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Did ESG Provide Stock Market Resilience?

An Empirical Analysis of European
Firms During COVID-19

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Abstract

This study examines whether ESG contributed to stock market resilience in Europe during the COVID-19 crisis. Using a dataset of publicly listed firms across 29 European countries, I applied Ordinary Least Squares regression and Difference-in-Differences analysis to assess ESG's impact on stock returns. The findings indicate that ESG did not significantly influence stock performance. Instead, larger firms with higher cash reserves and lower debt demonstrated stronger resilience in the short-term. Additionally, momentum effects played a crucial role. Over time, as financial uncertainty diminished, market-based risk measures became the dominant drivers of stock performance. Several factors may explain these results, including ESG rating inconsistencies, reporting differences, and greenwashing concerns. Furthermore, the relevance of ESG varies across industries, reducing the effectiveness of broad ESG metrics in predicting resilience. These findings have important implications for corporate leaders, investors, and regulators. Firms should focus on financial stability and material ESG factors that drive real value. Investors must critically assess ESG ratings, while regulators should enhance disclosure standards for greater transparency and comparability.

Keywords: ESG investing, ESG performance, sustainable finance, stock market resilience, COVID-19 financial impact, financial crisis, European equity markets.

O ESG Proporcionou Resiliência no Mercado de Ações? Uma Análise Empírica de Empresas Europeias Durante a COVID-19

Lukas Heipp

Resumo

Este estudo investiga se o ESG contribuiu para a resiliência do mercado acionista na Europa durante a crise da COVID-19. Utilizando um conjunto de dados de empresas de capital aberto em 29 países europeus, apliquei regressão por Mínimos Quadrados Ordinários e análise de Diferenças em Diferenças para avaliar o impacto do ESG nos retornos das ações. Os resultados indicam que o ESG não influenciou significativamente o desempenho das ações. Em vez disso, empresas maiores, com maiores reservas de caixa e menor endividamento, demonstraram maior resiliência no curto prazo. Além disso, efeitos de momentum desempenharam um papel crucial. Com o tempo, à medida que a incerteza financeira diminuiu, as medidas de risco baseadas no mercado tornaram-se os principais determinantes do desempenho das ações. Vários fatores podem explicar esses resultados, incluindo inconsistências nas classificações ESG, diferenças nos relatórios e preocupações com greenwashing. Ademais, a relevância do ESG varia entre os setores, o que reduz a eficácia de métricas ESG amplas na previsão da resiliência. Esses achados têm importantes implicações para líderes corporativos, investidores e reguladores. As empresas devem focar na estabilidade financeira e em fatores ESG materiais que gerem valor real. Os investidores devem avaliar criticamente as classificações ESG, enquanto os reguladores devem aprimorar os padrões de divulgação para garantir maior transparência e comparabilidade.

Palavras-chave: investimento ESG, desempenho ESG, finanças sustentáveis, resiliência do mercado acionista, impacto financeiro da COVID-19, crise financeira, mercados acionistas europeus.

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Abbreviations

AR	Abnormal Return
B/M	Book-to-Market Ratio
BHAR	Buy-and-Hold-Return
CAR	Cumulative Abnormal Return
CEM	Coarsened Exact Matching
CSR	Corporate Social Responsibility
DiD	Difference-in-Difference
ESG	Environment, Sustainability and Governance Score
ES	Environment and Sustainability Score
Feb	February
FFF	Fama-French Factors
OLS	Ordinary Least Squares
PEPP	Pandemic Emergency Purchase Program
PSM	Propensity Score Matching
Q1	First Quarter
R&D	Research & Development Expenses
ROA	Return on Assets
ROE	Return on Equity
SG&A	Sales, General & Administrative Expenses
SFDR	Sustainable Finance Disclosure Regulation
UK	United Kingdom
USD	US Dollar

1. Introduction

The COVID-19 pandemic was a defining moment for global financial markets, triggering one of the sharpest economic downturns in modern history. According to Behraves (2020), the economic shock caused by COVID-19 was three times worse than the 2008 financial crisis in terms of GDP decline on an annual basis. During the initial market crash, from February 24 to March 31, 2020, the STOXX Europe 600 index plummeted by approximately 28%. This sharp decline reflected the severity of investor panic and economic uncertainty. Amid this turmoil, ESG investing came under the spotlight.

ESG investing is an investment approach that considers environmental, social, and governance factors to enhance financial value by managing risks and opportunities. It also aligns with ethical and social values of investors (Starks, 2023). Even before the pandemic, ESG investing had been gaining significant traction. Global assets under management in ESG funds reached 30 trillion USD in 2022, with projections exceeding 40 trillion USD by 2030 (Bloomberg, 2024). Fund managers increasingly favored companies with high ESG scores (Starks, 2023). In Europe, ESG investing has been particularly prominent, largely due to comprehensive regulatory frameworks such as the European Green Deal and the Sustainable Finance Disclosure Regulation. These frameworks encourage transparency and actively channel investments toward sustainable business practices (Ffe, 2022).

The pandemic further accelerated interest in ESG investing. Data from BlackRock (2021) indicates that 94% of the sustainable indexes they analyzed outperformed their parent benchmarks during the first quarter of 2020. However, the empirical evidence on ESG resilience remains mixed. Some studies suggest that ESG enhances stock market resilience. Albuquerque et al. (2020) found that firms with high environmental and social (ES) ratings experienced better abnormal return (AR) and lower volatility during the initial market shock. In contrast, Demers et al. (2021) argued that, once firm fundamentals are controlled for, ESG does not systematically enhance stock market resilience during a crisis. These divergent findings highlight a critical research gap. While existing research provides valuable insights into the role of ESG in financial crises, most studies primarily examine the United States. It remains unclear whether ESG investments delivered a similar level of financial resilience in European stock markets. This may be explained by structural differences between the regions, such as the shareholder-oriented governance model in the United States compared to the stakeholder-oriented model in Europe (Stadler et al. 2006), as well as differences in ESG related investor preferences (Starks 2023). As emphasized by Löw et al. (2024), there is a need for more region-

specific studies to understand how ESG factors influenced stock performance during the COVID-19 crisis in Europe. This study addresses that gap by investigating the following research question:

Did ESG efforts contribute to the resilience of stocks during the COVID-19 crisis in Europe?

The link between ESG and stock performance, particularly during crises, carries important implications for business strategy, investment decisions, and regulatory policies. If strong ESG practices enhance resilience and provide a competitive advantage, they strengthen the case for embedding sustainability into corporate and investment strategies. Conversely, if ESG has no or even a negative impact, investors and businesses must reassess its role and shift focus to more effective crisis preparedness strategies.

This study examines firms with a market capitalization above 100 million USD, employing OLS regression and DiD analysis to evaluate the impact of ESG on key performance metrics. It considers both the immediate impact of the crisis and the subsequent phase of long-term market stabilization. By analyzing short-term and long-term effects, this empirical study provides valuable insights into the role of ESG in financial stability during crises. It contributes to the ongoing discourse on ESG's broader financial impact.

2. Background

Strategic Advantages of ESG: A Theoretical Perspective

Theoretically, integrating ESG practices can provide companies with multiple strategic advantages. These advantages may enhance both financial performance and long-term stability. Stakeholder theory highlights the importance of engaging with the interests and expectations of all stakeholders. This engagement builds trust and secures long-term success (Freeman, 2010). For example, Patagonia's dedication to environmental activism, sustainable materials, and fair labor practices strengthens its reputation for customers, employees and business partners. However, this alignment with stakeholder interests does not inherently guarantee improved financial performance, particularly during periods of market stress. The resource-based view argues that firms can achieve sustainable competitive advantage through valuable, rare, and inimitable resources (Grant, 1991). Tesla's ESG-driven focus has resulted in proprietary clean technologies and a strong green brand, both of which are difficult to replicate. These resources have supported Tesla's position as a leader in the electric vehicle industry, showing how ESG can contribute to strategic advantage. Legitimacy theory emphasizes the importance of aligning with societal norms to gain social approval and avoid potential legal, economic, and social

sanctions (Dowling et al., 1975). A notable example is Unilever, whose Sustainable Living Plan (Unilever, 2021) aligns the company with societal expectations. Overall, ESG could function as a powerful strategic tool.

Empirical Evidence on ESG and Company Performance

Research on ESG has highlighted its potential impact on various financial metrics, which ultimately affect stock returns (Ou & Penman, 1989). These findings provide a strong foundation for understanding ESG's financial benefits and offer practical insights for business leaders. Chen et al. (2023) explored how ESG performance enhances financial outcomes such as return on assets (ROA) and return on equity (ROE). Their findings suggest a clear positive impact of ESG activities on financial metrics for large companies. However, this effect is weaker for smaller firms. Similarly, Xie et al. (2019) demonstrated that specific ESG practices, such as green building initiatives, environmental supply chain management, and equal opportunity policies, enhance corporate efficiency and ROA. However, they emphasized that not all ESG activities yield positive results. Their findings suggest that a targeted, strategic approach is essential for ESG initiatives to be financially beneficial. Further evidence on ESG's financial benefits is provided by Eliwa et al. (2021), who found that companies with strong ESG performance enjoy lower debt costs in the European Union. Lenders perceive such companies as having reduced credit and reputational risks. Beyond financial metrics, Du et al. (2015) investigated the role of corporate social responsibility (CSR), which is a critical dimension of the ESG framework. Their research shows that CSR initiatives enhance employee satisfaction, reduce turnover, and boost organizational morale. Overall, the literature indicates that, when thoughtfully selected, ESG practices offer significant advantages. However, the impact of ESG varies depending on firm size.

The Mixed Relationship Between ESG and Stock Performance

While ESG initiatives seem to bolster internal performance, research suggests that these benefits do not always extend directly to stock performance. Luo (2022) examined the ESG portfolio performance of UK securities from 2003 to 2020 and found that ESG scores have a significant negative effect on stock returns. This finding suggests that investors who prioritize ESG principles may need to accept lower financial gains. Cornell (2021) further argues that while highly rated ESG firms benefit from a lower cost of capital, this advantage comes at the expense of lower expected returns for investors. Blitz & Fabozzi (2017) examined sin stocks, which are typically rated low on ESG (Paradis & Schiehl, 2021). Their replication study

revealed that the observed outperformance was entirely attributable to profitability and investment factors within the Fama-French model.

ESG's Role in Financial Crises: Conflicting Findings

Research on ESG's impact during financial crises presents methodological differences and contradictory findings. Albuquerque et al. (2020) applied a DiD approach to analyze the effect of environmental and social (ES) factors on AR. Their findings suggest that ESG contributes to significant positive AR, supporting the idea that ESG performance enhances resilience during financial downturns. However, their study focused solely on the early crisis period, raising concerns about its generalizability over longer timeframes. In contrast, Demers et al. (2021) use a linear regression framework to analyze BHAR. They found that, after accounting for firm characteristics, ESG had no significant impact on performance. Their analysis covered both the early crisis period in Q1 and the full year. While this approach provides detailed insights, it may not capture causal relationships as effectively as the DiD method. The key limitation of existing research is its predominant focus on U.S. firms, which may not fully translate to European markets. To address these gaps, my study integrates elements of both Albuquerque et al. (2020) and Demers et al. (2021). I combined multiple regressions and a DiD framework to assess ESG performance across both short-term and long-term periods.

3. Methodology

Sample Selection and Scope

This study investigates the relationship between ESG performance and stock returns during the COVID-19 crisis in Europe. The analysis is based on a representative sample of publicly listed firms from 29 European countries. All financial, stock market, ESG, and firm-level data were obtained from Refinitiv via the LSEG Workspace Excel add-in. Fama-French factor loadings were retrieved from Kenneth French's data library. The final sample includes 1,144 firm observations, selected based on specific inclusion criteria. Firms were required to have a minimum market capitalization of 100 million USD to ensure sufficient size and industry representation. Following Demers et al. (2021), firms in the financial and real estate sectors were excluded due to their distinct capital structures and regulatory environments. Observations with missing values for ESG scores, stock returns, or key control variables were also removed. The full sample selection process is illustrated in Table 1.

TABLE 1: Sample Selection. This table outlines the data cleaning and filtering process leading to the final regression sample of 1144 firms for the short- and long-term period.

Sample Restriction	Remaining Firms
European public firms (> 100 million USD, excl. Financial & Real Estate sector)	1995
Exclude firms without ESG score	1171
Exclude firms without stock return data	1152
Exclude firms with missing control variables	1144

Timeframes of Analysis

To capture the evolving impact of the crisis, this study analyzes two distinct periods. The short-term period spans February 24 to March 31, 2020. It captures the immediate market shock after COVID-19 lockdowns began in Europe, starting in Northern Italy. By March 31, the STOXX Europe 600 index had lost approximately 28%. The full-year 2020 period reflects longer-term impacts and market stabilization, with the index finishing the year with a 6.7% decline. These timeframes align with those used by Demers et al. (2021).

Measuring Stock Performance

The dependent variable in this study is stock performance, measured using BHAR and CAR. Abnormal returns quantify the portion of a stock's return that diverges from expected market movements, isolating performance not driven by broader market trends. CAR is computed as the arithmetic sum of abnormal returns over a given event window, whereas BHAR is calculated as the geometric sum of abnormal returns, which compounds returns over time. While differences between CAR and BHAR are generally minimal in short-term event studies, in long-term analyses, the compounding effect in BHAR can lead to significant deviations (Nguyen, 2020). Both metrics are derived from daily stock returns in USD, based on adjusted stock prices. Daily return data is preferred due to its precision in capturing market reactions, which aligns with the Efficient Market Hypothesis (Fama et al., 1969). Empirical research further supports the use of high-frequency data, as daily estimators consistently outperform those based on monthly or quarterly data (Hollstein et al., 2017). I employed the market model to estimate expected returns, as it provides a reliable and widely recognized framework in event studies, especially during crisis periods (Albuquerque et al., 2020; Demers et al., 2021). The expected return is calculated as the product of the firm's beta and the market return (Stapleton & Subrahmanyam, 1983). In this study, the market return represents the performance of a Europe-wide, value-weighted market portfolio, as compiled by French (n.d.). The beta coefficient is estimated through regression over 250 trading days, as a one-year historical

window has been shown to yield the lowest average prediction errors (Hollstein et al., 2017).

The formulas for BHAR and CAR are as follows:

BHAR Formula:

$$BHAR = \prod_{t=1}^T (1 + R_{i,t}) - \prod_{t=1}^T (1 + R_{e,t})$$

CAR Formula:

$$CAR = \sum_{t=1}^T (R_{i,t} - R_{e,t})$$

Where:

$R_{i,t}$: Actual return of the stock i on day t

$R_{e,t}$: Expected return based on the market model on day t

Specification of Independent Variables

ESG ratings serve as my main independent variable. Refinitiv's ESG score measures a company's overall ESG performance across more than 630 metrics. It summarizes the company's impact on environmental sustainability, social responsibility, and governance standards (LSEG, 2023). Refinitiv ESG scores are publicly available, standardized, and widely recognized in academic research. The analysis includes several independent variables as controls to ensure robust results. The full list is presented in Table 2.

Table 2: Control Variables and Justification. This table presents the control variables used in the analysis.

Variable	Justification
BTM	Firms with higher Book-to-Market ratios are associated with higher expected returns (Fama and French, 2006).
Momentum	Stocks that performed well before often continue to outperform (Jegadeesh & Titman, 2011).
IdioRisk	Stocks with past idiosyncratic volatility have low future average returns (Ang et al., 2009).
SMB, HML, RMW, CMA	Factor loadings quantify how sensitive an asset's returns are to systematic risk factors, that affect the overall market (Fama & French, 2015).
Size	Tendency for small companies returns to outperform big companies (Banz, 1981).
Cash	Importance of cash to stock price resilience during the Covid-19 crisis (Albuquerque et al., 2020; Glossner et al., 2020).
LTDebt and STDebt	Importance of low debt to stock price resilience during the Covid 19 crisis (Albuquerque et al., 2020; Glossner et al., 2020).
ROA	Profitable firms generate higher returns (Novy-Marx, 2013).
InvTurn	Supply chain disruptions faces long-term negative stock price effects (Hendricks et al., 2005).
RD&SGAstock	RD&SGAstock represents internally developed intangible assets. R&D have positive effect on returns (Chan et al., 2001). SG&A have also an investment component (Enache & Srivastava (2018). Following Demers et al. (2021) I construct the composite variable RD&SGAstock, that combines R&D expenses with one-third of SG&A (representing its investment portion), amortized over five years.
AcqIntang	Overconcentration of acquired intangibles leads to negative returns (Arikan, 2002).
DivPayout	Dividend payout ratio conveys additional signaling information (Bhattacharya, 1979).
Age	Firms with high information uncertainty earn lower returns Jiang et al. (2005).

This study applies country and industry fixed effects. Country fixed effects control for time-invariant national characteristics. These include healthcare systems, legal frameworks, cultural norms, geography, and historical economic structures. Industry fixed effects account for sector-specific factors. These include capital intensity, regulatory environment, technological standards, and market structures (Torres-Reyna, 2007). To address the distorting impact of extreme outliers on regression estimates, winsorization is applied to improve the robustness of the results (Dixon & Yuen, 1974).

Linear Regression Models for BHAR and CAR

Model 1 employs a linear regression to examine the relationship between ESG and BHAR for European companies during the COVID-19 pandemic. To test the significance of the relationships within the regression models, t-tests are used (Mishra et al., 2019). Since there is only one observation per firm, the firm and time subscripts are suppressed (Demers, 2021).

$$\begin{aligned} BHAR = & \gamma_0 + \gamma_1 ESG + \gamma_2 BTM + \gamma_3 Momentum + \gamma_4 IdioRisk + \gamma_5 SMB + \gamma_6 HML \\ & + \gamma_7 RMW + \gamma_8 CMA + \gamma_9 Size + \gamma_{10} Cash + \gamma_{11} LTDebt + \gamma_{12} STDebt \\ & + \gamma_{13} ROA + \gamma_{14} InvTurn + \gamma_{15} RD\&SGAstock + \gamma_{16} AcqIntang + \gamma_{17} DivPayout \\ & + \gamma_{18} Age + \sum_{i=1}^9 \delta_i industry_i + \sum_{i=1}^{29} \delta_i country_i + \varepsilon \end{aligned} \quad (1)$$

Similarly, Model 2 applies a linear regression to analyze the relationship between ESG and CAR for European firms. To test the significance of the relationships within the regression models, t-tests are used (Mishra et al., 2019). Since there is only one observation per firm, the firm and time subscripts are suppressed (Demers, 2021).

$$\begin{aligned} CAR = & \gamma_0 + \gamma_1 ESG + \gamma_2 BTM + \gamma_3 Momentum + \gamma_4 IdioRisk + \gamma_5 SMB + \gamma_6 HML \\ & + \gamma_7 RMW + \gamma_8 CMA + \gamma_9 Size + \gamma_{10} Cash + \gamma_{11} LTDebt + \gamma_{12} STDebt \\ & + \gamma_{13} ROA + \gamma_{14} InvTurn + \gamma_{15} RD\&SGAstock + \gamma_{16} AcqIntang + \gamma_{17} DivPayout \\ & + \gamma_{18} Age + \sum_{i=1}^9 \delta_i industry_i + \sum_{i=1}^{29} \delta_i country_i + \varepsilon \end{aligned} \quad (2)$$

Difference-in-Differences Models for AR

Beyond linear regression, additional tests are conducted to further assess ESG's impact on daily AR. A DiD approach, following Albuquerque et al. (2020), is implemented to evaluate how ESG performance influenced stock resilience. A Difference-in-Differences (DiD) approach removes biases in post-intervention comparisons between the treatment and control group that may arise from permanent differences between those groups. It also accounts for biases in within-group comparisons over time that could result from trends unrelated to the intervention (Columbia University, n.d.). Since all firms were affected by COVID-19, a traditional DiD model, which requires a control group where the event did not occur, is not applicable. Instead, I implement DiD with a continuous treatment, as proposed by Callaway et al. (2024). This method compares treated firms with high ESG scores to control group firms with low ESG scores, analyzing their performance differences over time. To ensure comparability, Coarsened Exact Matching (CEM) is employed to create balanced groups based on similar pre-treatment

characteristics. CEM reduces covariate imbalance through a user-defined, transparent preprocessing step that bounds model dependence and estimation error ex ante. Unlike traditional propensity score methods, CEM guarantees in-sample balance of nonlinearities and interactions. The procedure involves temporarily coarsening covariates, performing exact matching on these coarsened values, and then conducting the analysis using the uncoarsened data (Blackwell et al., 2010). Firms are matched on size, industry, and geography to minimize imbalance while maintaining a robust sample size.

In this DiD specification, an „After“ indicator variable is introduced. It takes a value of 0 before February 24, 2020, and 1 from February 24, 2020, onward. This date is chosen as it marks the first trading day following Italy’s initial lockdown, signaling the beginning of the COVID-19 market downturn. Additionally, a „Treated“ variable is defined. Firms with ESG scores in the top 25th percentile are assigned a value of 1, while firms below this threshold receive a value of 0. Firm and day fixed effects control for firm-specific characteristics and day-specific influences. This follows the approach of Albuquerque et al. (2020). The DiD regression is referred to as Model 3 in the analysis.

$$AR_{it} = \gamma_0 + \gamma_2 Treated_i \times After_t + \gamma_3 Firm\ FE_i + \gamma_4 Day\ FE_t + \varepsilon_{it} \quad (3)$$

Figure 1: Mean CAR Over Time for Control and Treated Groups (2020). This figure illustrates the CAR trends for control and treated groups throughout 2020. The vertical dashed red line marks February 24, 2020, indicating the onset of the Covid-19 outbreak. The control group with low ESG (blue) shows a stronger recovery post-event compared to the treated group with high ESG (red).



The required parallel trends assumption (Torres-Reyna, 2015) is satisfied with a 99% confidence level for AR during the pre-period (January 1 – February 24, 2020). On February 24, 2020, the control group had a CAR of -2.5%, which increased to 8.7% by the end of 2020. In comparison, the treated group started with a CAR of -2.6% and reached 6.0% by year-end.

Diagnostic and Robustness Tests

To ensure the reliability of findings and minimize potential biases, several methodological measures are implemented. The ESG score and control variables are incorporated with a time lag, using data from the last quarter before the crisis. This strengthens causality (Kinney, 2019). Additionally, several diagnostic tests are conducted to enhance the validity of the regression models. The Ramsey RESET test is applied to detect potential omitted variable bias (Ramsey, 1969). The Breusch-Pagan/Cook-Weisberg test is used to check for heteroskedasticity (Stocker, n.d.). COVID-19-specific variables, such as workplace closures, case numbers, and the stringency of containment measures, were initially considered but ultimately excluded due to multicollinearity.

4. Results

4.1 Descriptive Statistics

Table 3A presents the descriptive statistics for the sample firms during the COVID-19 crisis period from February 24 to March 31, 2020. During this period, firms experienced negative mean and median returns across all return measures, reflecting the severe market downturn. BHAR from February 24 to March 31 had a mean of -6.3% and a median of -5.6%. CAR was slightly more negative, with a mean of -7.4% and a median of -5.5%. Raw returns were substantially lower, averaging -29.7%, with a median of -28.6%. In terms of ESG performance, ESG scores from 2019 had a mean of 0.546 and a median of 0.559, showing a slight increase compared to 2018 scores. Firm size remained relatively stable, with a mean of 6.431 and a median of 6.374.

Table 3B provides descriptive statistics for the full-year sample from January 1 to December 31, 2020. In contrast to the short-term market shock, the full-year data reveals a moderate recovery. The mean BHAR turned positive at 6.0%, although the median remained slightly negative at -2.4%. Similarly, CAR improved to a mean of 9.2% and a median of 4.9%. Raw returns showed the strongest recovery, averaging 14.9%, with a median of 6.6%.

TABLE 3: Descriptive Statistics

Panel A: Summary Statistics February 24 - March 31, 2020

	N	Mean	STDV	P25	P50	P75
BHAR	1152	-0,063	0,167	-0,167	-0,056	0,039
CAR	1152	-0,074	0,224	-0,195	-0,055	-0,070
AR	42250	-0,001	0,037	-0,013	-0,001	0,011
Raw Return	1152	-0,297	0,163	-0,390	-0,286	-0,197
IdioRisk	1152	0,018	0,008	0,013	0,017	0,021
ESG (2019)	1152	0,546	0,202	0,405	0,559	0,705
ESG (2018)	1040	0,541	0,204	0,388	0,555	0,701
BTM	1144	0,575	0,604	0,229	0,430	0,731
Momentum	1152	0,257	0,434	0,010	0,221	0,420
SMB	1152	0,569	0,819	0,011	0,526	1,074
HML	1152	0,347	1,121	-0,389	0,153	1,009
RMW	1152	0,239	1,184	-0,395	0,178	0,894
CMA	1152	-0,368	1,023	-0,932	-0,332	0,290
Size	1149	6,431	0,675	5,914	6,374	6,880
Cash	1149	0,105	0,098	0,041	0,079	0,133
STDebt	1149	0,046	0,052	0,011	0,031	0,062
LTDebt	1149	0,185	0,137	0,078	0,169	0,262
AcqIntang	1149	0,206	0,181	0,054	0,160	0,322
RD&SGASStock	1149	0,160	0,135	0,046	0,142	0,241
ROA	1149	0,045	0,070	0,017	0,041	0,071
DivPayout	1152	0,245	0,278	0,000	0,152	0,452
InvTurn	1152	1,764	1,441	0,919	1,511	2,429
Age	1152	23,321	14,743	12,410	21,532	31,759

Panel B: Summary Statistics January 01 – December 31, 2020

	N	Mean	STDV	P25	P50	P75
BHAR	1152	0,060	0,474	-0,209	-0,024	0,216
CAR	1152	0,092	0,369	-0,117	0,049	0,273
AR	161654	0,000	0,030	-0,013	-0,001	0,012
Raw Return	1152	0,149	0,473	-0,122	0,066	0,308
IdioRisk	1152	0,019	0,008	0,014	0,017	0,022
ESG (2019)	1152	0,546	0,202	0,405	0,559	0,705
ESG (2018)	1040	0,541	0,204	0,388	0,555	0,701
BTM	1144	0,575	0,604	0,229	0,430	0,731
Momentum	1152	0,257	0,434	0,010	0,221	0,420
SMB	1152	0,576	0,837	0,018	0,532	1,057
HML	1152	0,313	1,124	-0,423	0,187	0,966
RMW	1152	0,294	1,170	-0,354	0,284	0,981
CMA	1152	-0,293	1,062	-0,879	-0,204	0,408
Size	1149	6,431	0,675	5,914	6,374	6,880
Cash	1149	0,105	0,098	0,041	0,079	0,133
STDebt	1149	0,046	0,052	0,011	0,031	0,062
LTDebt	1149	0,185	0,137	0,078	0,169	0,262
AcqIntang	1149	0,206	0,181	0,054	0,160	0,322
RD&SGASStock	1149	0,160	0,135	0,046	0,142	0,241
ROA	1149	0,045	0,070	0,017	0,041	0,071
DivPayout	1152	0,245	0,278	0,000	0,152	0,452
InvTurn	1152	1,764	1,441	0,919	1,511	2,429
Age	1152	23,321	14,743	12,410	21,532	31,759

4.2 Short-Term Results (Feb-March 2020)

The short-term analysis covers the period from February 24 to March 31, 2020, examining stock performance using BHAR (Table 4) and CAR (Table 5) as dependent variables. The initial analysis of short-term stock performance suggests that ESG was a significant determinant of resilience across model specification (1) and (2). However, this effect disappeared after controlling for firm size, as ESG loses statistical significance across specification (3) and (4). Omitting firm size as a control variable would have led to incorrect inferences. The insignificance of ESG in explaining short-term stock performance aligns with prior research questioning its protective role in financial downturns. Demers et al. (2021) similarly found no measurable effect of ESG on stock resilience during the short-term COVID-19 market crash.

Market-based risk measures, including BTM, idiosyncratic risk, and most Fama-French factor loadings, do not exhibit statistically significant effects in the short-term window. The insignificance of BTM, reflecting a firm's relative valuation, suggests that value considerations were largely irrelevant during the crisis. Similarly, the lack of significance in idiosyncratic risk indicates that firm-specific volatility was not relevant for investors. The Fama-French factors were also insignificant and failed to explain return differences. In contrast, momentum remains consistently positive and highly significant, suggesting that firms with strong pre-crisis performance continued to outperform despite broader market disruptions.

Financial flexibility, particularly in the form of cash holdings and long-term debt, played a significant role in determining stock market resilience. Firms with greater cash reserves exhibited stronger performance, underscoring the importance of liquidity buffers during periods of heightened uncertainty. In contrast, higher levels of long-term debt were associated with weaker returns, reflecting investor concerns over firms' financial obligations amid the crisis. Notably, while balance sheet strength proved important, profitability as measured by return on assets (ROA) was not statistically significant, suggesting that profitability did not drive investor confidence during this period. Firm size also emerged as one of the most robust predictors of resilience. Larger firms benefited from enhanced access to liquidity and targeted support measures, such as the European Central Bank's Pandemic Emergency Purchase Programme (PEPP) (European Central Bank, 2020), which helped stabilize their market position.

Furthermore, the findings indicate no evidence that investments in internally developed or acquired intangible assets had any impact on stock price resilience. Overall, these results suggest that ESG played a limited role in the short-term impact of a financial crisis. Instead, market resilience was primarily driven by firm size, liquidity reserves, and financial flexibility.

TABLE 4: BHAR Model 1 February 24 - March 31, 2020. This table presents regression results of BHAR on independent variables for February 24 – March 31, 2020, using the market model. Column (1) regresses return on ESG scores, (2) adds market-based measures of risk, (3) includes Size, and (4) uses the full Model. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance: * p<0.1, ** p<0.05, *** p<0.01. Variable definitions are available in the Appendix.

	(1) BHAR	(2) BHAR	(3) BHAR	(4) BHAR
ESG	0.132069*** (0.023708)	0.081452*** (0.027376)	-0.020297 (0.030859)	0.014991 (0.030181)
BTM		-0.022750 (0.013845)	-0.017310 (0.015760)	-0.008198 (0.016655)
Momentum		0.060297*** (0.013647)	0.049003*** (0.013846)	0.041777*** (0.013775)
IdioRisk		-2.069551 (1.292520)	-0.920560 (1.611368)	-1.280740 (1.772753)
SMB		-0.014928* (0.008040)	0.000247 (0.009364)	0.000202 (0.009539)
HML		0.019078* (0.010546)	0.023497** (0.011324)	0.025058** (0.011323)
RMW		0.001478 (0.008267)	-0.001112 (0.008846)	-0.001230 (0.008877)
CMA		-0.012341* (0.006858)	-0.008538 (0.006854)	-0.008271 (0.006681)
Size			0.063455*** (0.014594)	0.057264*** (0.014594)
Cash				0.140500** (0.063038)
LTDebt				-0.087974** (0.039332)
STDebt				-0.030713 (0.088749)
ROA				0.095256 (0.088211)
InvTurn				-0.008870*** (0.003213)
RD&SGAstock				0.068806 (0.046398)
AcqIntang				-0.008420 (0.030231)
DivPayout				0.035717** (0.016903)
Age				-0.000371 (0.000338)
_cons	-0.168054*** (0.036504)	-0.096821** (0.047243)	-0.479652*** (0.116971)	-0.445965*** (0.120912)
Observations	1152	1144	1144	1144
R-squared	0.198212	0.260547	0.282667	0.315593
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

TABLE 5: CAR Model 2 February 24 - March 31, 2020. This table presents regression results of CAR on independent variables for February 24 – March 31, 2020, using the market model. Column (1) regresses return on ESG scores, (2) adds market-based measures of risk, (3) includes Size, and (4) uses the full Model. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance: * p<0.1, ** p<0.05, *** p<0.01. Variable definitions are available in the Appendix.

	(1) CAR	(2) CAR	(3) CAR	(4) CAR
ESG	0.139987*** (0.030378)	0.070459** (0.035645)	-0.067273 (0.043517)	-0.016122 (0.042216)
BTM		-0.022083 (0.016740)	-0.014719 (0.017975)	-0.002945 (0.018860)
Momentum		0.081328*** (0.019063)	0.066039*** (0.018795)	0.055273*** (0.018520)
IdioRisk		-2.841682* (1.468548)	-1.286357 (1.705748)	-1.644372 (1.866519)
SMB		-0.026718** (0.010918)	-0.006177 (0.012317)	-0.006875 (0.012596)
HML		0.011984 (0.011417)	0.017965 (0.012284)	0.020680* (0.012413)
RMW		0.002116 (0.009458)	-0.001390 (0.009996)	-0.002077 (0.010201)
CMA		-0.017915** (0.008883)	-0.012767 (0.008922)	-0.012170 (0.008663)
Size			0.085896*** (0.017921)	0.076003*** (0.018154)
Cash				0.176895** (0.082164)
LTDebt				-0.141501** (0.056929)
STDebt				-0.096905 (0.129689)
ROA				0.153687 (0.121519)
InvTurn				-0.012299** (0.004948)
RD&SGAstock				0.087876 (0.060898)
AcqIntang				-0.011507 (0.042278)
DivPayout				0.054023** (0.021357)
Age				-0.000469 (0.000492)
_cons	-0.172658*** (0.050673)	-0.075295 (0.059452)	-0.593511*** (0.130611)	-0.534309*** (0.134705)
Observations	1152	1144	1144	1144
R-squared	0.186475	0.245798	0.268259	0.306912
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

4.3 Long-Term Results (Full Year 2020)

The long-term analysis covers the period from January 1 to December 31, 2020, examining stock performance using BHAR (Table 6) and CAR (Table 7) as dependent variables across multiple model specifications. While ESG initially appears negatively associated with BHAR and CAR, its statistical significance diminishes as additional controls are introduced in specification (4). The results suggest that ESG was not a significant driver of stock performance throughout the full crisis year when firm and market characteristics are fully accounted for. This conclusion aligns with the earlier short-term findings.

BTM did not show a statistically significant relationship with returns in either the short-term or long-term window. This confirms that value effects did not play a major role in explaining stock performance during the crisis period. Idiosyncratic risk is not significant when using BHAR in Table 6 but becomes significant when CAR is used in Table 7, suggesting that the importance of firm-specific risk varies depending on the chosen return metric. Momentum remains a consistent and statistically significant driver of stock performance throughout the year, highlighting the role of market sentiment and capital flows. Fama-French factors explain returns better in the long-term window than in the short term. Table 6 shows SMB and RMW are significant, whereas Table 7 finds SMB, HML, and RMW significant. This indicates that as market uncertainty subsided, firm returns became more systematically associated with established risk factors.

Size, cash holdings, and long-term debt significantly influenced stock performance during the initial crisis phase but lost explanatory power over the full-year period. Policy interventions stabilized financial markets, diminishing the relevance of firm size and balance sheet strength. Solid balance sheets proved especially beneficial in the early stages of the crisis, when uncertainty was highest. ROA remained statistically insignificant throughout.

The results indicate that internally developed intangible asset investments did not have a measurable impact on stock performance. This also holds true for externally acquired intangibles. This suggests that investors did not prioritize innovation-driven growth potential during both crisis windows.

Overall, these findings reinforce the limited role of ESG in determining stock returns during the COVID-19 crisis.

TABLE 6: BHAR Model 1 January 01 – December 31, 2020. This table presents regression results of BHAR on independent variables for January 1 – December 31, 2020, using the market model. Column (1) regresses return on ESG scores, (2) adds market-based measures of risk, (3) includes Size, and (4) uses the full Model. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance: * p<0.1, ** p<0.05, *** p<0.01. Variable definitions are available in the Appendix.

	(1) BHAR	(2) BHAR	(3) BHAR	(4) BHAR
ESG	-0.347012*** (0.078167)	-0.312717*** (0.076493)	-0.265985*** (0.096205)	-0.162454 (0.107341)
BTM		-0.023835 (0.034560)	-0.026026 (0.034103)	-0.012595 (0.035134)
Momentum		0.226734*** (0.055140)	0.232594*** (0.055911)	0.219184*** (0.054442)
IdioRisk		5.613933** (2.647640)	4.992150* (2.799028)	2.962959 (2.800980)
SMB		-0.046286* (0.024430)	-0.053366** (0.025721)	-0.055394** (0.026212)
HML		-0.036263 (0.022148)	-0.038325* (0.022252)	-0.034965 (0.021666)
RMW		0.030296 (0.019263)	0.031558 (0.019465)	0.033976* (0.019053)
CMA		-0.029847 (0.019065)	-0.031953* (0.019302)	-0.028867 (0.019198)
Size			-0.029833 (0.032331)	-0.039881 (0.034949)
Cash				0.313310 (0.217367)
LTDebt				-0.201856 (0.122941)
STDebt				-0.237283 (0.223649)
ROA				0.158253 (0.350754)
InvTurn				-0.031062*** (0.010337)
RD&SGAstock				0.024045 (0.183512)
AcqIntang				0.062804 (0.088443)
DivPayout				-0.058266 (0.043239)
Age				-0.002708*** (0.000876)
_cons	0.113277 (0.097934)	0.022781 (0.103447)	0.204658 (0.225313)	0.376541 (0.225313)
Observations	1152	1144	1144	1144
R-squared	0.208497	0.266442	0.267033	0.290908
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

TABLE 7: CAR Model 2 January 01 – December 31, 2020. This table presents regression results of CAR on independent variables for January 1 – December 31, 2020, using the market model. Column (1) regresses return on ESG scores, (2) adds market-based measures of risk, (3) includes Size, and (4) uses the full Model. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance: * p<0.1, ** p<0.05, *** p<0.01. Variable definitions are available in the Appendix.

	(1) CAR	(2) CAR	(3) CAR	(4) CAR
ESG	-0.270451*** (0.056449)	-0.201163*** (0.056832)	-0.139743* (0.075769)	-0.072897 (0.083470)
BTM		0.003275 (0.025914)	0.000396 (0.025748)	0.006741 (0.027587)
Momentum		0.142952*** (0.040363)	0.150655*** (0.041841)	0.143935*** (0.040555)
IdioRisk		7.236270*** (2.493548)	6.419070** (2.720057)	5.394000* (2.939318)
SMB		-0.039589** (0.018776)	-0.048894** (0.019083)	-0.051373*** (0.019634)
HML		-0.041817** (0.017435)	-0.044526** (0.017647)	-0.041342** (0.017762)
RMW		0.022205 (0.014394)	0.023865 (0.014621)	0.024596* (0.014686)
CMA		-0.021776 (0.014257)	-0.024544* (0.014461)	-0.021176 (0.014451)
Size			-0.039209 (0.026993)	-0.042781 (0.029081)
Cash				0.081865 (0.166271)
LTDebt				-0.138327 (0.094682)
STDebt				-0.100676 (0.237960)
ROA				0.172376 (0.230441)
InvTurn				-0.020354** (0.009139)
RD&SGAstock				-0.026725 (0.123737)
AcqIntang				0.015164 (0.072920)
DivPayout				-0.048219 (0.033247)
Age				-0.002259*** (0.000751)
_cons	0.113029 (0.078535)	-0.028161 (0.084333)	0.210878 (0.191930)	0.336072 (0.208549)
Observations	1152	1144	1144	1144
R-squared	0.196420	0.250081	0.251778	0.268891
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

4.4 Difference-in-Differences Analysis

The DiD regression in Model 3 quantifies the change in AR for high ESG firms compared to low ESG firms following the COVID-19 outbreak. The results are presented in Table 8.

TABLE 8: AR Model 3. This table presents the findings of the DiD regression analyzing daily AR during the first quarter of 2020 and the full year 2020, using the market model. The Treated variable equals one for high ESG firms and zero otherwise. The After variable takes the value one from February 24, 2020 onward and zero before this period. Firm and day fixed effects are included in specifications (2) and (4). Robust standard errors are reported in parentheses. Statistical significance is denoted as follows: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. A detailed description of all variables is provided in the Appendix.

	(1) AR Q1	(2) AR Q1	(3) AR 2020	(4) AR 2020
After × Treated	-0.001164 (0.000987)	-0.001164 (0.000982)	-0.000208 (0.000342)	-0.000208 (0.000338)
After	-0.000327 (0.000742)		0.000769*** (0.000257)	
Treated	-0.000158 (0.000264)		-0.000134 (0.000273)	
_cons	-0.000398** (0.000193)	-0.002698 (0.003873)	-0.000249 (0.000204)	-0.000271 (0.001363)
Observations	42250	42250	161654	161654
R-squared	0.000261	0.026899	0.000115	0.029833
Firm fixed effects	No	Yes	No	Yes
Day fixed effects	No	Yes	No	Yes

The DiD regression results provide further evidence that ESG classification did not play a decisive role in determining stock performance throughout the COVID-19 crisis. Across all model specifications, the interaction term After × Treated remains statistically insignificant. This indicates that high ESG firms did not experience significantly different AR compared to low ESG firms after February 24, 2020. This result holds even after controlling for firm and day fixed effects. This supports the conclusion that high ESG firms did not have a performance advantage during the crisis. The significance of the After variable in the full-year specification suggests that, regardless of ESG classification, firms exhibited positive AR in the later phases of the crisis. This finding aligns with broader market recovery trends observed throughout 2020, as stock markets rebounded following massive fiscal and monetary interventions. The Treated variable remains insignificant after all models. This suggests that high ESG firms did not show a distinct trend in AR before or after the crisis began. The inclusion of firm and day fixed effects in the final model specifications slightly increases the model's explanatory power. The low R^2 values across all models indicate that ESG classification alone is not a meaningful driver of AR variation. This suggests that daily stock performance during the crisis was driven more by market-wide and macroeconomic factors than by firm-specific characteristics.

4.5 Robust Tests

To validate the reliability of those findings, I conducted multiple robustness tests, including alternative model specifications, effect of ESG performance in 2018, effect of top quantile of firm size, effect on raw returns, and an alternative matching method for DiD using Propensity Score Matching. Across all robustness checks, the core result remains unchanged: ESG efforts did not provide a significant advantage in stock performance during the COVID-19 crisis.

Alternative Model Specifications

To assess whether the main results were sensitive to model selection, I estimated returns using the Fama-French 3-Factor and 5-Factor Models, as presented in Table 9.

TABLE 9: Effect of Fama-French Factor Models. This table displays the regression results for BHAR (Panel A) and CAR (Panel B) in relation to ESG scores, while controlling for all variables included in the model. The analysis covers two periods: the short-term market shock (February 24 – March 31, 2020) and the full-year performance (January 1 – December 31, 2020). Fama-French 3- and 5-Factor Models are used. Columns (1) - (2) analyze the effect of ESG scores on short-term returns, while columns (3) - (4) examine their impact on full-year returns. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance is denoted as follows: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Detailed variable definitions are in the Appendix.

Panel A: BHAR Fama French Model

	(1) 3 FFF BHAR Feb – March	(2) 5 FFF BHAR Feb – March	(3) 3 FFF BHAR 2020	(4) 5 FFF BHAR 2020
ESG	0.070382** (0.035023)	0.070110** (0.035170)	-0.083281 (0.110983)	-0.018175 (0.116769)
_cons	-0.077743 (0.108015)	-0.059726 (0.107623)	-0.485381 (0.315935)	-0.119899 (0.361078)
Observations	1144	1144	1144	1144
R-squared	0.136042	0.136930	0.165939	0.120816
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Panel B: CAR Fama French Model

	(1) 3 FFF CAR Feb – March	(2) 5 FFF CAR Feb – March	(3) 3 FFF CAR 2020	(4) 5 FFF CAR 2020
ESG	0.078677 (0.048776)	0.079062 (0.049083)	-0.030677 (0.089367)	0.026081 (0.092054)
_cons	-0.131205 (0.151263)	-0.108140 (0.151886)	-0.488683* (0.261997)	-0.215957 (0.275762)
Observations	1144	1.144	1.144	1.144
R-squared	0.135146	0.135355	0.153971	0.114585
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Blitz & Fabozzi (2017) showed that results on sin stocks varied notably depending on the asset pricing model used. Therefore, we apply the Fama-French model instead of the simpler market model. The results for BHAR (Table 9A) during the short-term crisis period (February 24 –

March 31, 2020) show a statistically significant ESG coefficient in both Fama-French specifications. Given that this is the only significant finding across multiple models, the result seems singular and does not suggest a broader trend. This impression is supported by untabulated robustness checks with 2018 ESG scores, where the effect is no longer significant. Over the full-year period, Fama-French models using BHAR as the dependent variable showed no impact. In Table 9B, ESG remains insignificant across both Fama-French models for CAR, further suggesting that ESG was not a robust determinant of stock performance during the crisis.

Impact of ESG Measurement Timing

To examine whether the timing of ESG measurement influenced its relationship with returns, I re-estimated the models using ESG scores from the prior year 2018. The results, shown in Table 10, confirm that the insignificance of ESG persists regardless of the measurement period. This suggests that investors did not incorporate even prior ESG ratings into their evaluation of firm resilience during the crisis.

TABLE 10: Effect of ESG (2018). This table presents regression results of CAR and BHAR on ESG scores using the market model, controlling for all variables included in the model for two periods: the short-term market shock (February 24 – March 31, 2020) and full-year performance (January 1 – December 31, 2020). Columns (1) - (2) examine 2018 ESG scores on short-term returns, while columns (3) - (4) assess their impact on full-year returns. Industry and country fixed effects are included. Robust standard errors are in parentheses. Continuous variables are winsorized at the 1% and 99% levels. Statistical significance is denoted as follows: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Detailed variable definitions are available in the Appendix.

	(1) BHAR Feb - March	(2) CAR Feb - March	(3) BHAR 2020	(4) CAR 2020
ESG (2018)	-0.027148 (0.029885)	-0.058101 (0.042270)	-0.169807** (0.086147)	-0.072215 (0.074873)
_cons	-0.408892*** (0.129022)	-0.496684*** (0.143425)	0.283718 (0.263621)	0.284809 (0.228071)
Observations	1035	1035	1035	1035
R-squared	0.314785	0.307447	0.309394	0.276027
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Firm Size and ESG Scores

Larger firms tend to receive higher ESG scores, not necessarily due to superior sustainability performance, but because of better disclosure practices (Drempetic, 2020). To account for this, we analyze the largest firm quantile to assess whether size-related reporting differences influence the ESG effect. ESG scores remain statistically insignificant in this subset. The statistical power of this test exceeds 99%, driven by the sample size, standard deviation, effect sizes, and an alpha level of 5%. This ensures, that if a true relationship between ESG and returns

existed in this subset, it would likely be detected. However, achieving the same statistical power for smaller firms was not possible due to higher return volatility.

TABLE 11: Effect of Top Quintile of Firm Size. This table presents regression results of CAR and BHAR on ESG scores using the market model, controlling for all variables included in the model. The sample is restricted to firms in the top size quantile as a robustness check. The analysis covers two periods: the short-term market shock (February 24 – March 31, 2020) and full-year performance (January 1 – December 31, 2020). Columns (1) and (2) examine the impact of ESG scores on short-term returns, while columns (3) and (4) assess their effect on full-year returns. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance is denoted as follows: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Detailed variable definitions are available in the Appendix.

	(1) BHAR Feb - March	(2) CAR Feb - March	(3) BHAR 2020	(4) CAR 2020
ESG	-0.036657 (0.066498)	-0.041991 (0.080751)	-0.104103 (0.135098)	-0.107870 (0.107310)
_cons	-0.299762 (0.199136)	-0.340342 (0.270960)	-0.204119 (0.492170)	-0.031459 (0.393831)
Observations	293	293	293	293
R-squared	0.367370	0.359702	0.386769	0.407607
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Market Expectations and Raw Returns

To evaluate the impact of market expectations, I analyzed raw returns instead of abnormal returns. The results, displayed in Table 12, reveal a strong negative correlation between ESG and raw returns.

TABLE 12: Effect on Raw Returns. This table presents regression results of raw returns on ESG scores, controlling for all variables included in the model for two periods: the short-term market shock (February 24 - March 31, 2020) and full-year performance (January 1 - December 31, 2020). Columns (1) - (2) analyze the effect of ESG scores on short-term returns, while columns (3) - (4) assess their impact on full-year returns. Industry and country fixed effects are included. Robust standard errors are in parentheses, and continuous variables are winsorized at the 1% and 99% levels. Statistical significance is denoted as follows: * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$. Detailed variable definitions are in the Appendix.

	(1) Raw Return Feb - March	(2) Raw Return Feb - March	(3) Raw Return 2020	(4) Raw Return 2020
ESG (2018)	-0.073572*** (0.026955)		-0.182535** (0.084676)	
ESG (2019)		-0.075497*** (0.027538)		-0.173330* (0.102604)
cons	-0.321261*** (0.079844)	-0.328447*** (0.073961)	-0.048989 (0.252219)	0.069090 (0.235020)
Observations	1035	1144	1035	1144
R-squared	0.389312	0.377920	0.299280	0.280924
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes

Firms with an ESG score of 1.0, representing the highest rating on the 0 to 1 scale, experienced on average 7.5% lower short-term returns and 17.3% lower full-year returns in 2019, all else equal. A similar pattern is observed for 2018, with such firms showing an average of 7.4% lower short-term and 18.3% lower full-year returns, all else equal. This relationship was not significant with BHAR or CAR as dependent variable. This indicates that the negative performance was likely driven by market dynamics rather than ESG factors.

Alternative Matching Method: Propensity Score Matching

This approach assesses whether the choice of matching method influenced the results of the DiD regression. The results are shown in Table 13.

TABLE 13: Effect of Propensity Score Matching. This table presents DiD regression results from Model 3 analyzing daily AR during the first quarter of 2020 and the full year 2020 using the market model. The Treated variable equals one for high ESG firms and zero otherwise. The After variable takes the value one from February 24, 2020 onward and zero before this period. Firm and day fixed effects are included in specifications (2) and (4). Robust standard errors are reported in parentheses. Statistical significance is denoted as follows: * p<0.1, ** p<0.05, *** p<0.01. A detailed description of all variables is provided in the Appendix.

	(1) AR Q1	(2) AR Q1	(3) AR 2020	(4) AR 2020
After x Treated	-0.000161 (0.001092)	-0.000161 (0.001073)	0.000489 (0.000449)	0.000489 (0.000443)
After	-0.002189*** (0.000411)		0.000992*** (0.000140)	
Treated	-0.000722* (0.000382)		-0.000722* (0.000382)	
_cons	-0.000446*** (0.000115)	-0.001592 (0.003734)	-0.000446*** (0.000115)	0.000026 (0.001358)
Observations	74360	74360	299278	299278
R-squared	0.001094	0.031583	0.000233	0.031678
Industry fixed effects	No	Yes	No	Yes
Country fixed effects	No	Yes	No	Yes

In this robustness test, I applied the alternative matching method PSM following Eccles et al. (2014). Specifically, I performed sector-based matching, using firm characteristics as covariates in the logit regression. These included Size, ROA, BTM, and total debt (LTDebt + ST Debt). I implemented PSM without replacement, utilizing nearest-neighbor matching to ensure comparability between treated and control firms. The parallel trends test holds at a 10% significance level, suggesting that pre-treatment trends were not significantly different between treated and control groups. Across all four specifications, the interaction term remains statistically insignificant. This indicates no significant difference in daily AR between high-ESG and low-ESG firms after the crisis began. The After variable is significantly negative in the short term and significantly positive in the long term, indicating that daily abnormal returns

declined following the onset of the COVID-19 crisis but recovered over time. The Treated coefficient is also significantly negative, suggesting that high-ESG firms consistently underperformed low-ESG firms across the entire sample period. Parallel trends are supported at the 99% confidence level under CEM matching, suggesting that the results are more robust and representative for this specification compared to those obtained using PSM.

Summary of Robustness Findings

Across all robustness tests the results confirm that ESG did not provide a significant performance advantage during the COVID-19 crisis. Furthermore, they eliminate concerns of model sensitivity, data bias, or omitted variables, ensuring that the results are methodologically sound and empirically robust.

5. Discussion

Findings

My study found no statistically significant relationship between ESG scores and stock performance during either the short-term market shock or the full-year period of the COVID-19 crisis. This result holds across both the Difference-in-Differences and OLS regression models. Instead, these results indicate that stock resilience was primarily driven by firm-specific financial fundamentals, particularly cash and low long-term debt. Firms with strong balance sheets significantly outperformed their peers, which suggests that investors prioritized financial stability over sustainability considerations during periods of extreme market uncertainty. These findings are consistent with Demers et al. (2021), who also found that ESG performance did not serve as a protective factor during financial downturns, whereas strong balance sheets did. The persistence of momentum effects reinforces that pre-crisis market trends played a more decisive role in determining stock performance than ESG characteristics. This underscores the dominance of market sentiment and capital flows over ESG factors in shaping crisis-period returns. Firm size also emerged as a significant determinant, as larger firms benefited from structural advantages, including enhanced liquidity access and central bank support programs (ECB, 2020). Over the long term, market-based risk factors gained greater significance, reflecting a shift from crisis-driven investment behavior to systemic return determinants.

Comparison with Prior Research

While my findings align with Demers et al. (2021), they diverge from Albuquerque et al. (2020), who found that firms with strong environmental and social (ES) scores exhibited significantly

higher AR in the U.S. market during the crisis. However, my DiD analysis found no such impact. Structural differences between U.S. and European markets could explain the contrasting results. In the U.S., where markets are more strongly oriented toward shareholder value (Stadler et al., 2006), it is plausible that firms adopt ESG practices primarily when they contribute to financial performance. As a result, ESG may carry greater weight in investment decisions, potentially explaining its observed significance in crisis resilience studies such as Albuquerque et al. (2020). In stakeholder-oriented systems like those in Europe, ESG practices are often shaped by institutional norms and regulatory mandates. While this drives broad ESG adoption, it may also dilute its strategic impact, particularly when ESG actions are not closely aligned with firm-specific material risks or sources of competitive advantage. My findings suggest that in European markets, where ESG is more standardized and institutionally driven, its role is more symbolic than strategic, which limits its impact on stock performance during the COVID-19 crisis.

Challenges in Measurement and Market Perception

A major challenge in ESG research is inconsistency in ESG scores across different providers. Berg et al. (2022) highlight that ESG ratings can vary substantially depending on methodology, transparency, and weighting criteria. Since my study relied on Refinitiv ESG scores, alternative ESG rating methodologies might have yielded different results. Additionally ESG scores rely heavily on disclosed information, meaning firms that report more extensively tend to receive higher ratings, regardless of actual sustainability performance (Drempetic, 2020). Yu et al. (2020) further highlight that large firms often engage in greenwashing, which makes it difficult to assess ESG's true impact on financial resilience. Moreover investor perceptions of ESG are not uniform across industries. In energy and industrials, environmental factors play a crucial role, whereas in technology and pharmaceuticals, social and governance considerations take precedence. In financial services, governance is the dominant concern (Gelb et al., 2023). Since my study uses aggregate ESG scores, it does not account for sector-specific ESG priorities. This may have diluted potential ESG effects, as investors react differently to ESG signals depending on the industry.

Methodological Strengths and Limitations

Methodologically, my study exhibits high statistical power. With the given sample size, effect size, and standard deviation, and using a 5% significance level, all regressions were designed to have a very high probability of detecting true effects when present (Kasahara, 2020). This minimizes the risk of overlooking meaningful relationships in the data. Despite these strengths,

several limitations must be acknowledged. This study assumes a uniform ESG effect across firms and industries, which may oversimplify ESG's financial impact. Sector-specific ESG factors (e.g., carbon policies in energy) could yield different outcomes. Moreover, my models assume a linear relationship between ESG and stock performance. However, non-linear patterns, such as diminishing marginal utility, may also be present.

6. Conclusion

This study contributes to the ongoing debate on ESG's role in financial crises by analyzing the performance of European firms during the COVID-19 market downturn. Using OLS regression and Difference-in-Differences models, I examined both short-term and long-term stock performance. The findings indicate that ESG scores were not a significant determinant of financial resilience when controlling for firm fundamentals. Larger firms with strong cash reserves and low debt performed significantly better during the initial phase of the crisis, though this advantage diminished over the long term. Momentum remained a key driver, as firms with strong pre-crisis performance continued to outperform. Fama-French loadings became more relevant in explaining returns over the longer horizon.

My findings have important implications for corporate leaders, investors, and regulators:

- Corporate leaders should focus on maintaining strong financial fundamentals, such as cash positions and low debt levels, rather than relying solely on ESG credentials. ESG strategies should emphasize material factors that drive long-term value.
- Investors should critically evaluate ESG investments, recognizing that financial resilience is mainly rooted in fundamental firm characteristics. Rather than treating ESG as a guarantee of stability, they should assess whether specific initiatives contribute to financial strength and make capital allocation decisions accordingly.
- Regulators should enhance ESG disclosure standards to improve transparency and comparability, addressing issues like greenwashing and ensuring that ESG scores accurately reflect meaningful sustainability performance.

ESG efforts can only achieve widespread and lasting adoption, if they translate into financial success. It is therefore crucial to establish clarity on how ESG can generate real financial value. Otherwise, ESG loses popularity. 13.3 billion USD were withdrawn from ESG funds in the U.S. in 2023, following 19.6 billion USD in outflows in 2024 (Bioy, 2025). However, there is still

an opportunity to turn ESG into a value driver, if companies, investors, and regulators make the right strategic choices today.

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Appendix

Table 13: Variable Definitions. This table provides a detailed description of all variables, their definitions, and how they are calculated.

Variable	Definition
AcqIntang	Other assets not having a physical existence such as goodwill, patents and copyrights. Set to zero if missing.
After	Indicator variable, which equals 0 before February 24, 2020, and 1 from February 24, 2020, onward.
AR	Abnormal return calculated as: $AR = (R_{i,t} - R_{e,t})$
Age	Years of data available before 2020.
BHAR	Buy-and-hold-return calculated as: $BHAR = \prod_{t=1}^T (1 + R_{i,t}) - \prod_{t=1}^T (1 + R_{e,t})$
BTM	Book value divided by market capitalization.
CAR	Cumulative abnormal return calculated as: $CAR = \sum_{t=1}^T (R_{i,t} - R_{e,t})$
Cash	Sum of cash and short term investments divided by adjusted total assets. Set to zero if missing.
CMA	Loading on Fama-French's conservative minus aggressive factor.
DivPayout	Defined as dividends divided by net income. Set to zero if missing.
ESG	Refinitiv's ESG Score based on the self-reported information in the environmental, social and corporate governance pillars.
HML	Loading on Fama-French's high minus low factor.
IdioRisk	Firm-specific root mean squared error of market model regression estimations.
InvTurn	Cost of goods sold (excl depreciation) divided by average of last year's and current year's inventories. Set to zero if missing.
Size	The common logarithm of market capitalization.
LTDebt	Interest bearing financial obligations, excluding amounts due within one year divided by adjusted total assets. Set to zero if missing.

Momentum	The 12- month raw return before the start of the return period.
RD&SGAstock	Stock of R&D + $\frac{1}{3}$ *SG&A investments scaled by adjusted total assets using 5-year amortization. For example, RD&SGAstock for fiscal 2019 = (FY2019(R&D + $\frac{1}{3}$ SGA)*100% + FY2018(R&D + $\frac{1}{3}$ SGA)*80% + FY2017(R&D + $\frac{1}{3}$ SGA)*60% + FY2016(R&D + $\frac{1}{3}$ SGA)*40% + FY2015(R&D + $\frac{1}{3}$ SGA)*20%) divided by total assets adjusted to include remaining notionally capitalized intangibles investments. Set to zero if missing.
Treated	Indicator variable, assigning a value of 1 to firms with ESG scores in the top 25th percentile and 0 to those below
RMW	Loading on Fama–French’s robust minus weak factor.
ROA	Return on assets, adjusted for the amortization of R&D and $\frac{1}{3}$ *SG&A. (Net income - special items - discontinued operations + R&D + $\frac{1}{3}$ SGA - RD $\frac{1}{3}$ SGA_ amort) / adjusted total assets. Total assets are adjusted to include the unamortized notionally capitalized intangibles investments. RD $\frac{1}{3}$ SGA_ amort is calculated assuming 20% annual amortization. Special items, discontinued operations, R&D and SG&A set to zero if missing.
SMB	Loading on Fama - French’s small minus big factor.
STDebt	STDebt represents that portion of debt payable within one year divided by adjusted total Assets. Set to zero if missing.

For all variable calculations, capitalized and unamortized R&D + $\frac{1}{3}$ SG&A are added to total assets. Unless indicated otherwise, data is for 2019. All factors loadings are obtained by regressing firm-specific returns on Fama–French’s five factors using a 250 – day estimation window beginning before the start of the return period and requiring 240 days of returns data. Some firms have less than the required five years of data available. If so, I use the first available R&D and SG&A expenses and assume these to be constant for prior years.