocks.

We build and contribute to the small amount of studies on the relationship between socially responsible investment and crisis resiliency. Lins, Servaes and Tamayo (2017) initiate the discussion by focusing on the effects of the financial crisis, which they characterize as a trust crisis, on the returns of socially responsible investments. They show that the stocks of US firms with high social capital, as measured by CSR intensity, returned four to seven percentage points more than with low social capital. With respect to the analysis of the COVID-19 crisis, the two studies closest to us are Albuquerque *et al.* (2020) and Demers *et al.* (2021), who analyse the performance differences of ESG stocks during the COVID-19 stock market crisis in the United States. Whereas Albuquerque *et al.* (2020) show that ESG stocks outperform, Demers *et al.* (2021) find the opposite after controlling for additional market-based and accounting-based variables. We not only complement these studies by focusing on European firms for which ESG characteristics are more prominent and should be expected to matter more, but more importantly our results can also explain this apparent contradiction as we dive into the dynamics over time and analyse the persistence of a potential outperformance. We find that ESG stocks outperform only in the immediate crisis and that the effect vanishes quickly after the financial markets calm down again, indicating that it is the dynamics rather than different jurisdictions and firm specifics such as risk factors and green learning (see e.g. Chircop, Tarsalewska and Trzeciakiewicz, 2022) that explain the differences in results. We view this non-persistence finding as a key contribution of our analysis.

Ding *et al.* (2021) use a broad sample of international firms to analyse stock performance during the height of the COVID-19 crisis. Among (many) other things, they also show a positive effect of ES characteristics. However, their anal-

ysis does not control for traditional market-based measures of risk and other confounding variables that potentially lead to an omitted variable bias (Demers *et al.*, 2021). In line with our argument of stronger investors' preferences for ESG stocks in severe crises, Ferriani and Natoli (2021) find – by using fund flows – that during the COVID-19 crisis investors showed a preference for low ESG risk funds. This indicates that investors were less inclined to sell assets with strong ESG characteristics. Cardillo, Bendinelli and Torluccio (2022) is a complement to our study by analysing the performance of ESG stocks during the pandemic in 2020 rather than in the immediate crisis. They find that ESG stocks outperform in their reaction to national case numbers and deaths.

Additionally, Al-Awadhi *et al.* (2020) and Broadstock *et al.* (2021) investigate the impact of the pandemic for Chinese stocks. Al-Awadhi *et al.* (2020) document a negative, statistically significant relationship between reported COVID-19 cases in China and stock returns across the board. Broadstock *et al.* (2021) provide evidence for higher raw returns of stocks of higher ESG-rated mainland Chinese companies during the early phase of the pandemic. In contrast to these papers, we use a much broader data sample of European stocks. The spread of the disease across European countries allows for a broad basis to investigate the differential impact of a very significant economic shock on ESG stocks.

Our paper also contributes to the wider literature on ESG and financial market performance during the pandemic. Using data on 30 ESG-rated funds, Pisani and Russo (2021) show higher non-risk-controlled returns of funds with higher ESG ratings in a very short event window (less than a week) of the declaration of the pandemic. Mirza *et al.* (2020) find – using a small data sample of 23 European social entrepreneurship funds stemming from a non-disclosed data source – that the performance of these funds was better during the early stage of the pandemic.

The paper is organized as follows. In the next section we review the related literature, which allows us to derive our two main hypotheses. In the third section, we outline our data source as well as the main characteristics of the data and their descriptive statistics. In the fourth section we bring our hypotheses to the data and test the effect of ESG characteristics on stock performance in February 2020 and beyond, using an event study

as well as a difference-in-differences approach. The final section concludes.

Theoretical background and hypotheses

ESG refers to the incorporation of environmental, social and governance considerations into corporate management, financial decision-making and investors' portfolio decisions (Liang and Renneboog, 2021). Bénabou and Tirole (2010) distinguish between three main motives: reputational concerns of corporations (doing well by doing good), delegated philanthropy (the firm as a channel for the expression of shareholders' values) and insider-initiated corporate philanthropy (management uses the corporation to implement their social values). While the first two aspects translate into a long-term orientation of the firm, the latter is closely tied to potential corporate governance problems. With the former two views, firms give up short-term profits in exchange for long-term ones, or achieving social goals shared by stakeholders. Numerous studies focus on strategies that trade off short-term profits and long-term shareholder value. McWilliams and Siegel (2011) combine arguments from the resource-based framework and standard economic models to argue that ESG can act as the private provision of public goods, which in turn can be used strategically by managers to increase firm value. Along a similar vein, Brekke and Nyborg (2008) argue that ESG may act as a screening strategy in the labour market that enables the firm to attract highly motivated and productive employees, thereby increasing the long-term value of the firm. Relatedly, in an early contribution Russo and Fouts (1997) consider ESG as a mechanism for developing long-term environmental resources and capabilities. By developing an industry equilibrium model, Albuquerque, Koskinen and Zhang (2019) argue that ESG is associated with a product differentiation strategy, which means that firms that undertake such a strategy face less elastic demand and hence are able to increase their long-term profits.

Rather than investigating the effects of ESG on long-term **value generation**, we aim to test the theoretical notion of ESG being **value preserving**, that is, a risk-mitigation instrument, based on an insurance-related theoretical framework and the notion of building trust vis-à-vis investors via ESG. With regard to the insurance-based theo-

retical reasoning, we follow the arguments put forward by strategy scholars (see Gardberg and Fombrun, 2006; Godfrey, 2005; Godfrey, Merrill and Hansen, 2009; Kanamura, 2021). They argue that ESG activities create goodwill or moral capital, which acts as protection against severe downside risks. A trust-based complementary argument has been put forward by Barnett and Salomon (2012) (see also Hillenbrand, Money and Ghobadian, 2013 for empirical evidence).

Potential risk-mitigating and insurance-type aspects of ESG have been the focus of a number of empirical studies. For instance, Monti *et al.* (2022) use a large international sample to show that CRS/ESG³ leads to lower equity risk. In a similar direction, Stellner, Klein and Zwergel (2015) highlight an implication of the lower risk of ESG: lower credit risk. Heal (2005) stresses the risk-mitigation effect of ESG strategies based on theoretical and conceptual considerations (for an empirical angle, see also Cerqueti *et al.*, 2021, who argue in favour of a systematic risk-mitigation effect of ESG). In addition, Albuquerque, Koskinen and Zhang (2019) argue that these firms are able to avoid certain risks, making them more attractive to investors. Furthermore, using standard asset-pricing arguments they show that from the perspective of a risk-averse investor, firms facing a less price-elastic demand have lower systematic risk, leading to higher stock-market valuations.

Taken together, this literature underscores the importance of risk considerations when investing in ESG assets, as well as the long-term orientation of such investors. In the following, we aim now to relate this discussion more precisely to the COVID-19 shock and its potential implications for ESG and non-ESG-focused companies. It is important to note that the health shock translated into severe economic repercussions immediately, as well as expectation-wise. This happened in particular due to the reactions of individuals as well as governments, through social distancing requirements and lockdowns. Hence, the health crisis became a severe economic crisis – a systematic shock.

In order to explore the overall effects of the COVID-19 shock on stock prices in detail, it is useful to consider the two driving forces behind stock valuations based on discounted cash flows/dividends. Using the stock valuation model,

³We use these two terms here interchangeably.

the steep change in market prices could either be due to a sudden and sharp reduction in expected cash flows at a given discount rate, or to an increase in the discount rate (see Cochrane, 2011). In the following we explore why an ESG differential might have existed for either factor.

Cash flow (growth) and stakeholder perspective. The COVID-19 shock had a strong effect on investors' perceptions about future earnings and growth. The downward adjustment in the immediate period could be different for firms with high and low ESG scores for a number of cash flow-related reasons. First, a key potential driver is the build-up of trust between the ESG-focused firm and its stakeholders (see e.g. Lins, Servaes and Tamayo, 2017), making the relationship between the firm and their customers, employees or suppliers more resilient. In particular, suppliers of ESG-focused firms would deliver to the firms even in turbulent times. This, in turn, leads to less expected interruptions of the firm's supply chains. Hence, the cash flows of the firm would be expected to be less volatile and more stable vis-à-vis the COVID-19 shock. Second, if ESG strategies are associated with a closer and more long-term relationship between customers and the firm (e.g. via product differentiation, see Albuquerque, Koskinen and Zhang, 2019), customers may be less willing to switch to competitors, implying more stable cash flows in the crisis. Similarly, ESG orientation can lead to the build-up of reputation, implying a more resilient customer-firm relationship and hence more stable cash flows (see e.g. Akey et al., 2021). Edmans (2011) and Edmans, Li and Zhang (2014) provide evidence that the ESG orientation of firms also leads to such a long-term relationship with regard to employees, based on employee satisfaction, leading to a more stable employee base and, hence, more stable cash flows.

Required return, ESG and COVID-19. Another potential reason for the expected-return differential between low and highly rated ESG stocks could be a structural difference vis-à-vis systematic risk between the two types of stocks (see Giese et al., 2019). A further possible channel stems from time-varying expected returns in the crisis. If investors revise their required expected returns upward more strongly for low ESG-rated stocks than for highly ESG-rated shares, then this revision would translate into a stronger reduction in the stock price of low as opposed to high-ESG stocks. The reasons behind the lower expected re-

turns for investors with ESG stocks may lie in their willingness to trade off their social preferences and financial returns (see Cornell, 2021).

The differential effect of the COVID-19 crisis on the required expected returns could also be associated with the long-term orientation of ESG investors as discussed above. There is evidence that long-term investors behave more patiently towards the high-ESG firms in their portfolios, selling relatively less after negative earnings surprises or poor stock returns (see Starks, Venkat and Zhu, 2017). Various studies suggest that such a long-term horizon also exists with regard to ESG-oriented shareholders and investors (see e.g. Bollen, 2007; Riedl and Smeets, 2017). Porter and Kramer (2006) view ESG investment of companies as a method to attract long-term investors. In a similar vein, Renneboog, Ter Horst and Zhang (2011) show that socially responsible investors are less inclined to trade on past returns, indicating their stronger orientation towards non-financial perspectives, with their lower propensity to trade implying more long-term orientation. This long-term orientation of ESG-focused firms may lead to less pronounced selling pressures on ESG stocks and, hence, the immediate effect on ESG stocks would be that those stocks would outperform during a very pronounced economic shock such as the COVID-19 crisis.

This association would also be in line with the findings on such differential effects during the financial crisis (see Bouslah, Kryzanowski and M'Zali, 2018), as well as with the insurance-like protection aspect of socially responsible behaviour of the firm and their investors (see e.g. Gardberg and Fombrun, 2006; Godfrey, 2005; Godfrey, Merrill and Hansen, 2009; Kanamura, 2021). The insurance-like aspect of ESG can also be associated with better risk-management practices of ESG-focused firms (see Giese et al., 2019) and the evidence that successful ESG engagements reduce the firm's exposure to a downward risk factor (cf. Hoepner et al., 2020).

We summarize our discussion in

H1: Less pronounced downward pressure on ESG stocks leads them to outperform after a systematic shock.

Given that our arguments point towards a risk-mitigating, insurance-like effect of ESG orientation towards a pronounced systematic shock, the very same arguments also imply that this

Table 1. Country distribution

Country	Count	Share	Country	Count	Share
Austria	24	0.024	Ireland	14	0.014
Belgium	37	0.036	Italy	49	0.048
Switzerland	86	0.084	Luxembourg	18	0.018
Cyprus	1	0.001	Malta	2	0.002
Czech Republic	2	0.002	Netherlands	47	0.046
Denmark	33	0.032	Norway	28	0.027
Finland	32	0.031	Poland	11	0.011
France	118	0.116	Portugal	9	0.009
Germany	139	0.136	Spain	41	0.040
Greece	7	0.007	Sweden	115	0.113
Hungary	2	0.002	United Kingdom	207	0.203

Note: The table shows the distribution of firms across countries.

overperformance vanishes with the systematic shock, that is, with the reversal of the downturn of the stock market in the COVID-19 crisis. If financial market participants expect a return to more normal times in the future (e.g. due to monetary and fiscal policy intervention), then the positive differential effect of ESG disappears and the outperformance of ESG-oriented firms vanishes. Hence, we state

H2: The resilience of ESG stocks vis-à-vis shocks eventually peters out after the immediate crisis. The initial outperformance is not persistent.

Testing our second hypothesis is also a discriminatory test against an alternative theory behind the effect of the hypothesis. Rather than being caused by the insurance effect, the differential overperformance might be caused by previous undervaluation, which is undone in the crisis. This undervaluation might, for instance, be due to negative signalling effects of ESG, as argued in DesJardine, Marti and Durand (2021). In this case we should, however, observe this effect to be persistent. In this sense a potential confirmation of *H2* also rejects this alternative interpretation.

Data and descriptive statistics

Our sample comprises all publicly listed non-finance firms headquartered in the European Union (compositions as of 31 December 2020) for which ESG scores for year-end 2019 are available in the Thomson Reuters Refinitiv ESG database and for which we could match financials from Bloomberg. We follow Lins, Servaes and Tamayo

(2017) and remove micro-cap stocks, that is, firms with a year-end 2019 market capitalization of less than \$250m. The concern is that they are more volatile and have limited liquidity. As these effects amplify during a crisis (Lins, Servaes and Tamayo, 2017), we exclude these stocks from our analysis. For a similar reason, we exclude firms with a stock price smaller than one euro since these stocks tend to behave highly volatily as well. These criteria led to a sample of 1022 firms. Table 1 shows the country distribution of firms in our sample.⁴

We use the Refinitiv ESG score database for the main independent variables in this study, the ESG score per firm and its different components. It is calculated based on three *Environmental*, four *Social* and three *Governance* categories that underlie the ESG rating methodology.^{5,6} Furthermore, the ESG scores are relative measures – it is the percentile at which the company is ranked within its industry. Hence, it is relative to the industry peers in the ESG database. Table 2 shows the distribution of firms in our sample across industries.⁷

We calculate the firms' abnormal returns during the crisis period. Following Albuquerque, Koskinen and Zhang (2019), we define the crisis period

⁴All of our results are robust to excluding countries with less than 10 firms.

⁵We use 2019 ESG scores to exclude that firms adapted their ES policies to the crisis.

⁶We use the weights from the ESG score to scale each sub-score, that is, E, S, G or ES score.

⁷Because we impose a number of restrictions on our sample, we are not using the population of firms in the Refinitiv database. Therefore, the ESG score is not similarly distributed across industries anymore. Figure A.1 in the Appendix shows the distribution of ESG scores across industries.

Table 2. Industry distribution

Economic sector	Industry group	Freq.	Share
Basic Materials	Chemicals	37	0.036
	Construction Materials	9	0.009
	Containers & Packaging	12	0.012
	Metals & Mining	27	0.026
	Paper & Forest Products	13	0.013
Energy	Oil & Gas	14	0.014
	Oil & Gas Related Equipment and Services	19	0.019
	Renewable Energy	7	0.007
Consumer Cyclicals	Automobiles & Auto Parts	33	0.032
	Diversified Retail	6	0.006
	Homebuilding & Construction Supplies	26	0.025
	Hotels & Entertainment Services	34	0.033
	Household Goods	8	0.008
	Leisure Products	8	0.008
	Media & Publishing	24	0.024
	Specialty Retailers	33	0.032
	Textiles & Apparel	17	0.017
	Consumer Non-Cyclicals	Beverages	15
Food & Tobacco		40	0.039
Food & Drug Retailing		23	0.023
Personal & Household Products & Services		12	0.012
Healthcare	Biotechnology & Medical Research	20	0.020
	Healthcare Equipment & Supplies	36	0.035
	Healthcare Providers & Service	10	0.010
	Pharmaceuticals	36	0.035
Industrials	Aerospace & Defense	19	0.019
	Construction & Engineering	36	0.035
	Diversified Industrial Goods Wholesale	2	0.002
	Freight & Logistics Services	20	0.020
	Machinery, Tools, Heavy Vehicles, Trains & Ship	96	0.094
	Passenger Transportation Services	8	0.008
	Professional & Commercial Services	50	0.049
	Transport Infrastructure	12	0.012
	Real Estate Operations	50	0.049
	Residential & Commercial REITs	33	0.032
Technology	Communications & Networking	10	0.010
	Computers, Phones & Household Electronics	4	0.004
	Electronic Equipment & Parts	11	0.011
	Office Equipment	5	0.005
	Semiconductors & Semiconductor Equipment	18	0.018
	Software & IT Services	62	0.061
Utilities	Telecommunications Services	32	0.031
	Electric Utilities & IPPs	23	0.023
	Multiline Utilities	8	0.008
	Natural Gas Utilities	2	0.002
	Water & Related Utilities	2	0.002

Note: The table shows the distribution of firms across industries. The classification follows the Thomson Reuters Business Classification used in the Refinitiv database.

in our main analysis as being between 24 February 2020 and 17 March 2020.⁸ We use information on daily closing stock prices adjusted for dividends

and stock splits. We convert all stock prices into euros based on their historical exchange rate. We use the European value-weighted market value

⁸On 21 February 2020, Italy imposed the first lockdown of a European country for several municipalities in Northern Italy. On 17 March 2020, coordinated central

bank action to enhance the provision of global US dollar liquidity became effective (ECB, 2020), essentially implying a trough in the stock market.

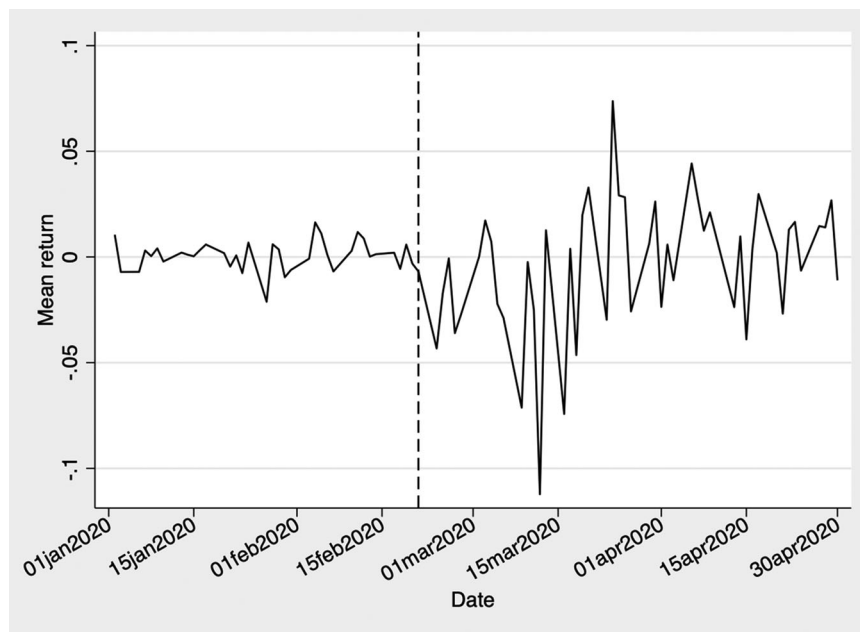


Figure 1. Development of average daily stock return.

Notes: The figure shows the development of the average stock return of the companies in our sample over the period from 1 January 2020 to 30 April 2020. The dashed line indicates the last trading day of the pre-crisis period (21 February 2020).

The figures show results from our event-study regression analysis of the CAR for different time window lengths since the outbreak of the crisis – starting with 1 day, ending with 60 days. The coefficient for the ESG score – and its subscores – for each time window length is displayed together with the 95% confidence interval, which we calculate using the industry-level clustered standard errors. The regressions include the full set of control variables. The dashed line indicates the end of the crisis period.

and risk-free rate from the Kenneth French data library.⁹ Abnormal returns are calculated as the difference between the raw returns and the expected returns based on the market model over the 60-month period that ended in January 2020.¹⁰

An implicit assumption of our research design is that there was indeed an effect on the stock market during our crisis period. Figure 1 provides evidence for this by showing the development of the mean daily return of our sample firms before and during our crisis period. It clearly shows that the returns become much more volatile after 24 February.

We follow Lins, Servaes and Tamayo (2017) and use firm and stock characteristics as additional control variables. All variables are summarized in Table 3. We also add country and industry fixed effects to our analysis.¹¹ This is also based on

⁹https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

¹⁰We exclude firms with less than 12 months of data.

¹¹We rely on the 56 industry groups of the Thomson Reuters Business Classification that are used in the Refinitiv database.

the findings of, for example, Martin and Nagler (2020), who show that the stock market expects larger economic losses among countries with higher debt-to-GDP ratios during the COVID-19 outbreak. We also control for the firms' factor loadings based on the Fama–French three-factor model: SMB (small minus big), HML (high minus low) and the momentum factor WML (winners minus losers). For this purpose, we estimate the factor loadings similarly to the firm betas over the 60 months prior to the crisis. These variables allow controlling for further risk factors and return determinants, such as size.¹²

Table 4 presents the descriptive statistics of the main variables of our analysis. As a consequence of the rapid and severe stock market decline, the cumulative raw return (CRR) during the COVID-19 outbreak period from 24 February to 17 March 2020 is, on average, negative. Our variable of interest, the ESG score, has a mean of 56.018 and a median of 57.681. Hence, the firms in our sample

¹²See e.g. Rahman, Amin and Al Mamun (2021) for COVID-related size effects on stock markets.

Table 3. Control variables

Variable	Definition
Size	Natural logarithm of a firm's market capitalization
LTD	Long-term debt divided by total assets
STD	Debt in current liabilities divided by total assets
Cash	Cash and marketable securities divided by total assets
Profit	Adjusted operating income divided by total assets
BtM	Book value of equity divided by market capitalization
Neg.BtM	Dummy variable set to one if the book-to-market ratio is negative
Moment	Cumulative raw return of each company over the period from 22 February 2019 until 23 February 2020
IR	Residual variance from the market model estimated over the 5-year period from February 2015 until January 2020
Industry	56 industry groups of the Thomson Reuters Business Classification

Table 4. Descriptive statistics

Variable	N	Mean	SD	Min	Max
CRR	1022	-0.346	0.152	-0.773	0.283
CAR	1022	-0.217	0.180	-0.739	1.470
ESG score	1022	56.018	19.556	3.001	94.105
ES score	1022	57.763	21.991	1.130	97.067
E score	1022	51.528	26.169	0	98.989
S score	1022	61.460	21.697	2.040	97.568
G score	1022	52.035	22.467	1.154	97.917
Size	1022	21.821	1.406	19.347	26.384
LTD	1022	0.220	0.154	0	1.019
STD	1022	0.268	0.152	0	1.013
Cash	1022	0.122	0.133	0	0.952
Profit	1022	0.078	0.112	-0.738	2.103
BtM	1022	0.530	0.559	-1.876	11.915
Neg.BtM	1022	0.011	0.103	0	1
Moment	1022	0.174	0.318	-0.727	8.319
IR	1022	0.012	0.007	0.002	0.336

perform on average better in environmental and social activities than their individual industry average. This effect is mainly driven by the social pillar, with a mean S score of 61.640. The range of the ESG score is from 1.130 to 97.067. Table A.1 in the Appendix presents the correlation matrix for the variables in our sample. The table also includes a comparison of mean cumulative abnormal returns (CARs) for companies above and below the median of a respective ESG score.

Analysis – Results

Event study

Crisis resilience. We use an ordinary least squares (OLS) model to regress the CARs – over the crisis period from 24 February to 17 March 2020 – on ESG scores. Thereby, we test H1: did firms with

higher ESG scores have more resilient stock prices during the initial COVID-19 shock than firms with lower ESG scores?¹³

We add the variables in Table 3 as well as industry and country dummies as control variables. In particular, long-term debt (LTD), short-term debt (STD), cash holdings (Cash) and profitability (Profit) are important in order to control for a tightening of firms' access to external finance and effects on revenues during the crisis (Ramelli and Wagner, 2020). As capital markets during the crisis period were hesitant to provide financing, firms with more cash, less debt and higher profitability had better preconditions to maintain their business operations and to continue their investments

¹³We follow Lins, Servaes and Tamayo (2017), who find stock price overperformance of higher ES-rated firms during the financial crisis.

Table 5. Crisis resilience

	CAR				
	(1)	(2)	(3)	(4)	(5)
ESG score	0.0009** (0.0004)				
ES score		0.0009*** (0.0003)			
E score			0.0005** (0.0002)		
S score				0.0008** (0.0003)	
G score					0.0002 (0.0003)
Size	-0.0023 (0.0051)	-0.0028 (0.0049)	0.0002 (0.0044)	-0.0015 (0.0050)	0.0042 (0.0043)
LTD	-0.0286 (0.0618)	-0.0268 (0.0614)	-0.0216 (0.0613)	-0.0255 (0.0616)	-0.0178 (0.0629)
STD	-0.1009* (0.0536)	-0.1020* (0.0534)	-0.0981* (0.0534)	-0.0953* (0.0542)	-0.0855 (0.0551)
Cash	0.0403 (0.0585)	0.0449 (0.0585)	0.0432 (0.0570)	0.0419 (0.0592)	0.0334 (0.0588)
Profit	0.1053 (0.0790)	0.1064 (0.0766)	0.0995 (0.0775)	0.1054 (0.0755)	0.0961 (0.0759)
BtM	0.0164 (0.0120)	0.0158 (0.0119)	0.0171 (0.0122)	0.0168 (0.0117)	0.0196 (0.0118)
Neg. BtM	-0.0306 (0.0897)	-0.0321 (0.0895)	-0.0295 (0.0895)	-0.0334 (0.0889)	-0.0282 (0.0885)
Moment	0.0021 (0.0197)	0.0016 (0.0193)	0.0002 (0.0194)	0.0017 (0.0195)	-0.0002 (0.0203)
IR	3.2639*** (1.1553)	3.2268*** (1.1385)	3.1849*** (1.1535)	3.2420*** (1.1406)	3.1989*** (1.1887)
Constant	-0.2960*** (0.1004)	-0.2875*** (0.0987)	-0.3235*** (0.0921)	-0.3189*** (0.1004)	-0.3968*** (0.0912)
Industry FE	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes
Factor loadings	yes	yes	yes	yes	yes
Observations	1022	1022	1022	1022	1022

Note: The table shows the estimated coefficients of an OLS model with the CAR over the complete 17-day crisis period, that is, 24 February to 17 March 2020. The factor loadings are SMB (small minus big), HML (high minus low) and WML (winners minus losers). Standard errors clustered on the industry level in parentheses. * $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

in the recovery period (De Vito and Gómez, 2020; Ramelli and Wagner, 2020). Furthermore, we add characteristics to the model that can explain stock returns: the natural logarithm of a firm's market capitalization (Size), the book-to-market ratio (BtM), a dummy variable for negative book-to-market ratios (Neg. BtM), returns over the year before the crisis period (Moment), and idiosyncratic stock variance (IR), as well as two factor loadings from the Fama–French three-factor model (SMB, HML) and the momentum factor loading (WML). Industry dummies account for the heterogeneous average ESG scores across industries.

Table 5 summarizes the results. The standard errors are clustered on the industry level. Specification 1 shows a positive coefficient for the ESG score. It is statistically significantly different from zero at the 5% level. Taking a more nuanced look in specifications 2–5 of Table 5 shows that this positive effect is driven by the ES factors. While both the E score and the S score have a statistically significant effect, the Gscore seems to have no effect.

Using only the ES score, as proposed by Albuquerque *et al.* (2020), we find a positive effect that is different from zero at the 1% level. A one standard deviation increase in the ES score is associated with a 1.9 percentage point increase in

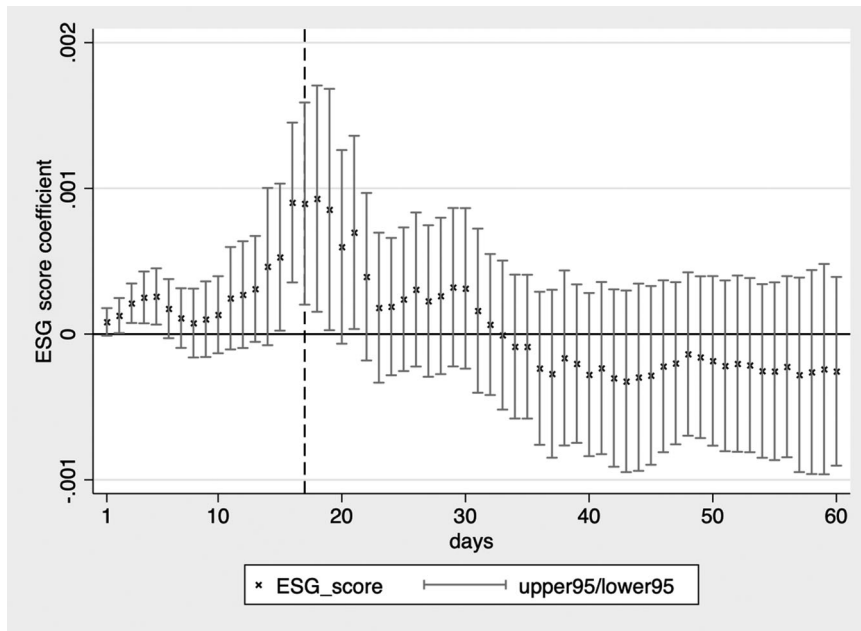


Figure 2. Persistence – ESG score

Note: The figures show results from our event-study regression analysis of the CAR for different time window lengths since the outbreak of the crisis – starting with 1 day, ending with 60 days. The coefficient for the ESG score – and its subscores – for each time window length is displayed together with the 95% confidence interval, which we calculate using the industry-level clustered standard errors. The regressions include the full set of control variables. The dashed line indicates the end of the crisis period.

the CAR during the crisis period. The economic size of the effect of the E and S factors is rather similar. A one standard deviation increase in the E score leads to a 1.3 percentage point increase in the CAR. The respective number for the S factor amounts to 1.7 percentage points. The coefficient for the G factor is not statistically significant. That indicates that the more traditional mechanisms (governance mechanisms) seem to have played no special role in the COVID-19-related stock market crisis in 2020.

(Non-)Persistence. In the next step, we investigate the (non-)persistence of the effects summarized in H2. For this, we extend the observation period starting stepwise with the origin of the crisis on 24 February. We use our baseline model for the CAR as laid out in Table 5 and estimate the model for different time windows. We start with 24 February 2020 and expand our observation window step-by-step on a daily (trading-day) basis. We move the window forward for a maximum of 60 days. We report the resulting estimates of the respective coefficients and the corresponding confidence intervals for the ESG score and all sub-scores in Figures 2–6. The five

figures illustrate the time series of the effect. Note that all regressions include the full set of control variables.

Figure 2 shows that firms with a higher ESG score started to mildly outperform their counterparts with a lower ESG score right from the beginning of the crisis. This effect became more and more pronounced and statistically significant until the trough of the stock prices in the COVID-19 crisis was reached on 17 March – after 17 trading days. Until the end of the fourth trading week, the effect was positive and statistically significant. Thereafter, the effect remained positive but became statistically insignificant. In the seventh week of trading the coefficient for the ESG score became basically zero, that is, the effect of the ESG score completely vanished. Afterwards it basically stayed at the zero line. Hence, there is no long-term effect of the ESG score on the CAR of the firms in our sample.

Similar patterns can be observed in Figures 3–5. A close look at these figures shows that the effects are relatively more pronounced in size and statistical significance with the S score than the E score. The E score coefficients are statistically significant for a smaller number of trading days.

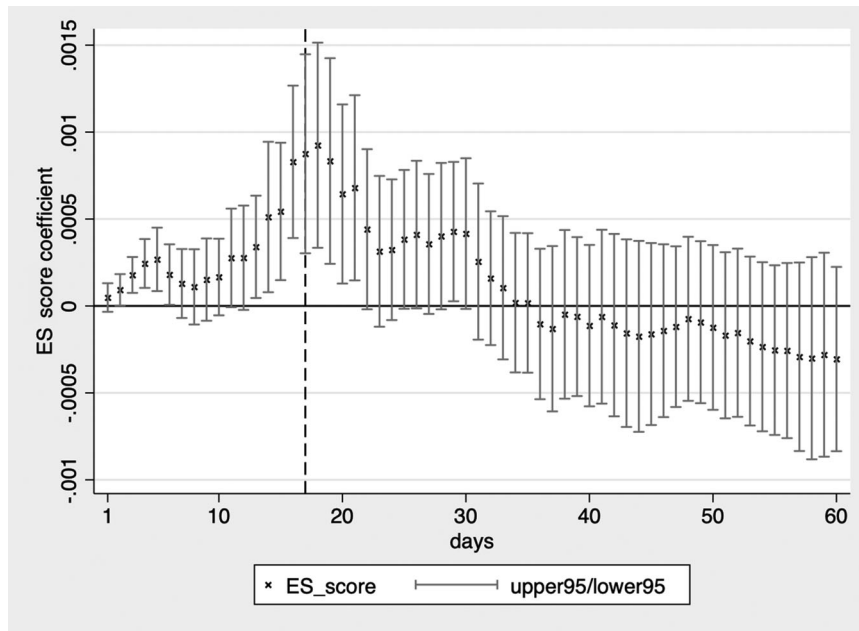


Figure 3. Persistence – ES score

Note: The figures show results from our event-study regression analysis of the CAR for different time window lengths since the outbreak of the crisis – starting with 1 day, ending with 60 days. The coefficient for the ESG score – and its subscores – for each time window length is displayed together with the 95% confidence interval, which we calculate using the industry-level clustered standard errors. The regressions include the full set of control variables. The dashed line indicates the end of the crisis period.

Hence, our analysis provides evidence for H2. While firms with higher ESG scores seem to have outperformed in the period in which the systematic shock occurred, this outperformance has been undone in the period of the market recovery, implying no CARs of firms with higher ESG scores over the entire period.

Difference-in-differences analysis

In order to check the robustness of the event study results and in order to be confident about the causal interpretation of our results, we also employ a difference-in-differences approach. As in the previous section, we continue to use the same sample of firms and to rely on the heterogeneity in the ESG score to identify differences in the crisis resilience and its persistence.

Crisis resilience. For the difference-in-differences analysis, we extend the period of observation by including a pre-crisis period. Thereby, we are also able to investigate common trends in the pre-crisis period. We include 10 trading days in the pre-crisis period. The total period spans from 10 February to 17 March 2020. We use the panel data of the firms' daily abnormal returns to analyse whether

the crisis starting on 24 February 2020 impacted firms with different ESG scores differently. More specifically, we estimate the following model:

$$\begin{aligned} \text{abnormal return}_{it} = & \beta_0 + \beta_1 \cdot \text{ESG score}_i \cdot \text{crisis}_t \\ & + \beta_2 \text{DayFE}_t + \beta_3 \text{FirmFE}_i \\ & + \varepsilon_{it} \end{aligned} \quad (1)$$

where the dependent variable is the abnormal return (%) of firm i on day t , that is, the abnormal daily return multiplied by 100. ESG score_i denotes the ESG score of the respective firm, while the crisis variable takes the value of one between 24 February and 17 March, and zero otherwise. We include day fixed effects and firm fixed effects, which subsume the baseline terms of ESG score_i and crisis_t . Standard errors are clustered on the firm level.

Table 6 presents the results. The upper panel uses day and firm fixed effects. We observe that companies with a higher ESG score experience a higher daily abnormal return in the crisis period. The estimate of 0.008 implies that increasing the ESG score from the first to the third quartile increases the daily abnormal return by 0.23 percentage points on average. In line with the results

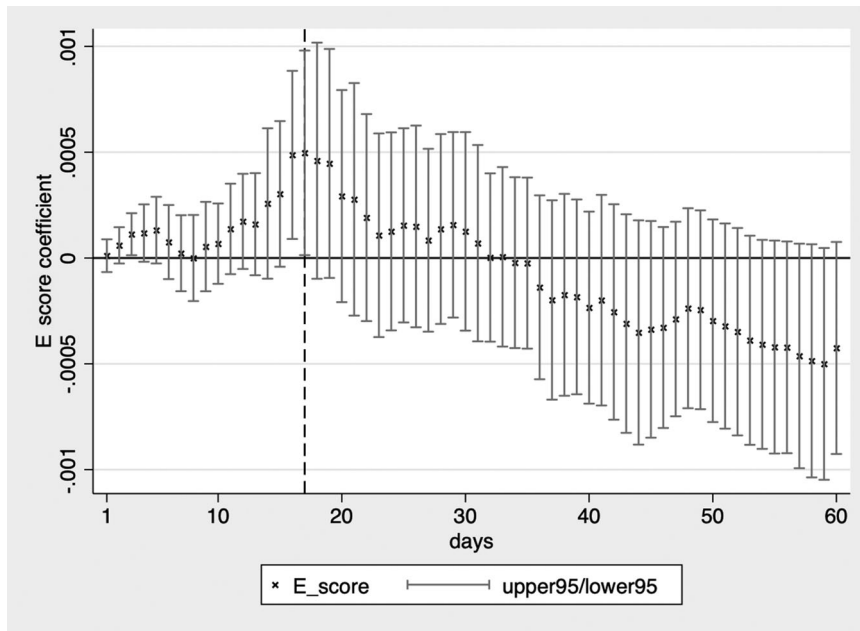


Figure 4. Persistence – E score

Note: The figures show results from our event-study regression analysis of the CAR for different time window lengths since the outbreak of the crisis – starting with 1 day, ending with 60 days. The coefficient for the ESG score – and its subscores – for each time window length is displayed together with the 95% confidence interval, which we calculate using the industry-level clustered standard errors. The regressions include the full set of control variables. The dashed line indicates the end of the crisis period.

Table 6. Difference-in-differences estimation

	ESG score	ES score	E score	S score	G score
<i>crisis · var</i>	0.008*** (0.003)	0.009*** (0.002)	0.004* (0.002)	0.011*** (0.002)	0.002 (0.002)
Day FE	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes
Observations	27,584	27,584	27,584	27,584	27,584
<i>crisis · var</i>	0.006*** (0.002)	0.006*** (0.002)	0.002 (0.002)	0.009*** (0.002)	0.003 (0.002)
Country-day FE	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes
Observations	27,557	27,557	27,557	27,557	27,557

Note: The table shows the estimated coefficients of Equation (1). *var* is a placeholder for the variable shown in the header of each column. The number of observations between the upper and lower panel differ because country-day fixed effects lead to one additional singleton firm observation.

Standard errors clustered on the firm level in parentheses. *p < 0.1. **p < 0.05. ***p < 0.01.

of the event study, we also observe positive effects in the crisis period for the ES, E and S score.

One advantage of the difference-in-differences analysis is that it allows us to control for additional factors. Of particular concern are differences in the timing of state support across countries, but also health conditions and containment efforts. Whereas the extent of a country’s support is covered by the firm fixed effects, differences in

the timing across countries are not. Therefore, the lower panel of Table 6 presents the same regressions with country-day fixed effects. The coefficients in the first four regressions all decrease. However, except for the E score, we continue to observe significantly positive effects.

As an additional robustness check, we use a median split of the different ESG scores instead of the continuous measures. Table A.2 in the

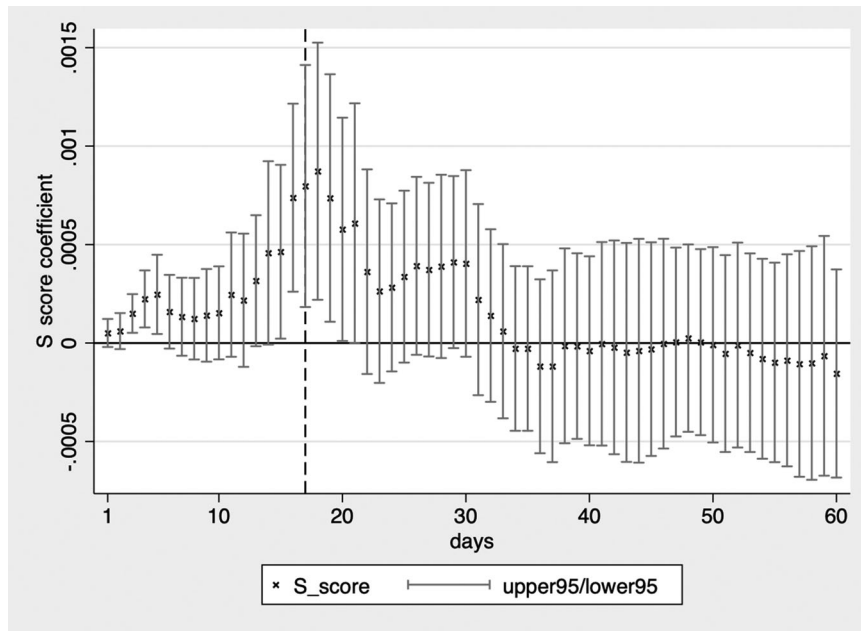


Figure 5. Persistence – S score

Note: The figures show results from our event-study regression analysis of the CAR for different time window lengths since the outbreak of the crisis – starting with 1 day, ending with 60 days. The coefficient for the ESG score – and its subscores – for each time window length is displayed together with the 95% confidence interval, which we calculate using the industry-level clustered standard errors. The regressions include the full set of control variables. The dashed line indicates the end of the crisis period.

Appendix shows the results. We observe a very similar pattern. When controlling for country-day fixed effects, we find that firms with an above median ESG score have on average a 0.203 percentage points higher daily return in the crisis period than firms with a below median score.

(Non-)Persistence. In order to analyse the persistence of the effect, we further extend our analysis by adding 17 additional trading days, that is, the same length as the crisis period. We denote this additional period from 18 March to 9 April as the post-crisis period and create the variable $post_t$, which equals one from 18 March onward and zero before. We extend our empirical model with an interaction term of the dummy variable $post_t$, indicating the post-crisis period, and the different scores:

$$\begin{aligned}
 abnormal\ return_{it} = & \beta_0 + \beta_1 \cdot ESG\ score_i \cdot crisis_t \\
 & + \beta_2 \cdot ESG\ score_i \cdot post_t \\
 & + \beta_3 DayFE_t + \beta_4 FirmFE_i \\
 & + \varepsilon_{it} \tag{2}
 \end{aligned}$$

As in Equation (1), the baseline terms of $ESG\ score_i$, $crisis_t$ and $post_t$ are subsumed by the

firm and day fixed effects. Table 7 presents the results. The upper panel includes again day and firm fixed effects and the lower panel country-day fixed effects – in addition to firm fixed effects. Two observations stand out. First, the crisis effect remains robust to this extension. Second, none of the coefficients of the interaction term with the post-period indicator is positive. That means that firms with high ESG scores do not outperform firms in the post-crisis period compared to the pre-crisis period. On the contrary, we even observe a weakly significant negative effect for the S score. Using a median split confirms the overall picture (see Table A.3 in the Appendix). Finally, we repeat the analysis using daily raw returns instead of abnormal returns. The results are qualitatively the same (see Table A.4 in the Appendix).

The results from the difference-in-differences analysis mainly confirm the results of the event study. Stocks with high ESG scores outperform stocks with low ESG scores in times of crisis. However, the effect is not persistent and fades away over time.

Common trend analysis. Finally, for a causal interpretation of our results of the difference-in-

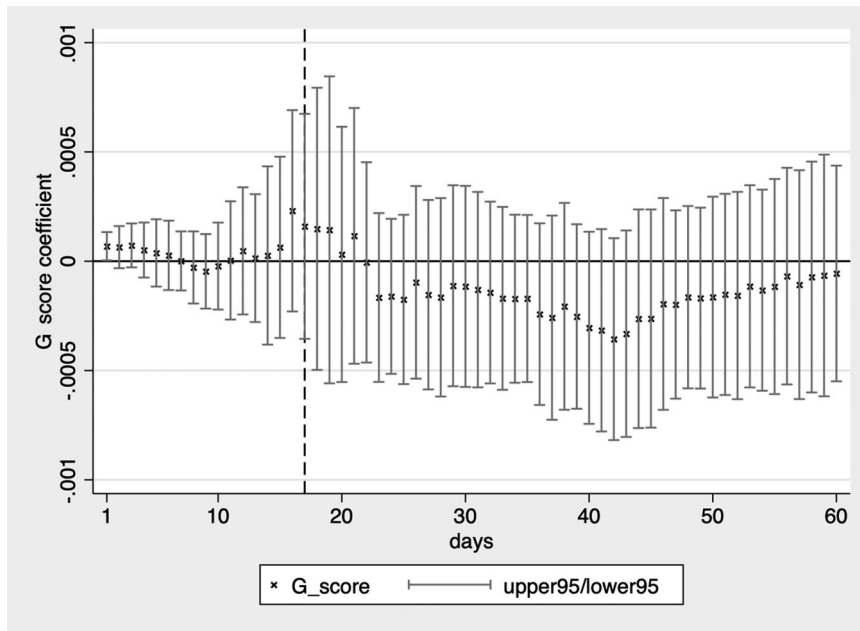


Figure 6. Persistence – G score.

Note: The figures show results from our event-study regression analysis of the CAR for different time window lengths since the outbreak of the crisis – starting with 1 day, ending with 60 days. The coefficient for the ESG score – and its subscores – for each time window length is displayed together with the 95% confidence interval, which we calculate using the industry-level clustered standard errors. The regressions include the full set of control variables. The dashed line indicates the end of the crisis period.

differences analysis, we require common trends in the pre-crisis period. For those reasons, we detail our analysis in the previous subsection further and estimate the leads and lags model (see e.g. Atanasov and Black, 2016):

$$\begin{aligned}
 abnormal\ return_{it} &= \beta_0 + \sum_{k=-9}^{-1} \beta_1^k \cdot ESG\ score_i \cdot I_k \\
 &+ \sum_{k=1}^{17} \beta_1^k \cdot ESG\ score_i \cdot I_k + \beta_2 DayFE_t \\
 &+ \beta_3 FirmFE_i + \varepsilon_{it}
 \end{aligned}
 \tag{3}$$

where I_k is an indicator variable which equals one on day k and zero otherwise. Day $k = 0$ is the last day before the crisis (i.e. 21 February 2020) and serves as the baseline. With this approach, we can identify potential deviations from the common trend assumption. For the common trend assumption to hold, we need the estimates of β_1^k to be statistically zero for $k = [-9; -1]$, that is, there should be no performance difference associated with the ESG score before the crisis.

Figure 7 visualizes the result of the estimation of Equation (3). Three observations stand out. First, we indeed observe coefficients of approximately zero for the pre-crisis period. Hence, our common trend assumption holds. Second, we observe a few significantly positive coefficients right at the start of the crisis period. There are also some negative coefficients – one of which is significantly different from zero. That is in line with some correction movements in the crisis period. Finally, we observe three strongly positive and significant coefficients at the end of the crisis period. Overall, the coefficients fit very well to the results of our event study summarized in Figure 2. Whereas Figure 2 shows the development of the coefficient of the ESG score on the CARs over the analysed time periods, Figure 7 shows the development on the daily abnormal returns over time. Loosely speaking, Figure 7 relates to the first derivative of Figure 2.

We conclude from this analysis that we can interpret the coefficients of our difference-in-differences analysis causally. However, Figure 7 shows that there is substantial heterogeneity in the crisis period and that the average crisis effects

Table 7. Difference-in-differences estimation with post-crisis period

	ESG score	ES score	E score	S score	G score
<i>crisis · var</i>	0.008*** (0.003)	0.009*** (0.002)	0.004* (0.002)	0.011*** (0.002)	0.002 (0.002)
<i>post · var</i>	-0.003 (0.002)	-0.002 (0.002)	-0.002 (0.001)	-0.003* (0.002)	-0.001 (0.002)
Day FE	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes
Observations	44,888	44,888	44,888	44,888	44,888
<i>crisis · var</i>	0.006*** (0.002)	0.006*** (0.002)	0.002 (0.002)	0.009*** (0.002)	0.003 (0.002)
<i>post · var</i>	-0.003 (0.002)	-0.002 (0.002)	-0.002 (0.001)	-0.003* (0.002)	-0.002 (0.002)
Country-day FE	yes	yes	yes	yes	yes
Firm FE	yes	yes	yes	yes	yes
Observations	44,844	44,844	44,844	44,844	44,844

Note: The table shows the estimated coefficients of Equation (2). *var* is a placeholder for the variable shown in the header of each column. The number of observations between the upper and lower panel differ because country-day fixed effects lead to one additional singleton firm observation.

Standard errors clustered on the firm level in parentheses. *p < 0.1. **p < 0.05. ***p < 0.01.

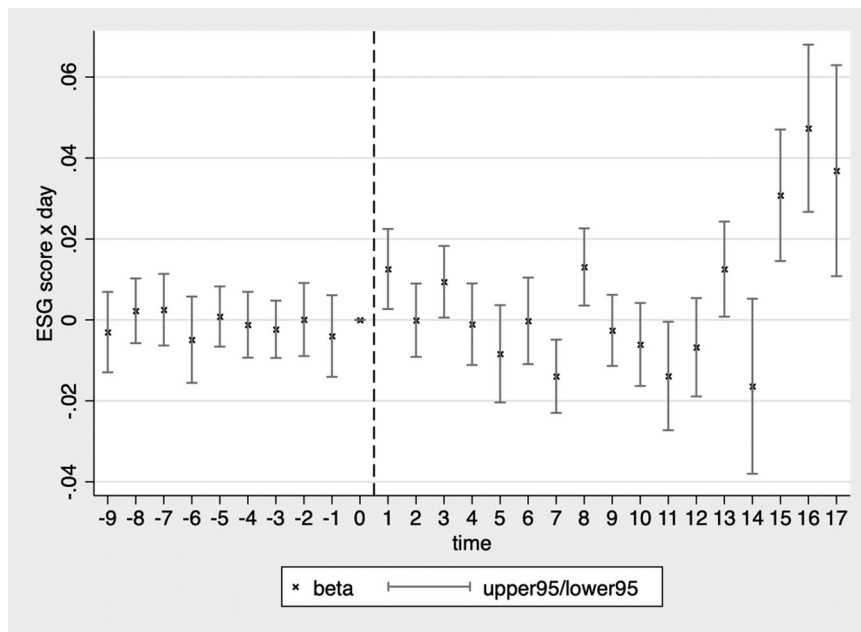


Figure 7. Leads and lags analysis for ESG score.

Note: The figure shows the estimated coefficients of Equation (3), that is, the estimated coefficients and their 95% confidence interval for each day in the sample. The last day of the pre-crisis period (21 February 2020) serves as the baseline.

summarized in Tables 6 and 7 do not show the full picture.

Discussion

The empirical results of the event study and the difference-in-differences analysis lead to the same

conclusion. We find support for both of our hypotheses. First, companies with a high ESG score outperform low-ESG firms in the downturn caused by a systematic shock. That supports the view that an ESG strategy leads to a risk-mitigating, insurance-like mechanism in times of crises. Companies with a high ESG score seem to

be able to build a relationship of trust with their investors and other stakeholders such that they attract more long-term-oriented customers. Second, the effect lasts only as long as the systematic shock is in place. As soon as the European Central Bank intervened, the outperformance reversed and high-ESG firms performed similarly to low-ESG firms. The latter observation also supports the insurance mechanism of an ESG strategy. The outperformance is temporary as long as the crisis lasts. As soon as the situation normalizes, the short-term-oriented investors return to the stock market, leading the low-ESG firm stocks to recover.

We can reject alternative explanations of the crisis outperformance – such as a previous undervaluation – due to negative signalling effects of ESG (DesJardine, Marti and Durand, 2021). Furthermore, we show that the effect can be observed internationally across European countries. Our approach ensures that the observed outperformance is not a country-specific particularity. Finally, we can also rule out that it is driven by the extent and timing of measures fighting the health crisis, such as social distancing requirements and lockdowns.

Hence, our findings extend the existing literature on the performance of ESG-related stocks in times of crisis. By carefully controlling for risk factors, our findings imply an insurance effect beyond the usual risk factors. This has, in our view, important managerial implications. Managers provide an additional value driver to their (risk-averse) investors by relying on ESG factors via the risk-mitigation and insurance effect. We find, however, that this effect is not persistent and can only be observed during the immediate crisis.

Regarding the COVID-19 stock market crisis in particular, our results on the dynamics of the outperformance and its non-persistence can also explain the apparently contradictory results in the literature. This result highlights the necessity to account for such dynamics in future research. Finally, we provide evidence that the different elements of ESG – that is, the E, S and, in particular, G – matter differently. We consider exploring these differences as an interesting route for future research.

Our research has at least three implications for shareholders as well as for managerial decision-making, as well as for shareholders. First, our finding that ESG orientation is associated with an insurance effect in a crisis implies that there is a benefit to ESG investment. However, given

that it is not persistent, the benefit is only small. Second, in addition to this direct shareholder benefit, it implies for managerial decision-making that ESG orientation is a valuable ingredient in the risk-management toolbox protecting against pronounced downside risks. It is, however, not a general ‘equity vaccine’ but rather one with a limited lifetime. Last but not least, our findings imply that in this context concentration on the environmental and social dimensions pays, and that the governance perspective can be neglected.

A potential limitation of our approach is that there is no generally agreed standard on ESG reporting, and that we rely on ESG scores stemming from one data provider. However, Thomson Reuters is one of the most accepted data providers in the field, and the problem is inherent to the field in general.

Conclusion

The main aim of this paper is to analyse the performance of socially responsible investments during the COVID-19-associated stock market crash. We focus on the European market in which aspects of socially responsible investments have turned out to become particularly important in the public debate, but also in the financial service industry (e.g. in asset management). We take an extensive list of further risk factors as well as firm characteristics into account to carve out the effects of higher ESG ratings on stock market performance. We provide evidence for the risk-mitigation, insurance-like effects of socially responsible investment. While our analysis shows a positive statistically significant effect of ESG scores in the downturn of the crisis, the effect is economically rather small in size and fades away completely in the recovery of the market. The robustness of our results in two different approaches supports a causal interpretation of the results. Our findings are in line with theoretical reasoning and add to a further understanding of socially responsible investment: while they provide a certain degree of insurance, there are no persistent effects over a longer period of time, in which the initial systematic stock market shock has petered out. Our research suggests an important managerial implication since it stresses the risk-mitigation effect of ESG orientation of management in case of severe, systematic financial market shocks.

Our finding of an immediate outperformance of ESG stocks is in line with the observations from earlier stock market crises (Lins, Servaes and Tamayo, 2017). We believe that observing the insurance effect across different events highlights the relevance of responsible investment. It will be interesting to see whether the effect can be observed during future crises as well, or whether (other) market participants will include it in their trading strategies to their advantage.

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Supporting Information

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