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Does ESG investing pay-off? An analysis of the Eurozone area before and during the Covid-19 pandemic

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Abstract

We examine whether the stock return performance of 620 Eurozone companies based on their environmental, social and governance (ESG) ratings both before and during the Covid-19 pandemic on both a nominal and risk adjusted basis. We also look at how country level governance indicators interact with our samples of ESG_{High} and ESG_{Low} companies to affect both nominal and risk adjusted investment returns. We use both panel data and cross-sectional regressions as well as the difference-in-differences approach to derive the empirical results. We generally find some evidence that highly rated ESG firms performed slightly worse than lower rated ESG both overall and during the pandemic. However, once we control for governance at the country level, we find that in high governance scoring countries ESG_{High} companies perform better than ESG_{Low} companies. Finally, when we examine the relative performance of EU companies compared to companies in economies less impacted by the Covid-19 pandemic, namely South Korea and Australia, we find that during the pandemic, the South Korean and Australian companies performed much better than their counterparts in Europe.

KEYWORDS

country governance, Covid-19, ESG investing, panel data, Sharpe ratio

1 | INTRODUCTION

A growing interest in environmental, social and governance issues (ESG) both in society as a whole and at the corporate level sees firms being increasingly judged both by their financial performance and also on issues such as corporate social responsibility (CSR) as well as ESG. The ESG agenda relates not only to the company itself, but also its various stakeholders including management, other employees, suppliers and both retail and institutional shareholders. The Covid-19 pandemic resulted in an increase in government and corporate interest in ESG issues. Indeed, ESG issues have been part of many governments post pandemic recovery plans and green investing has become an important topic in the light on the recent COP06 and COP07 conferences held in Glasgow (2021) and Marrakech (2022). The rise in Environmental concerns is reflected in the European Parliaments Green deal which aims to make the make European Union climate neutral by 2050.

In recent years, there has been an increasing recognition on the part of mutual funds that investors are more

concerned with ESG issues when building their portfolios. As such, the investment industry has been screening companies with regard to their performance in the ESG area and companies whose ESG scores fall below certain thresholds can be excluded from investment by some funds. According to a report by Price Waterhouse Coopers (2022)[i] asset managers are expected to increase their ESG related Assets Under Management (AUM) to $33.9 trillion in 2026 up from $18.4 trillion in 2021, which equates to a compound annual growth rate of 12.9%. The same report notes that the European market is expected to grow ESG related investments from $12.8 trillion in 2021 to $19.3 trillion in 2026. The US Market is also expected to grow ESG related investments from $4.8 trillion in 2021 to $10 trillion in 2026. According to a recent survey by Capital Group (2021) institutional investors emphasize more the Environmental pillar (44%) than the Social pillar (25%) and the Governance pillar (31%) when making their ESG investment allocations.

The Exchange Traded Funds (ETF) industry has also recognized the importance of ESG investment demand, and as at February 2023, ESG ETF assets stood at $449.5 billion with the yearly net flows into ESG ETFs increasing some 36 times: from $4.7 billion in assets under management in 2014 to $169 billion in 2021.[ii] There can be little doubt that as well as meeting growing investor demand in this space, the growing interest in ESG investing on the part of the mutual fund and investment industry is also seen as a means to justify high active management fees and as a way of marketing new products to investors. There is also evidence that ESG investing is being driven by millennials who are changing their wealth management priorities and this group is likely to be quite large inheritors of funds over the next 20 years. According to a press release by Power[iii] 52% of millennials plan to increase their investment with firms that have high ESG investment priorities compared to just 24% among investors over age 40. There is also evidence that the Securities Exchange Commission (SEC) and other regulators are showing greater interest in requiring companies to make ESG disclosures more mainstream in company reporting requirements.

As the ESG issues have grown in importance, there has been greater monitoring, collection, and measurement of data on companies' performance in these areas by financial data providers such as Reuters Eikon, Morningstar, Bloomberg and MSCI. Measuring how corporations perform in respect of ESG is by no means an easy issue, there are mission statements, strategies, self-monitoring and incentive structures emanating from within the firm itself. Then there are also external pressures on the firm as a result of new regulations and government policies. Some authors such as Wood (1991) argue that a company's performance in these areas should ideally be measured by outcomes rather than the intentions and statements of firms. The overall picture is further complicated because of "greenwashing" in respect of the environment dimension, whereby companies marketing and public relations departments attempt to persuade the public and data providers that their strategies, policies and products are more environmentally friendly than they are in reality. In general, greenwashing involves companies making ESG commitments without actually taking any real action to meet the commitments. The same can also be applied to the social and governance aspects of the company, with the documented evidence differing significantly from the reality of the actual practices of the company.

The main focus of our research is to examine whether investing in higher rated ESG companies leads to better returns for shareholders compared to investing in lower rated ESG stocks in the Eurozone area in both absolute returns and on the basis of risk-adjusted returns. We choose the Eurozone area because ESG issues have been highlighted by the European Union's Sustainable Finance Disclosure Regulation which commenced in March 2021 aimed at increasing harmonization of standards and leading to greater transparency in relation to sustainable financial products. By confining our analysis to the Eurozone are we are also able to avoid the disruptive effects of currency changes on investment returns which are highlighted by Filippou and Taylor (2021). A second important issue that we examine is whether investing in higher rated ESG firms led to better results during the Covid19 pandemic compared to companies with lower ESG ratings. This is an interesting issue because on an a priori basis it might be thought that investment in high ESG companies would lead to relatively better returns than investing in low ESG companies during the pandemic. A third issue, we examine is whether country level governance issues can impact upon investor returns in the ESG investment area. This issue is potentially important, because there is the possibility that the equity performance of ESG_{High} and ESG_{Low} companies might be affected by the quality of governance in a country. In particular, we explore how country level governance interacts with the ESG ratings of companies and potentially impacts on shareholder returns an issue that has been neglected in previous ESG studies.

Our research makes several contributions to the existing literature. We are the first paper to look at how ESG ratings affect both absolute and risk-adjusted shareholder returns in the Eurozone area. A second contribution is that we examine how the Covid-19 pandemic has affected shareholder returns with a specific focus on ESG_{High} and

ESG_{Low} companies. Another significant contribution is that this study is the first to examine the impact of country governance scores and how they can affect the shareholder returns performance of ESG_{High} and ESG_{Low} companies. This latter contribution is of particular importance, as differences in country level governance not only has the potential to affect the overall returns to shareholders but may also interact with ESG_{High} and ESG_{Low} companies in different ways. A final contribution is that we use the difference-in-differences approach to compare the performance of the Eurozone countries compared to two countries that were less affected by the Covid-19 crisis namely South Korea and Australia, extending it to the possible effects of high versus low ESG scores for all pillars. Our main findings are that in general there is very little difference in the performance of ESG_{High} and ESG_{Low} companies in terms of their ability to improve investor returns during the sample period either in an absolute return or a risk adjusted return basis. However, once we incorporate governance issues, we do find some evidence that ESG_{Low} companies underperform ESG_{High} companies in countries with a high governance score.

The remainder of the paper is set out as follows: Section 2 provides a brief overview of the literature in relation to shareholder returns and ESG investing. Section 3 describes our data set and methodology. Section 4 outlines our empirical results while Section 5 concludes.

2 | LITERATURE REVIEW

From an individual firm's perspective, the marginal costs, and benefits of investing in improving their ESG profile should cancel out but, of course, that does not mean that at any point in time a company is in equilibrium or even close to equilibrium with regard to their ESG investments. Even if companies are in equilibrium, it may pay some companies to invest in achieving a higher ESG rating to meet their desired risk–return profile, while for other companies, especially in different sectors of the economy it may be optimal to have a lower ESG rating. The issue becomes even more complicated once one recognizes that the optimal ESG rating for one company may well depend upon the ESG ratings chosen by its competitors and that new regulatory requirements relating to ESG may mean managements have to re-assess their optimal ESG strategies over time. There may also be a benefit to companies in having high ESG scores should there be a negative economic shock as Lins et al. (2017) find in the case of U.S. companies based on the Corporate Social Responsibility scores during the global financial crisis.

Even when there is reason to believe that a firm is at or close to their equilibrium, that does not mean that investors themselves will be in equilibrium, since investors preferences for ESG investments can change over time and according to market conditions. Although investors are showing more interest in ESG issues, especially on the part of institutional investors as emphasized by Dyck et al. (2019), this does not in any way mean that it is their main objective, which is usually to do with the risk–return characteristics of their investments in various companies and their overall portfolios.[iv] Miller (1977) dicusses the role of uncertainty in leading to divergences in the risk-return expectations of investors and this is also likely to apply to both retail and institutional investors with respect to their ESG invesments. As outlined in the following, at the theoretical level, there is also no inherent reason why highly rated ESG stocks should outperform or underperform lower rated ESG stock in terms of their risk–return characteristics and the literature itself is ambiguous on whether ESG_{High} or ESG_{Low} companies will have higher expected returns depending on the model set up, see Cornell (2021).

One of the most interesting theoretical studies looking at the role of investors ESG preferences is that of, Pástor et al. (2021). In their model heterogeneous firms are divided into green firms that generate positive societal externalities, while brown firms generate negative societal externalities. Investors differ in their ESG preferences, they gain utility from holding green securities and negative utility from brown securities. One of the key predictions of the model is that investors are willing to pay more for green firm securities and that green firms will have negative CAPM alphas, while brown firms' securities will have positive CAPM alphas. In other words, investors with higher ESG preferences can expect lower risk-adjusted returns than those with lower ESG preferences. Another key prediction is that deviations of portfolios from a combination of the market portfolio and the risk-free security crucially depend upon their being differences in ESG preferences among investors. If there are identical ESG preferences, then the standard CAPM result of an investment in the risk-free security and the market portfolio being optimal still holds.

Another important study is that of Pedersen et al. (2020) who set out a theory in which company ESG scores play two roles (i) providing valuable information about the fundamentals of a company and (ii) affecting investors preferences. In their study, up to a certain point raising a company's ESG score can raise a company's Sharpe-ratio but at a certain ESG score level further raising the ESG score lowers the Sharpe-ratio. Investors are divided into three types, Type U—who are ESG unaware and they simply seek to maximize their mean variance utility; Type A—who are ESG aware using companies ESG scores to update their views about the about the

return—variance trade-off and finally, Type M—who are ESG motivated but have a strong preference for higher score ESG companies. Type M investors are prepared to accept a lower Sharpe ratio in their portfolios in return for higher ESG scores. The relative prevalence of these different types of investors has an effect on the expected returns for high ESG scoring stocks. When there is a relatively high prevalence of Type U investors, ESG_{High} stocks lead to high expected returns since their prices are not bid up by Type U investors. When there is a prevalence of Type A investors then ESG_{High} stocks are bid up in price and there is no connection between ESG scores and future expected returns. Finally, when there is a prevalence of Type M investors then ESG_{High} stocks are significantly bid-up in price and ESG_{High} stocks deliver low expected returns since Type M investors sacrifice returns in order to have ESG_{High} stocks in their portfolios.

An additional insight is provided by Zerbib (2022) who employs a single-period equilibrium model with two types of investors, those that invest in all securities and sustainable investors that exclude certain securities from their portfolio and internalize the private costs of externalities. The securities omitted from sustainable investors' portfolios are termed "excluded assets". In equilibrium, there is on average a positive expected premium on the excluded assets to induce regular investors to hold them in their portfolios. Although this applies on average, this does not mean that it necessarily applies to individual securities because the correlation of excluded assets with those of non-excluded securities matters. In particular, individual securities with low correlations with investible securities may have lower expected rates of return because they will be valued by those investors that invest in all securities due to their portfolio risk reduction characteristics. In the context of ESG investing, the market segmentation into ESG_{High} and ESG_{Low} stocks results in a lower average return on ESG_{High} stocks than on ESG_{Low} stocks but some individual ESG_{Low} stocks can be expected to have a lower return than ESG_{High} due to their higher correlation.

Company ESG scores can also impact upon the cost of debt finance, an interesting study in this respect is that of Apergis et al. (2022), using data on borrowing costs over the period 2010–2019 for S&P 500 companies. They show that empirically higher ESG ratings lower the required cost of debt. The rationale being that companies with high ESG scores can reduce their potential exposure to reputational, legal, operational, and regulatory risks, while low ESG score companies have greater exposure to potential ESG liabilities which increases their probability of bankruptcy. Their results apply not only to the aggregate ESG scores but also to each of the individual Environmental, Social and Governance pillars.

The idea that a better ESG score can impact positively on shareholder returns is rooted in corporate social responsibility theories including stakeholder, institutional and legitimacy theories. In these theories, ESG can improve a shareholder returns by helping a company to improve both its relationship and reputation with its various stakeholders. In addition, raising its ESG score can be a valid corporate strategy for a company to improve its standing and branding within society and as a means of coping with a societal and political environment that generally demands better performance in these areas, see for example, Richardson (2013). As emphasized by Frynas and Yamahaki (2016) for a company to grow and prosper it important that the company not only satisfy the demands of its stakeholders but also make it possible for the Company to win important government procurement contracts, see Flammer (2018) and Flammer and Kacperczyk (2019).

A higher ESG score could be bad for risk-adjusted returns as it may lead to a higher weight in institutional investors' portfolios and therefore a higher share price and lower expected future return on equity. Another important contribution is made by van der Beck (2021) who distinguishes between realized returns from ESG investing and expected returns, he shows that for each $1 withdrawn from the market portfolio towards Green ESG stocks raises their price by $0.40. The paper shows that mutual fund flows increasing their weightings toward Green ESG stocks improved their realized performance during the period 2016–2021 but importantly this then lowers expected returns going forward. Against this, there is the possibility that a preference for higher ESG rated companies in institutional investors portfolio can lower the standard deviation of a company stock helping to improve the risk-adjusted returns. In addition, higher investment in ESG matters could in the short run lower the profitability of the firm by leading to certain sunk costs and ongoing costs to improve a company's ESG score. Against this, a higher ESG score might lower the required rate of return on the part of investors thereby further raising its share price meaning future lower returns. However, investment in ESG initiatives while it increases costs in the short run may bring medium to long term benefits for shareholders due to improving a company's reputation, branding and customer satisfaction raising demand as customers switch from lower to higher rated ESG companies over time. As argued by Lynch and O'Hagan-Luff (2023). companies with higher ESG scores may benefit from having more price inelastic demand for their products enabling them to raise their prices and margins compared to low ESG coring companies.

In their paper, Cui and Docherty (2020) shows that stock price reaction to good and bad ESG news can lead

to stock market overreaction. In particular, a negative ESG news event will lead to a fall in share prices that creates the possibility of investors making abnormal returns by investing in such companies once the news has been released to the market. The Cui and Docherty paper is important to consider when it comes to empirical studies because if the study commences with a start date just following a negative ESG news event then it is possible that excess returns for ESG investing will be discovered that would not happen if the commencement of the study was prior to the negative ESG news event.

In their study Atmaz and Basak (2018) make an important contribution by making it clear not only the level of ESG score can affect potential returns but also the dispersion of ESG scores among different providers. Using theoretical reasoning, they postulate that higher dispersions implies more risk and consequently a greater risk premium for the affected companies, which in the presence of risk averse investors means higher required rate of return on capital and lower share price and better future expected returns. They also make the point that firms without credit ratings may be less transparent and so have greater divergence in their ESG ratings. In their contribution, Christensen et al. (2021) concentrate on why disagreement on ESG ratings occurs and find that more disclosure leads to higher disagreement. The cause of rating disagreements is also examined in Berg et al. (2019) who identify three causes of rating disagreements; (i) that the data providers have different sources and categories when determining their ratings, (ii) there is disagreement on interpretation even when there are common categories and (iii) there are differences in the scope of data used to measure ESG ratings.

The empirical impact of disagreements on ESG ratings is explored by Gibson et al. (2019) who uses the standard deviation of the seven different providers and uses monthly stock returns as the dependent variable with control variables for size, momentum, and quality. They find that stock returns are positively related to ESG disagreement suggesting a higher risk premium for companies with higher ESG rating disagreement particularly in respect of the environmental dimension. They look at rating disagreements for S&P 500 firms over the period 2010–2017 and the average pairwise correlation between the ESG ratings is 0.45 but is lowest for governance at 0.16 and highest for environmental dimension at 0.46. Interestingly, disagreement tends to be higher for the largest capitalization companies, which are more complex to examine and for firms that do not have a credit rating. In addition, divergence in ESG ratings appears to be greatest in the case of consumer durables and telecommunications industries.

A study by Belghitar et al. (2014) finds that socially responsible (SR) investors get no benefit in terms of either returns or variance in their portfolios but they actually lose utility once the higher moments such as skewness and kurtosis are taken into account. According to a meta study by Friede et al. (2015) some 90% of studies find a positive ESG corporate financial performance (CFP) effect, which appears to be relatively stable over time covering a wide range of securities including corporate bonds, green real estate, emerging markets etc. In Halbritter and Dorfleitner (2015) both high and low ESG scoring companies exhibit positive alpha (excess risk-adjusted returns) with high ESG companies performing largely in line with the market and the low ESG slightly under-performing the market, however, the alpha for ESG_{High} is quite small and not significant. Only companies exhibiting better social scores appear to offer better returns of approximately 5%. When it comes to governance, they find a negative alpha of −2% between high and low ESG scores.[v] One benefit noted in the study is that companies with higher ESG scores appear to have lower betas and therefore lower systematic risk. They also find a large fall in the significance of ESG ratings for investor returns in providing alpha during the post 2012 decade.

When using the aggregate ESG scores it is important to note that there may well be a cancellation effect, for instance, a high Environmental score can be offset by a low Governance score or vice-versa. Hence, it is possible to have two companies with similar ESG ratings to have different expected returns, depending upon the relative importance of each of the three ESG pillars that make up the aggregate score in influencing shareholder returns. There can also be differences in results depending on the data provider used, for example, there can be a difference if Refinitiv ratings or those of Bloomberg are used. Some studies include financial companies while others exclude them. There is also strong evidence that the log of Market Capitalization is highly correlated with ESG ratings which suggests that larger companies either have more resources to devote to ESG issues and/or they become more concerned with ESG matters as their market valuation increases.

There is inevitably less literature available on the impact of ESG ratings during the pandemic. Pástor and Vorsatz (2020) argue that investors may be more inclined to invest in companies with stronger ESG profiles to limit downside risk particularly in periods of crisis. This idea is also supported in studies such as Singh (2021) who looks at how the crisis affects investment strategies and spillovers between different asset classes including, equities, corporate bonds and high yield bonds. According to Singh, daily data picked up concern about the pandemic in February 2020 while real increase in volatility starts once it was declared a global pandemic by WHO. Singh finds that investors prefer investment in leading ESG corporate bond issues rather than the leaders in the EGS ratings for

the equity market and high yield corporate bonds during the crisis period. The argument being that investors pay more attention to fundamentals behind companies during a pandemic with companies with strong fundamentals and long run sustainability and survivability becoming more attractive to investors and possibly more resilient to financial and non-financial shocks.

One advantage of looking at ESG issues both before and during the Covid-19 pandemic is that Covid-19 can be treated as an exogenous increase in the demand for ESG_{High} and as such it helps to reduce endogeneity concerns whereby an increase in ESG score leads to an increase in the share price of highly rated ESG companies. Bae et al. (2021) find no relation between stock performance and CSR/ESG scores because of the pandemic. Their study is based on US evidence for 1759 US firms and find that CSR rating do not affect shareholder returns using both Refinitiv data and Bloomberg data. We now proceed to look at our data for the Eurozone economies.

3 | DATA AND METHODOLOGY

3.1 | The dataset

Academic research in the area of ESG investing has increased as more data has become available and the growing importance of ESG issues. Most of the early empirical studies used the dataset employed by Kinder, Lyndenberg, Domini (KLD) which had become the de facto measure of Corporate Social Policy in the academic literature. However, the dataset was subject to many criticisms for inaccuracy and subjectivity including the weighting system employed and the aggregation of the data to a single score, See Wang et al. (2015) and Crane et al. (2017). For our study, we use the Reuters Eikon database as it is the most comprehensive and consistent dataset available covering the Eurozone area. The Reuters Eikon database uses over 850 separate indicators when formulating its ESG scores. The indicators are used as inputs to scoring the three individual pillars: Environmental, Social and Governance. One interesting feature of the Reuters Eikon approach is that companies are not scored only on their own merits by also by comparison to other companies that have been given ESG scores. The overall ESG score for a company is a simple weighted average of the three main pillars, Environmental, Social and Governance. The ESG scores are kept under continual review and can be changed upwards and downwards in response to news articles about a company in the financial press.

As well as using absolute return data from the same database, we also conduct some further analysis using the 5-year Sharpe ratio as the dependent variable for our selected companies, the importance of the Sharpe ratio is highlighted in Pedersen et al. (2020) and Ahmed et al. (2021), to see whether ESG ratings has a positive or negative effect on risk-adjusted returns. This is an important adjustment to make since investment in ESG ratings can potentially reduce the standard deviation of returns for investors as well as affecting the returns themselves.

We examine the impact of the Covid-19 pandemic in two ways; firstly, by the inclusion of a time dummy which permits us to examine the performance of highly rated ESG companies. Secondly, we examine use the difference-in-differences approach to compare the performance of the EU companies with those in two countries that were less affected by the crisis namely South Korea and Australia.

We have used only the 2019 ESG scores for our study[vi] as they are at the mid-point of our 5-year data span. To ensure consistency of data, and to have a consolidated dataset we take, return data, the Sharpe ratio, Sortino ratio,[vii] and values of the market capitalisation are all taken from Reuters Eikon. After eliminating companies for which we could not get full data for all variables and countries from, we ended up with data from 620 companies and 14 countries in the Eurozone area to conduct our empirical analysis.

3.2 | Panel data regressions

For our empirical work, we adopt a portfolio approach to examine the impact of ESG ratings on investor returns. Three equally-weighted portfolios are devised: namely, the top 25% highest performing ESG rated companies are assigned to the highest portfolio (ESG_{High}) and the 25% worst performing companies are assigned to the lowest portfolio (ESG_{Low}). Finally, the 50% in the middle are assigned to the non-investable portfolio, but included as part of the data analysis so that we compare ESG_{High} and ESG_{Low} stocks against the other 75% of the companies. Using this approach, we are then able to see how the ESG_{High} and ESG_{Low} stocks perform to see if there is a significant excess return from the ESG_{High} or ESG_{Low} portfolio investment. We create a dummy for each group, with the value of 1 attributed to the ESG_{High} group and zero for all other companies (including the middle 50%) and then we do likewise with for the ESG_{Low} group. We also introduce a Covid-19 dummy which takes the value of 1 for the period January 2020 to March 2021; and 0 for the remainder pre-Covid-19 sample period which runs from March 2016 till December 2020.

The first model to be estimated is given by Equation (1):

$$R_{it} = a_1 + a_2\text{Covid}_t + a_3\text{ESG}_{\text{Low},it} + a_4(\text{ESG}_{\text{Low},t} \times \text{Covid}_t) + a_5\text{ESG}_{\text{High},t} + a_6\left(\text{ESG}_{\text{High},t} \times \text{Covid}_t\right) + u_t, \quad (1)$$

where R_{it} is the absolute returns, ESG_{Low} is the portfolio of companies with the lowest ESG scores, ESG_{High} is the portfolio of companies with the highest ESG scores, Covid is a dummy taking a value of 1 for the Covid-19 period and 0 for the non-Covid-19 period.

Next, we add to Equation (1) some control variables that are potentially of interest and can standardize our results.[viii] Namely, the log of the market capitalization, the Sortino ratio, the Sharpe ratio and the companies betas which pick up the systematic risk. This specification is given below:

$$R_{it} = \beta_1 + \beta_2\text{Covid}_t + \beta_3\text{ESG}_{\text{Low},it} + \beta_4(\text{ESG}_{\text{Low},it} \times \text{Covid}_t) + \beta_5\text{ESG}_{\text{High},it} + \beta_6\left(\text{ESG}_{\text{High},it} \times \text{Covid}_t\right) + \beta_7\ln\text{M}_{\text{Cap},it} + \beta_8\text{Sortino}_{\text{it}} + \beta_9\text{Sharpe}_{\text{it}} + \beta_{10}\text{Beta}_{\text{it}} + \varepsilon_{it}, \quad (2)$$

where $\ln M_{\text{Cap}}$ is the natural log of market cap, Sortino is the 5-year Sortino ratio, Sharpe is the 5-year Sharpe ratio and Beta is the five-year average beta coefficient.

3.3 | Cross sectional regressions

An interesting question in relation to ESG investment returns that has not previously been explored in the literature, is whether country level governance influences the returns to ESG investing either positively or negatively. One possibility is that high ESG scoring companies in countries with high governance scores perform better than high ESG companies in countries with low governance scores. Indeed, it is also possible that low ESG companies may perform better in countries with better governance scores. However, it could also be the other way round because in countries with high governance scores there are additional costs of compliance for companies, and they are more likely to be caught and fined for any failure to comply with legal legislation in relation to ESG matters. On the other hand, in countries with high governance scores there may however be a better focus of management on the proper running of firms to increase shareholder returns and better processes that improve returns to shareholders. In countries with low governance scores then it may be the case that companies with high ESG scores perform better than companies with low ESG score but it could also be the other way around as ESG_{Low} companies get away with costs that are incurred by ESG_{High} companies. The issue of how high ESG companies and low ESG companies perform in both high and low governance countries is clearly an important empirical matter even if it is not possible to ascertain an expected sign for the relevant coefficients at a theoretical level.

TABLE 1 World governance scores by country.

World governance indicator score by country for 2019			
Low (below 7.3)		**High (above 7.3)**	
Germany	7.194	Finland	8.480
Portugal	7.130	Luxembourg	8.409
Slovenia	6.980	Netherlands	8.296
Malta	6.736	Austria	7.895
Cyprus	6.654	Ireland	7.681
Spain	6.595	Belgium	7.363
Greece	5.783		

The World Bank provides country level governance score for each of the six categories on a range from −2.5 to +2.5, but not an overall score. The six individual categories that are scored by the World Bank are Voice and Accountability, Political Stability/No Violence, Government Effectiveness, Regulatory Quality, Rule of Law and Control of Corruption. To obtain an overall score we took the 2019 figures for each of the six individual categories and then rescaled the scores on a scale of 0–10 and then took the average of the six categories to generate an aggregate WGI score for each country between 0 and 10. The average scores for each country are reported in Table 1 below.

It should be noted that the aggregate WGI scores over time for each country are remarkably stable with minimal variation. Thus, to investigate the relationship between ESG_{High} and ESG_{Low} companies and WGI governance scores we run the following set of cross-sectional regressions:

$$R_i = \gamma_1 + \gamma_2\text{Beta}_i + \gamma_3\text{INDEX}_{\text{Low},i} + \gamma_4\text{INDEX}_{\text{High},i} + \gamma_5\text{WGI}_{\text{High},i} + \gamma_6\left(\text{INDEX}_{\text{Low},i} \times \text{WGI}_{\text{High},i}\right) + \gamma_7\left(\text{INDEX}_{\text{High},i} \times \text{WGI}_{\text{High},i}\right) + w_i, \quad (3)$$

$$S_i = \delta_1 + \delta_2\text{Beta}_i + \delta_3\text{INDEX}_{\text{Low},i} + \delta_4\text{INDEX}_{\text{High},i} + \delta_5\text{WGI}_{\text{High},i} + \delta_6\left(\text{INDEX}_{\text{Low},i} \times \text{WGI}_{\text{High},i}\right) + \delta_7\left(\text{INDEX}_{\text{High},i} \times \text{WGI}_{\text{High},i}\right) + e_i, \quad (4)$$

In Equations (3), (4) R_i is the absolute returns where S_i is the risk-adjusted returns as given by the 5-year Sharpe ratio, $\text{Index}_{\text{High}}$ or $\text{Index}_{\text{Low}}$ refers to the top 25% and bottom 25% of companies using either their overall ESG score, Environment (ENV) score, Social (SOC) score or Governance (GOV) score. The WGI_{High} is a dummy variable with a value of 1 that indicates that the country has a high WGI score above 7.3 and zero otherwise.

3.4 | Difference-in-Differences regressions

In our final look at the relationship between ESG scores and shareholder returns, we utilize the Difference-in-Differences (DID) as well as a Difference-in-Difference-in-Differences (DIDID) approach, which allow us to compare the performance of the Eurozone countries compared to two countries that were less affected by the Covid-19 crisis; namely South Korea and Australia. In order, to do the DID comparison we have used the 620 Eurozone company-based data against a total of 503 South Korean and Australian companies. In order, to do this we estimate the following regression:

$$R_{it} = a + \sum_{i=1}^{j} \beta_j X_{j,it} + \gamma DB_{it} + \delta \text{Covid}_{it} + \xi(\text{Covid}_{it} \times DB_{it}) + u_{it}, \quad (5)$$

where R_{it} is the monthly returns for each of the 1123 stocks in our sample, $X_{j,it}$ denotes a set of financial variables that affect returns, these include, the log of market capitalisation, the five-year average beta coefficient, the Sharpe ratio and the Sortino ratio. DB_{it} is a dummy that takes the value of zero for the Covid-19 affected Eurozone countries and the value of 1 for the countries that were not greatly affected by Covid-19 namely, Australia and South Korea. $Covid_{it}$ is a time dummy variable for Covid-19 that takes the value of 1 for the Covid-19 related period (Jan 2020-March 2021) and zero for the period prior to the Covid-19 outbreak. Finally, the ξ_1 coefficient is the DID coefficient that shows the interaction of the two dummies.

Turning to the DIDID, it extends the standard DID methodology to allow for a second control variable. Here, the second control is for high and low indexed on (ESG, ENV, SOC and GOV) companies. This is explored through by estimating the following regressions (6) and (7) where the dummy variable $\text{INDEX}_{\text{High}}$, and $\text{INDEX}_{\text{Low}}$ are introduced to Equations (6), (7) respectively.

$$\begin{aligned} R_{it} = a + \sum_{i=1}^{j} \beta_j X_{j,it} + \gamma DB_{it} + \delta \text{Covid}_{it} \\ + \xi_1(DB_{it} \times \text{Covid}_{it}) + \xi_2 \text{INDEX}_{\text{High}} \\ + \xi_3\left(\text{Covid}_{it} \times DB_{it} \times \text{INDEX}_{\text{High}}\right) + u_{it}, \end{aligned} \quad (6)$$

$$\begin{aligned} R_{it} = a + \sum_{i=1}^{j} \beta_j X_{j,it} + \gamma DB_{it} + \delta \text{Covid}_{it} \\ + \xi_1(\text{DB}_{it} \times \text{Covid}_{it}) + \xi_2 \text{INDEX}_{\text{Low}} \\ + \xi_3(\text{Covid}_{it} \times \text{DB}_{it} \times \text{INDEX}_{\text{Low}}) + u_{it}. \end{aligned} \quad (7)$$

Coefficient ξ_1 as before shows the difference between the non-Eurozone (South Korea and Australia) and Eurozone countries during the Covid-19 period; and ξ_2 examines the difference in returns among the $\text{INDEX}_{\text{High}}$ and $\text{INDEX}_{\text{Low}}$ stocks for Equations (6), (7) respectively. Thus, the main interest here is the estimate of the DIDID coefficient on the interaction term (ξ_3) involving the three variables, Covid, *DB* and $\text{INDEX}_{\text{High}}$ or $\text{INDEX}_{\text{Low}}$.

4 | EMPIRICAL RESULTS

4.1 | Statistical overview

Prior to embarking with our main econometric analysis as described in the methodology section above, we obtained some summary statistics for all countries and for their respective sub-groups, as well as correlation matrices with correlation coefficients for all variables (to detect any possible multicollinearity problems. The results of those statistical tests are presented in the Appendix (see Table A1 for summary statistics, and Tables A2–A4 for correlation matrices for All-countries, for EU countries and for non-EU countries, respectively). From this preliminary analysis, we can see that although some correlations are high, there is no evidence of possible problematic multicollinearity. The median values are as expected and they have been used in conjunction with the first and third quartiles (not reported here) to create the various portfolios of high and low ESG, ENV, SOC and GOV values.

4.2 | Panel data results: ESG scores and Covid-19

Next, we proceed with the panel data regressions. Table 2 reports results from Equation (1) for the ESG-portfolio related regressions. With regards to All-countries, the results indicate that there were positive returns both for the ESG_{Low} and ESG_{High} groups, but they were not statistically significant. Likewise, the Covid-19 dummy shows that shareholders did slightly better than compared to the non Covid-19 period but the results again are not statistically significant. Importantly, the interaction term seems to indicate that ESG_{Low} companies underperformed during the Covid-19 period but again the results are not significant. However, when it comes to ESG_{High} companies they seem to underperform during the Covid-19 period and this result is statistically significant.

TABLE 2 Results for environmental, social and governance issues (ESG) score, top 25% and bottom 25% with Covid 19 effect (no control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
Covid	0.00274	0.0156***	−0.00365	−0.00260	0.00604	−0.0159**	−0.00165	−0.00412	0.00226	0.000978	0.00680
	(0.00192)	(0.00567)	(0.00595)	(0.00772)	(0.00452)	(0.00697)	(0.00301)	(0.00362)	(0.00529)	(0.00387)	(0.00662)
ESG_{Low}	0.00102	0.00285	−0.000384	0.00729	−0.00806	−0.00310	−0.0131**	0.00144	−0.0257	0.0103	0.0198***
	(0.00206)	(0.00344)	(0.00446)	(0.00490)	(0.00527)	(0.00513)	(0.00648)	(0.00529)	(0.0198)	(0.00974)	(0.00716)
Covid*ESG_{Low}	−0.00607	−0.0193**	−0.0247***	−0.00820	0.0100	−0.00125	0.00817	0.00901	0.00661	−0.0201	−0.0191**
	(0.00480)	(0.00971)	(0.00805)	(0.0102)	(0.00747)	(0.0105)	(0.00967)	(0.00985)	(0.0521)	(0.0127)	(0.00916)
ESG_{High}	0.00112	0.00103	0.00102	0.00457	0.00192	−0.00384	0.00273	−0.00109	−0.00815**	0.00340	0.00749
	(0.00141)	(0.00298)	(0.00450)	(0.00474)	(0.00377)	(0.00562)	(0.00360)	(0.00304)	(0.00409)	(0.00444)	(0.00529)
Covid*ESG_{High}	−0.00620**	−0.0133**	−0.00518	−0.00571	0.00005	−0.0188	0.00292	−0.00601	0.0242***	0.00156	−0.0161**
	(0.00260)	(0.00643)	(0.00848)	(0.00893)	(0.00758)	(0.0178)	(0.00548)	(0.00507)	(0.00567)	(0.00693)	(0.00747)
Constant	0.00218**	0.00106	0.00561**	−0.000704	0.00395**	0.0110***	0.00551*	0.00495**	0.00650*	0.00211	−0.00624
	(0.00103)	(0.00250)	(0.00249)	(0.00418)	(0.00184)	(0.00295)	(0.00302)	(0.00225)	(0.00361)	(0.00338)	(0.00427)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. ESG_{High} denotes the 25% best companies in terms of overall ESG scores reported in regression models (1)–(4). ESG_{Low} denotes the 25% lowest companies in terms of ESG scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

When we look at the individual countries, the results are mixed. In general, the ESG_{Low} companies outperformed on average on five out of the 10 reported country cases, with statistically significant results only for the case of Spain but they underperformed for the remaining five countries. For the ESG_{High} group we found that seven out of 10 countries report positive returns, but the only significant effect is that of Luxemburg which shows negative returns and thus underperformance. Also, during the Covid-19 period both the ESG_{Low} and ESG_{High} companies generated significant negative returns with the negative coefficients being relatively worse for the ESG_{Low} companies. Thus, when we look at other countries the overall picture shows that there is no clear pattern to suggest that ESG_{Low} companies perform any better or worse than ESG_{High} companies over the entire sample period or during the Covid-19 period.

Results from Equation (2) are reported at Table 3. Here it is clear that the control variables are generally significant with the log of market capitalization being positive and significant, the Sortino and Sharpe ratios being (in most cases) positive and significant while the beta coefficient is mostly negative and significant.[ix] The main effect of adding the control variables is that the returns on the ESG_{High} stocks prove to be negative and significant both during the entire sample period as well as during the Covid-19 period. Interestingly for the purposes of our study the Covid-19 dummy is overall associated with significant positive returns for Germany but is negative and significant for Greece. The ESG_{Low} companies seem to have performed better than the ESG_{High} companies over the entire sample period. However, during the Covid-19 period the ESG_{Low} and ESG_{High} companies appear to have both had very similar negative effects but the effect for the ESG_{High} companies is both negative and significant while it is not significant for the ESG_{Low} companies. As such, our results are not supportive of the ESG_{High} companies performing better than the ESG_{Low} companies during the pandemic. To the contrary, our results appear to suggest that the ESG_{High} companies underperform the ESG_{Low} companies.

The problem with using the aggregate ESG score is that they can mask big differences between companies in respect of their scores in the individual pillars. For example, two companies could have similar ESG scores but one having a high environmental score and the other a low but similar overall ESG scores due to the second company performing better on the social and governance pillars. To further investigate the relationship between the performance of ESG_{High} and ESG_{Low} companies we look at each of the three pillars individually. In Tables 4 and 5, we estimate modified versions of Equations (1) and (2) respectively. Here we are using the top 25% Companies with a high environmental score (ENV_{High}) and the bottom 25% of companies with a low environmental score (ENV_{Low}). Table 4 reports results without the additional explanatory variables, while Table 5 reports results after adding the control variables.

From Table 3 we see that when looking at All-countries in the sample, the ENV_{Low} companies and the ENV_{High} companies both have a negative return over the sample period but neither is significant. When it comes to the Covid-19 time dummy the ENV_{High} companies have a slightly higher negative coefficient than the ENV_{Low} companies, but the coefficients are again not significant in either case. The only country where we get significant positive effects during the Covid-19 period from ENV_{Low} companies is the case of Finland at the 5% significance level and ENV_{High} at the 10% significance level. During the Covid-19 period ENV_{Low} companies have a significant negative return at the 10% level of significance in the cases of Belgium and the Netherlands. Also, ENV_{High} companies do well in the case of Finland during the Covid-19 period at the 5% level of significance but the coefficient value is well below that of the ENV_{Low} companies in Finland. In the case of the Netherlands there is a significant negative coefficient for both ENV_{Low} and ENV_{High} companies at the 10% and 1% significance levels respectively. In Table 5 where we add the control variables, we can see that for all the countries the ENV_{High} companies actually have a significantly negative effect on returns, and this also applies at the country level for Germany and Finland.

Continuing our analysis, Tables 6, 7 are the equivalent of regressions (1) and (2) respectively but this time using the top 25% Companies with a high Social score (SOC_{High}) and the bottom 25% of companies with a low social score (SOC_{Low}). In Table 6 we can see that when we use the social pillar score only for All-countries then there is some evidence of under-performance on the part of the SOC_{High} companies during the Covid-19 period but otherwise none of the other terms are significant. At the country level there is some evidence that in the cases of Germany, Austria and Spain that the SOC_{Low} companies have significant negative returns during the Covid-19 period. There is a significant positive effect for SOC_{Low} companies only in the case of Finland. Once we add the control variables in Table 7 it can be seen that in the All-countries estimation the SOC_{High} companies have a significant negative return both overall at the 1% level of significance and in the case of Ireland at the 5% level of significance. During the Covid-19 period the SOC_{High} companies also have a significant negative return at the 10% significance level. At the country level we find some evidence of a significant positive effect on returns for SOC_{Low}

TABLE 3 Results for environmental, social and governance issues (ESG) score with Covid 19 effect (including control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
LMcap	0.00283***	0.00340***	0.00160***	0.00118***	0.00147***	0.00187	0.00394***	0.000389	0.00542**	0.00258*	0.00331**
	(0.000437)	(0.000869)	(0.000573)	(0.000370)	(0.000472)	(0.00122)	(0.00116)	(0.000314)	(0.00227)	(0.00153)	(0.00142)
Sortino	0.0153***	0.00903**	0.0464**	−0.0117	0.0368***	0.0136	0.0579***	0.0108	0.0384	0.0140	0.0544***
	(0.00353)	(0.00458)	(0.0199)	(0.0289)	(0.00880)	(0.0384)	(0.0203)	(0.0107)	(0.0847)	(0.0172)	(0.00927)
Sharpe	0.0497***	0.0636***	−0.00409	0.0893**	0.00716	0.0462	−0.0237	0.0616***	0.0238	0.0448*	−0.00428
	(0.00671)	(0.0104)	(0.0316)	(0.0448)	(0.0135)	(0.0745)	(0.0350)	(0.0192)	(0.127)	(0.0258)	(0.0187)
Beta	−0.00509***	−0.00248	−0.00323**	−0.00607***	−0.00117	−0.0138***	−0.0117**	−0.00663***	−0.00701	−0.00346**	0.00127
	(0.00121)	(0.00231)	(0.00127)	(0.000874)	(0.000847)	(0.00220)	(0.00463)	(0.00144)	(0.00457)	(0.00151)	(0.00373)
Covid	0.00272	0.0156***	−0.00365	−0.00260	0.00604	−0.0159**	−0.00165	−0.00411	0.00226	0.000978	0.00666
	(0.00192)	(0.00567)	(0.00596)	(0.00772)	(0.00452)	(0.00698)	(0.00301)	(0.00362)	(0.00530)	(0.00387)	(0.00664)
ESG_{Low}	0.00215	0.00593**	0.00526**	0.00445	−0.00510	−0.000598	−0.000473	−0.00329	−0.00723	0.00587	0.0110***
	(0.00148)	(0.00275)	(0.00234)	(0.00341)	(0.00336)	(0.00327)	(0.00456)	(0.00315)	(0.0139)	(0.00547)	(0.00392)
Covid × ESG_{Low}	−0.00606	−0.0193**	−0.0247***	−0.00820	0.0100	−0.00125	0.00817	0.00901	0.00651	−0.0201	−0.0190**
	(0.00480)	(0.00971)	(0.00806)	(0.0102)	(0.00748)	(0.0105)	(0.00967)	(0.00986)	(0.0521)	(0.0128)	(0.00917)
ESG_{High}	−0.00229*	−0.00134	7.83e-05	0.00306	−0.00352*	−0.00144	−0.00644*	0.00247	−0.00503	−0.00396	−0.000658
	(0.00118)	(0.00221)	(0.00203)	(0.00332)	(0.00206)	(0.00307)	(0.00354)	(0.00182)	(0.00827)	(0.00262)	(0.00497)
Covid*ESG_{High}	−0.00619**	−0.0133**	−0.00518	−0.00571	4.97e-05	−0.0188	0.00292	−0.00601	0.0242***	0.00156	−0.0159**
	(0.00260)	(0.00644)	(0.00849)	(0.00894)	(0.00759)	(0.0178)	(0.00549)	(0.00507)	(0.00568)	(0.00693)	(0.00749)
Constant	−0.0554***	−0.0718***	−0.0281**	−0.0207**	−0.0275***	−0.0156	−0.0745***	−0.000223	−0.110**	−0.0500	−0.0803**
	(0.00987)	(0.0206)	(0.0129)	(0.00882)	(0.0104)	(0.0255)	(0.0238)	(0.00686)	(0.0521)	(0.0356)	(0.0332)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. ESG_{High} denotes the 25% best companies in terms of overall ESG scores reported in regression models (1)–(4). ESG_{Low} denotes the 25% lowest companies in terms of ESG scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 4 Results for environmental (ENV) pillar score, top 25% and bottom 25% with Covid 19 effect (without control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
Covid	0.000733	0.00849**	−0.00820*	0.00107	0.000636	−0.0280*	−0.00325	−0.00624**	−8.60e-05	0.00773**	0.000611
	(0.00168)	(0.00371)	(0.00436)	(0.00801)	(0.00447)	(0.0153)	(0.00307)	(0.00310)	(0.00654)	(0.00309)	(0.00698)
ENV_{Low}	−0.000247	0.00129	−0.000577	0.0148***	−0.00641	−0.00557	−0.0109	−0.00410	−0.0152	0.00165	0.00830
	(0.00218)	(0.00335)	(0.00878)	(0.00519)	(0.00674)	(0.00545)	(0.00769)	(0.00716)	(0.0170)	(0.00977)	(0.00704)
Covid × ENV_{Low}	−0.00193	−0.00848	0.0141	−0.0206*	0.0234**	0.0105	0.0140	0.0192	0.0104	−0.0220*	−0.00315
	(0.00502)	(0.0103)	(0.0290)	(0.0111)	(0.0114)	(0.0163)	(0.0106)	(0.0118)	(0.0419)	(0.0117)	(0.00897)
ENV_{High}	−0.000254	−0.00155	0.00605	0.00849*	−0.00201	−0.00158	0.00560*	−0.00438	−0.00661	−0.00131	0.00179
	(0.00137)	(0.00300)	(0.00483)	(0.00455)	(0.00329)	(0.00581)	(0.00313)	(0.00278)	(0.00444)	(0.00377)	(0.00564)
Covid × ENV_{High}	−0.00229	−0.00121	−0.00168	−0.00686	0.0136**	0.0108	0.00405	−0.00360	0.0177*	−0.0187***	−0.00690
	(0.00252)	(0.00654)	(0.00615)	(0.00869)	(0.00620)	(0.0168)	(0.00508)	(0.00437)	(0.00992)	(0.00495)	(0.00801)
Constant	0.00284***	0.00223	0.00461**	−0.00356	0.00459*	0.0122***	0.00373	0.00676***	0.00443	0.00454**	−0.00243
	(0.000924)	(0.00200)	(0.00206)	(0.00422)	(0.00249)	(0.00447)	(0.00248)	(0.00170)	(0.00424)	(0.00223)	(0.00456)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. ENV_{High} denotes the 25% best companies in terms of Environmental pillar scores reported in regression models (1)–(4). ENV_{Low} denotes the 25% lowest companies in terms of Environmental pillar scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 5 Results for environmental (ENV) pillar score, top 25% and bottom 25% with Covid 19 effect (including control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
LMcap	0.00262***	0.00312***	0.00146**	0.00126***	0.00122*	0.00218**	0.00392***	0.000612*	0.00613**	0.00199	0.00308**
	(0.000421)	(0.000784)	(0.000576)	(0.000418)	(0.000631)	(0.00110)	(0.00121)	(0.000355)	(0.00241)	(0.00124)	(0.00141)
Sortino	0.0153***	0.00847*	0.0471**	−0.0157	0.0381***	0.0159	0.0470	0.0140	0.00585	0.0192	0.0582***
	(0.00359)	(0.00460)	(0.0196)	(0.0295)	(0.0122)	(0.0368)	(0.0287)	(0.0101)	(0.103)	(0.0175)	(0.0115)
Sharpe	0.0501***	0.0658***	−0.00343	0.0935**	0.00383	0.0434	−0.00717	0.0555***	0.0808	0.0355	−0.0105
	(0.00675)	(0.0107)	(0.0321)	(0.0463)	(0.0175)	(0.0724)	(0.0448)	(0.0180)	(0.154)	(0.0267)	(0.0220)
Beta	−0.00525***	−0.00246	−0.00375***	−0.00591***	−0.00215*	−0.0144***	−0.0109**	−0.00623***	−0.00581	−0.00440***	0.00128
	(0.00121)	(0.00235)	(0.000959)	(0.000903)	(0.00118)	(0.00226)	(0.00453)	(0.00130)	(0.00499)	(0.00141)	(0.00396)
Covid	0.000734	0.00849**	−0.00820*	0.00107	0.000636	−0.0280*	−0.00325	−0.00623**	−8.60e-05	0.00773**	0.000611
	(0.00168)	(0.00371)	(0.00436)	(0.00801)	(0.00447)	(0.0153)	(0.00308)	(0.00310)	(0.00655)	(0.00309)	(0.00698)
ENV_{Low}	0.000195	0.00168	−0.00389	0.00858**	−0.00720	0.000271	−0.00499	−0.00722*	−0.00577	0.00292	0.00662
	(0.00155)	(0.00273)	(0.00823)	(0.00335)	(0.00442)	(0.00288)	(0.00427)	(0.00438)	(0.0116)	(0.00545)	(0.00412)
Covid × ENV_{Low}	−0.00193	−0.00848	0.0141	−0.0206*	0.0234**	0.0105	0.0140	0.0192	0.0103	−0.0220*	−0.00315
	(0.00502)	(0.0103)	(0.0290)	(0.0111)	(0.0114)	(0.0164)	(0.0106)	(0.0118)	(0.0420)	(0.0117)	(0.00898)
ENV_{High}	−0.00244**	−0.00457**	−3.07e-05	0.00253	−0.00398**	−0.00451	−0.00587	−4.04e-05	−0.00829	0.00295	−0.00126
	(0.00114)	(0.00201)	(0.00186)	(0.00303)	(0.00193)	(0.00376)	(0.00405)	(0.00152)	(0.00824)	(0.00219)	(0.00479)
Covid × ENV_{High}	−0.00233	−0.00121	−0.00168	−0.00686	0.0136**	0.0108	0.00405	−0.00361	0.0177*	−0.0187***	−0.00706
	(0.00252)	(0.00655)	(0.00616)	(0.00870)	(0.00621)	(0.0168)	(0.00508)	(0.00437)	(0.00994)	(0.00496)	(0.00801)
Constant	−0.0500***	−0.0635***	−0.0235*	−0.0237**	−0.0207	−0.0210	−0.0735***	−0.00426	−0.126**	−0.0375	−0.0748**
	(0.00948)	(0.0187)	(0.0127)	(0.00963)	(0.0144)	(0.0213)	(0.0238)	(0.00790)	(0.0550)	(0.0277)	(0.0338)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. ENV_{High} denotes the 25% best companies in terms of Environmental pillar scores reported in regression models (1)–(4). ENV_{Low} denotes the 25% lowest companies in terms of Environmental pillar scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 6 Results for social pillar score, top 25% and bottom 25% with Covid 19 effect (without control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
Covid	0.00214	0.0119***	−0.00363	−0.00337	0.00667*	−0.0262***	0.000715	−0.00388	0.00507	0.000648	0.00332
	(0.00179)	(0.00428)	(0.00609)	(0.00851)	(0.00356)	(0.00489)	(0.00509)	(0.00350)	(0.00570)	(0.00392)	(0.00716)
SOC_{Low}	−7.94e-05	0.00460*	−0.00360	0.00613	−0.0104**	−0.00462	−0.00954	0.00550	−0.0197	−0.000469	0.0131
	(0.00192)	(0.00277)	(0.00488)	(0.00492)	(0.00503)	(0.00467)	(0.00603)	(0.00535)	(0.0166)	(0.00874)	(0.00820)
Covid × SOC_{Low}	−0.00496	−0.0176*	−0.0200**	−0.00259	0.0186*	0.0140	0.00160	0.00850	0.00275	−0.0115	−0.0191**
	(0.00469)	(0.00947)	(0.00826)	(0.00949)	(0.0106)	(0.00862)	(0.00863)	(0.00966)	(0.0418)	(0.0169)	(0.00911)
SOC_{High}	2.52e-06	0.000650	0.000123	0.00936	−0.000856	−0.00239	0.00332	0.00174	−0.00232	0.00500	−0.00118
	(0.00163)	(0.00391)	(0.00398)	(0.00664)	(0.00344)	(0.00759)	(0.00538)	(0.00297)	(0.00636)	(0.00434)	(0.00563)
Covid × SOC_{High}	−0.00488*	−0.00429	−0.0111	−0.0145	−0.00655	−0.0105	0.00118	−0.00604	0.00199	−0.00246	−0.00769
	(0.00294)	(0.00776)	(0.00712)	(0.0133)	(0.00725)	(0.0244)	(0.00643)	(0.00562)	(0.0172)	(0.00595)	(0.00823)
Constant	0.00273***	0.000740	0.00592**	−0.00112	0.00507**	0.0118***	0.00459	0.00347	0.00576	0.00329	−0.00102
	(0.00100)	(0.00199)	(0.00249)	(0.00440)	(0.00204)	(0.00350)	(0.00394)	(0.00231)	(0.00454)	(0.00365)	(0.00467)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. SOC_{High} denotes the 25% best companies in terms of Social pillar scores reported in regression models (1)–(4). SOC_{Low} denotes the 25% lowest companies in terms of Social pillar scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 7 Results for social pillar score, top 25% and bottom 25% with Covid 19 effect (including control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
LMcap	0.00287***	0.00356***	0.00152***	0.00115***	0.00130***	0.00254**	0.00458***	0.000416	0.00594**	0.00261	0.00305**
	(0.000423)	(0.000853)	(0.000550)	(0.000342)	(0.000476)	(0.000994)	(0.00120)	(0.000298)	(0.00233)	(0.00169)	(0.00124)
Sortino	0.0156***	0.0107**	0.0446**	−0.0121	0.0333**	0.0263	0.0661***	0.0108	0.00322	0.0142	0.0536***
	(0.00345)	(0.00468)	(0.0189)	(0.0296)	(0.0135)	(0.0340)	(0.0181)	(0.0109)	(0.0956)	(0.0164)	(0.00919)
Sharpe	0.0492***	0.0618***	−0.000533	0.0900*	0.0103	0.0239	−0.0371	0.0614***	0.0827	0.0443*	−0.00258
	(0.00662)	(0.0111)	(0.0302)	(0.0469)	(0.0190)	(0.0663)	(0.0306)	(0.0191)	(0.144)	(0.0252)	(0.0178)
Beta	−0.00533***	−0.00322	−0.00348***	−0.00609***	−0.00238***	−0.013***	−0.0115***	−0.00662***	−0.00592	−0.00429***	0.00128
	(0.00117)	(0.00223)	(0.00120)	(0.000926)	(0.000886)	(0.00179)	(0.00428)	(0.00140)	(0.00460)	(0.00146)	(0.00357)
Covid	0.00212	0.0119***	−0.00363	−0.00337	0.00667*	−0.026***	0.000715	−0.00387	0.00507	0.000648	0.00313
	(0.00179)	(0.00428)	(0.00609)	(0.00852)	(0.00357)	(0.00489)	(0.00510)	(0.00350)	(0.00571)	(0.00392)	(0.00718)
SOC_{Low}	0.00158	0.00642***	0.00495*	0.00200	−0.00812**	−0.00104	0.00221	−0.00259	−0.00430	0.00244	0.0121***
	(0.00139)	(0.00219)	(0.00258)	(0.00297)	(0.00349)	(0.00240)	(0.00417)	(0.00317)	(0.0112)	(0.00683)	(0.00332)
Covid × SOC_{Low}	−0.00494	−0.0176*	−0.0200**	−0.00259	0.0186*	0.0140	0.00160	0.00850	0.00269	−0.0115	−0.0189**
	(0.00469)	(0.00948)	(0.00827)	(0.00950)	(0.0106)	(0.00863)	(0.00864)	(0.00966)	(0.0419)	(0.0169)	(0.00912)
SOC_{High}	−0.00376***	−0.00504	0.00170	0.00443	−0.00162	−0.00452	−0.00898***	0.00285	−0.00347	−0.00372	−0.00219
	(0.00141)	(0.00384)	(0.00215)	(0.00476)	(0.00200)	(0.00420)	(0.00347)	(0.00182)	(0.00769)	(0.00274)	(0.00423)
Covid × SOC_{High}	−0.00487*	−0.00429	−0.0111	−0.0145	−0.00655	−0.0105	0.00118	−0.00604	0.00199	−0.00246	−0.00750
	(0.00294)	(0.00776)	(0.00712)	(0.0133)	(0.00726)	(0.0244)	(0.00643)	(0.00563)	(0.0172)	(0.00596)	(0.00825)
Constant	−0.0554***	−0.0737***	−0.0261**	−0.0197**	−0.0224**	−0.0284	−0.0895***	−0.00109	−0.123**	−0.0492	−0.0735**
	(0.00941)	(0.0194)	(0.0126)	(0.00842)	(0.0108)	(0.0201)	(0.0244)	(0.00652)	(0.0528)	(0.0389)	(0.0297)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies var	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. SOC_{High} denotes the 25% best companies in terms of Social pillar scores reported in regression models (1)–(4). SOC_{Low} denotes the 25% lowest companies in terms of Social pillar scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 8 Results for governance pillar score, top 25% and bottom 25% with Covid 19 effect (without control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
Covid	−0.00216	0.00509	−0.0132**	−0.00520	0.00543	−0.0177***	−0.00542	−0.00651*	−0.0238	0.00151	0.00203
	(0.00234)	(0.00677)	(0.00564)	(0.00864)	(0.00405)	(0.00636)	(0.00478)	(0.00390)	(0.0238)	(0.00532)	(0.00582)
GOV_{Low}	−0.000430	0.000649	−0.0127**	0.00202	−0.00568*	0.00957*	0.00102	−0.00364	−0.0307	0.00287	0.0130**
	(0.00202)	(0.00346)	(0.00495)	(0.00590)	(0.00323)	(0.00495)	(0.00706)	(0.00434)	(0.0224)	(0.00689)	(0.00642)
Covid × GOV_{Low}	0.00677*	0.00362	0.0241	−0.00291	0.00437	0.00222	0.0182*	0.0104	0.0725	−0.0118	−0.0136*
	(0.00411)	(0.00866)	(0.0159)	(0.0120)	(0.00815)	(0.0143)	(0.00934)	(0.00775)	(0.0523)	(0.00937)	(0.00714)
GOV_{High}	0.00118	0.00223	−0.00391	−0.00423	−0.00122	−0.00237	0.00168	0.000258	−0.00399	0.00151	0.0104**
	(0.00140)	(0.00296)	(0.00388)	(0.00531)	(0.00585)	(0.00490)	(0.00491)	(0.00310)	(0.00645)	(0.00486)	(0.00438)
Covid × GOV_{High}	0.000579	−0.00182	0.00426	0.000704	0.00422	−0.0110	0.00858	0.00107	0.0276	−0.00290	−0.00667
	(0.00302)	(0.00784)	(0.00684)	(0.00984)	(0.00851)	(0.0143)	(0.00655)	(0.00580)	(0.0252)	(0.00675)	(0.00737)
Constant	0.00253**	0.00152	0.00959***	0.00259	0.00532**	0.00796**	0.000899	0.00562**	0.00752	0.00363	−0.00587
	(0.00107)	(0.00205)	(0.00255)	(0.00465)	(0.00207)	(0.00317)	(0.00441)	(0.00242)	(0.00591)	(0.00413)	(0.00374)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. GOV_{High} denotes the 25% best companies in terms of Governance pillar scores reported in regression models (1)–(4). GOV_{Low} denotes the 25% lowest companies in terms of Governance pillar scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 9 Results for governance pillar score, top 25% and bottom 25% with Covid 19 effect (including control variables).

Variables	(1) All Countries	(2) Germany	(3) Austria	(4) Belgium	(5) Finland	(6) Greece	(7) Ireland	(8) Italy	(9) Luxembourg	(10) Netherlands	(11) Spain
LMcap	0.00245***	0.00297***	0.00123**	0.00141***	0.00147***	0.00231**	0.00351***	0.000529*	0.00622***	0.00178	0.00267**
	(0.000400)	(0.000797)	(0.000563)	(0.000412)	(0.000530)	(0.00113)	(0.00114)	(0.000301)	(0.00209)	(0.00140)	(0.00118)
Sortino	0.0148***	0.00821*	0.0342*	−0.0161	0.0446***	0.0342	0.0481*	0.0108	0.0106	0.0173	0.0502***
	(0.00362)	(0.00476)	(0.0176)	(0.0302)	(0.00905)	(0.0417)	(0.0281)	(0.0104)	(0.0959)	(0.0167)	(0.0109)
Sharpe	0.0514***	0.0669***	0.0158	0.0942**	−0.00678	0.00472	−0.00869	0.0603***	0.0668	0.0422	0.00537
	(0.00688)	(0.0109)	(0.0285)	(0.0468)	(0.0137)	(0.0820)	(0.0455)	(0.0186)	(0.148)	(0.0265)	(0.0197)
Beta	−0.00538***	−0.00277	−0.00403***	−0.00608***	−0.00110	−0.0137***	−0.0113**	−0.00660***	−0.00597*	−0.00451***	3.66e-06
	(0.00120)	(0.00226)	(0.000865)	(0.000829)	(0.000809)	(0.00281)	(0.00512)	(0.00143)	(0.00332)	(0.00124)	(0.00337)
Covid	−0.00216	0.00509	−0.0132**	−0.00520	0.00543	−0.0177***	−0.00542	−0.00650*	−0.0238	0.00151	0.00203
	(0.00234)	(0.00677)	(0.00565)	(0.00865)	(0.00406)	(0.00637)	(0.00478)	(0.00390)	(0.0239)	(0.00533)	(0.00582)
GOV_{Low}	0.000390	0.00126	−0.00830*	0.00248	−0.00272	0.00245	−0.00474	−0.00287	−0.0230	0.00758*	0.00783**
	(0.00148)	(0.00268)	(0.00444)	(0.00395)	(0.00250)	(0.00389)	(0.00473)	(0.00260)	(0.0154)	(0.00412)	(0.00373)
Covid × GOV_{Low}	0.00674	0.00362	0.0241	−0.00291	0.00437	0.00222	0.0182*	0.0104	0.0724	−0.0118	−0.0139*
	(0.00411)	(0.00866)	(0.0159)	(0.0120)	(0.00816)	(0.0143)	(0.00934)	(0.00776)	(0.0524)	(0.00938)	(0.00714)
GOV_{High}	−0.000516	−0.00131	−0.00230	−0.00137	−0.00449*	0.000530	−0.00360	0.000380	−0.00588	0.00361	0.000377
	(0.000950)	(0.00225)	(0.00210)	(0.00328)	(0.00267)	(0.00268)	(0.00394)	(0.00175)	(0.00705)	(0.00250)	(0.00284)
Covid × GOV_{High}	0.000579	−0.00182	0.00426	0.000704	0.00422	−0.0110	0.00858	0.00107	0.0276	−0.00290	−0.00667
	(0.00302)	(0.00784)	(0.00685)	(0.00984)	(0.00852)	(0.0143)	(0.00656)	(0.00580)	(0.0252)	(0.00676)	(0.00738)
Constant	−0.0467***	−0.0604***	−0.0162	−0.0242**	−0.0280**	−0.0259	−0.0641**	−0.00266	−0.122***	−0.0338	−0.0659**
	(0.00902)	(0.0187)	(0.0124)	(0.00955)	(0.0119)	(0.0224)	(0.0250)	(0.00665)	(0.0439)	(0.0321)	(0.0295)
Observations	36,574	10,148	1829	2891	2183	1593	2655	5072	1414	3245	4010
Number of companies	620	172	31	49	37	27	45	86	24	55	68

Note: Robust standard errors in parentheses. GOV_{High} denotes the 25% best companies in terms of Governance scores reported in regression models (1)–(4). GOV_{Low} denotes the 25% lowest companies in terms of Governance scores score reported in regression models (1)–(4). ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 10 Cross sectional results for 5-year average returns against indices and WGI_{High}.

Variables	(1) ESG	(2) ENV	(3) SOC	(4) GOV	(5) ESG	(6) ENV	(7) SOC	(8) GOV
Beta	0.262***	0.255***	0.256***	0.256***	0.258***	0.248***	0.252***	0.251***
	(0.0457)	(0.0457)	(0.0458)	(0.0456)	(0.0456)	(0.0457)	(0.0457)	(0.0456)
$Index_{Low}$	−0.0123	0.123*	0.0441	0.132*	0.171	0.123	0.191	0.107
	(0.0711)	(0.0711)	(0.0712)	(0.0710)	(0.131)	(0.126)	(0.132)	(0.126)
$Index_{High}$	−0.152**	−0.0597	−0.0724	−0.0460	−0.144	−0.101	−0.0784	0.0090
	(0.0711)	(0.0710)	(0.0712)	(0.0710)	(0.115)	(0.117)	(0.114)	(0.123)
WGI_{High}					0.190**	0.114	0.166*	0.157*
					(0.0870)	(0.0885)	(0.0897)	(0.0853)
$Index_{Low} \times WGI_{High}$					−0.266*	0.00256	−0.209	0.0212
					(0.156)	(0.153)	(0.157)	(0.153)
$Index_{High} \times WGI_{High}$					0.0144	0.0873	0.0603	−0.0890
					(0.146)	(0.148)	(0.147)	(0.150)
Constant	−0.0277	−0.0764	−0.0546	−0.0839	−0.151*	−0.149*	−0.168*	−0.179**
	(0.0622)	(0.0619)	(0.0643)	(0.0625)	(0.0847)	(0.0861)	(0.0887)	(0.0823)
Observations	620	620	620	620	620	620	620	620
R^2	0.056	0.057	0.052	0.057	0.068	0.065	0.063	0.065

Note: Standard errors in parentheses. $INDEX_{High}$ denotes the 25% best companies in terms of ESG, ENV, SOC and GOV scores reported in regression models (1)–(4). $INDEX_{Low}$ denotes the 25% lowest companies in terms of ESG, ENV, SOC and GOV score reported in regression models (1)–(4). WGI_{High} is a dummy variable taking a value of 1 for the countries listed in Table. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

companies in the case of Germany at 1% significance and Austria at 10% significance and Spain at the 1% significance level. However, the SOC_{Low} level companies have a significant negative coefficient at the 5% level in the case of Finland.

In sum Table 7 shows that when looking at all the sample using the social pillar reveals that the SOC_{High} companies have a significant negative impact on returns which is not the case for the SOC_{Low} companies where the relationship is positive but not significant. When examining the relationship between Covid-19 period and SOC_{High} and SOC_{Low} companies, we can see that there is a negative relationship of a similar magnitude in both cases, but it is significant in the case of the SOC_{High} companies. When it comes to the individual countries there is evidence that in Germany the SOC_{Low} companies outperform the SOC_{High} countries, since there is a significant positive effect for the former and a negative but not significant effect for the latter. However, during the Covid-19 period the SOC_{Low} companies in Germany do worse than the SOC_{High} companies.

Finally, Tables 8, 9 are the equivalent of regressions (1) and (2) respectively but this time examining the top 25% companies with a high governance score (GOV_{High}) and the bottom 25% of companies with a low governance score (GOV_{Low}). In Table 7 we see that when looking at all the sample countries using the governance pillar score reveals a positive significant effect only for the GOV_{Low} companies during the Covid-19 pandemic. When it comes to the various countries during the Covid-19 period there is a significant positive effect for GOV_{Low} companies in the case of Ireland at the 10% level of significance but a significant negative effect at the 10% significance level in the case of Spain. When we add control variables then Table 8 reveals that there is no evidence that the governance plays any significance role in the returns of either GOV_{Low} or GOV_{High} companies for all countries. There is, however, a significant negative effect for GOV_{Low} in the case of Austria and a significant positive effect in the case of Spain. At the country level during the Covid-19 period there is a significant positive effect for GOV_{Low} companies in the case of Ireland at the 10% significance level but a negative effect in the case of Spain at the 10% significance level.

4.3 | Cross sectional regression results: country level governance and its impact on ESG investment returns

After the panel data analysis, we proceed with additional cross-sectional regression results to examine the role of

TABLE 11 Cross sectional results for 5-year risk adjusted returns (Sharperatio) against indices and WGI_{High}.

Variables	(1) ESG	(2) ENV	(3) SOC	(4) GOV	(5) ESG	(6) ENV	(7) SOC	(8) GOV
Beta	−0.0173**	−0.0178**	−0.0172**	−0.0172**	−0.0162*	−0.0172**	−0.0164*	−0.0163*
	(0.00857)	(0.00855)	(0.00857)	(0.00857)	(0.00855)	(0.00857)	(0.00857)	(0.00858)
$Index_{Low}$	0.0115	0.0243*	0.00205	0.00167	0.0634***	0.0186	0.0191	0.0291
	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0245)	(0.0237)	(0.0248)	(0.0237)
$Index_{High}$	0.000920	−0.00464	−9.92e-05	−0.00136	0.00967	−0.0142	−0.0151	0.0148
	(0.0133)	(0.0133)	(0.0133)	(0.0133)	(0.0216)	(0.0220)	(0.0214)	(0.0230)
WGI_{High}					0.00430	−0.0215	−0.0168	−0.000245
					(0.0163)	(0.0166)	(0.0168)	(0.0160)
$Index_{Low} \times WGI_{High}$					−0.0723**	0.00810	−0.0235	−0.0391
					(0.0292)	(0.0286)	(0.0294)	(0.0287)
$Index_{High} \times WGI_{High}$					−0.0143	0.0125	0.0229	−0.0240
					(0.0274)	(0.0277)	(0.0275)	(0.0282)
Constant	0.0377***	0.0364***	0.0402***	0.0406***	0.0337**	0.0507***	0.0511***	0.0398**
	(0.0117)	(0.0116)	(0.0120)	(0.0117)	(0.0159)	(0.0162)	(0.0167)	(0.0155)
Observations	620	620	620	620	620	620	620	620
R^2	0.008	0.014	0.007	0.007	0.021	0.017	0.013	0.013

Note: Standard errors in parentheses. $INDEX_{High}$ denotes the 25% best companies in terms of ESG, ENV, SOC and GOV scores reported in regression models (1)–(4) respectively. $INDEX_{Low}$ denotes the 25% lowest companies in terms of ESG, ENV, SOC and GOV score reported in regression models (1)–(4).
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 12 Difference-in-Differences analysis.

Variables	(1)	(2)	(3)	(4)
Beta	−0.464***	−0.464***	−0.470***	−0.470***
	(0.0845)	(0.0845)	(0.0845)	(0.0845)
Sharpe	4.624***	4.624***	4.622***	4.623***
	(0.953)	(0.953)	(0.953)	(0.953)
Sortino	2.476***	2.476***	2.454***	2.454***
	(0.492)	(0.492)	(0.492)	(0.492)
LMcap	0.216***	0.216***	0.227***	0.227***
	(0.0298)	(0.0298)	(0.0306)	(0.0306)
Covid		0.161	0.161	−0.0330
		(0.119)	(0.119)	(0.160)
DB			0.174	0.0636
			(0.107)	(0.123)
Covid × DB				0.433*
				(0.239)
Constant	−4.121***	−4.162***	−4.464***	−4.415***
	(0.657)	(0.658)	(0.684)	(0.685)
Observations	66,223	66,223	66,223	66,223
Number of companies	1123	1123	1123	1123

Note: Standard errors in parentheses. Covid is the Covid-19 time dummy. DB is the 0,1 dummy for EU/Non-EU. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

TABLE 13 The Difference-in-Difference-in-Differences (DIDID) effect of the top 25%.

Variables	(1) ESG	(2) ENV	(3) SOC	(4) GOV
Beta	−0.475***	−0.455***	−0.457***	−0.466***
	(0.0804)	(0.0793)	(0.0792)	(0.0795)
Sharpe	4.657***	4.498***	4.385***	4.622***
	(1.318)	(1.334)	(1.243)	(1.297)
Sortino	2.451***	2.459***	2.500***	2.424***
	(0.747)	(0.757)	(0.707)	(0.739)
LMcap	0.222***	0.253***	0.266***	0.238***
	(0.0263)	(0.0279)	(0.0280)	(0.0264)
Covid	−0.109	0.0172	0.0108	0.0128
	(0.163)	(0.209)	(0.211)	(0.194)
DB	−0.186*	0.0947	0.0298	0.0446
	(0.0988)	(0.110)	(0.106)	(0.118)
Covid × DB	1.651***	0.306	0.428	0.629**
	(0.310)	(0.298)	(0.297)	(0.306)
$Index_{high}$	−0.257**	−0.169	−0.311***	−0.0362
	(0.102)	(0.106)	(0.118)	(0.0904)
Covid × $Index_{high}$	−0.414	−0.153	−0.123	−0.180
	(0.263)	(0.276)	(0.288)	(0.270)
$Index_{high}$	−0.129	−0.227	−0.00464	0.109
	(0.163)	(0.162)	(0.164)	(0.151)
Covid × DB × $Index_{high}$	0.414	0.612	−0.146	−0.728*
	(0.455)	(0.468)	(0.477)	(0.423)
Constant	−4.322***	−4.932***	−5.153***	−4.652***
	(0.596)	(0.629)	(0.622)	(0.599)
Observations	66,223	66,223	66,223	66,223
Number of companies	1123	1123	1123	1123

Note: Robust standard errors in parentheses. $INDEX_{High}$ denotes the 25% best companies in terms of ESG, ENV, SOC and GOV scores reported in regression models (1)–(4) respectively. Covid is the covid-19 time dummy. DB is the 0,1 dummy for EU/Non-EU. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

country level governance. The cross-sectional results reported in Table 10 are using absolute returns as the dependent variable. The results clearly show a positive relation with the beta coefficients. When looking at the regressions that excludes the WGI variable (regression models (1)–(4)) we can see that in the case of the ESG_{Low} there is a negative effect on returns but it is not significant. However, in the case of ESG_{High} companies not only is the coefficient negative it is also significant suggesting that ESG_{High} companies perform significantly worse than ESG_{Low} companies. There is also some evidence that the ENV_{Low} companies and GOV_{Low} companies outperform their the ENV_{High} and GOV_{High} companies at the 10% significance level.

When looking at what happens when we include the WGI_{High} countries (regression models (5)–(8)) we get some very interesting results. The first is that there is a positive relationship between having WGI_{High} scores that is significant at the 5% level. We also find by looking at the interaction terms that ESG_{Low} companies perform significantly worse than ESG_{High} companies in WGI_{High} countries. However, we were not able to detect any significant effects when it comes to the individual ENV_{Low}, SOC_{Low}, GOV_{Low} and ENV_{High}, SOC_{High}, GOV_{High} companies.

In Table 11 the cross-sectional regression uses the 5-year average Sharpe ratio as the dependent variable rather than the nominal returns used in Table 10. When we do not control for governance issues, it can be seen that only ENV_{Low} companies have significant positive risk adjusted returns. When we control for country level governance ESG_{Low} companies have a positive and significant positive return overall, showing the value of incorporating WGI into the regressions. It can be seen that ESG_{Low} companies have negative risk adjusted returns at the 5% significance level in WGI_{High} countries while the coefficient for ESG_{High} companies is also negative it is of a much smaller value and it is not significant. Interestingly, when it comes to the individual pillars using indexes for ENV, SOC or GOV there is no significant interaction with the WGI_{High} dummy, suggesting that risk adjusted returns are unaffected by the individual pillars in the WGI_{High} countries. Our overall results clearly show the value including the world governance indicator dummy into the regressions.

4.4 | Difference-in-Differences results: the performance of the Eurozone area compared to countries less affected by Covid-19

In the final part of our econometric analysis, we perform the DID tests. We use South Korea and Australia as comparators to the Eurozone as it is clear from the GDP growth statistics that they were less affected by the Covid-19 pandemic. This is evidenced by the fact that while the Eurozone real GDP having grown 1.6% in 2019 fell in 2020 by 6.1%, in the case of South Korea having grown 2.2% in 2019 it fell by 0.9% in 2020 and in the case of Australia having after having negative growth in 2019 of −0.1% it actually grew by 2.2% in 2020. The results of the estimated regression Equation (5) are reported in Table 12. The results suggest that during Covid-19 the countries that were not significantly affected by the pandemic showed on average significantly higher returns

TABLE 14 The Difference-in-Difference-in-Differences (DIDID) effect of the bottom 25%.

Variables	(1) ESG	(2) ENV	(3) SOC	(4) GOV
Beta	−0.462***	−0.466***	−0.464***	−0.462***
	(0.0794)	(0.0776)	(0.0795)	(0.0793)
Sharpe	4.608***	4.575***	4.632***	4.727***
	(1.272)	(1.241)	(1.291)	(1.314)
Sortino	2.416***	2.405***	2.426***	2.372***
	(0.727)	(0.707)	(0.733)	(0.748)
LMcap	0.244***	0.251***	0.240***	0.239***
	(0.0264)	(0.0269)	(0.0254)	(0.0258)
Covid	−0.140	−0.0228	0.000274	−0.193
	(0.151)	(0.164)	(0.131)	(0.168)
DB	0.0906	0.0587	0.136	0.103
	(0.0835)	(0.0872)	(0.0867)	(0.0852)
Covid × DB	0.221	0.198	0.0220	0.313
	(0.244)	(0.265)	(0.241)	(0.248)
$Index_{low}$	0.0165	0.269	0.244	0.0307
	(0.215)	(0.167)	(0.229)	(0.142)
Covid × $Index_{low}$	0.778	−0.0817	−0.283	0.645*
	(0.592)	(0.444)	(0.852)	(0.379)
DB × $Index_{low}$	−0.0427	−0.122	−0.326	−0.108
	(0.262)	(0.217)	(0.268)	(0.242)
Covid × DB × $Index_{low}$	0.0171	0.631	1.199	0.368
	(0.718)	(0.594)	(0.939)	(0.625)
Constant	−4.791***	−4.971***	−4.726***	−4.681***
	(0.605)	(0.615)	(0.587)	(0.593)
Observations	66,223	66,223	66,223	66,223
Number of companies	1123	1123	1123	1123

Note: Robust standard errors in parentheses. $Index_{low}$ denotes the 25% lowest companies in terms of ESG, ENV, SOC and GOV score reported in regression models (1)–(4) respectively. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

with the coefficient reading 0.433 compared to those affected by Covid-19.

Next, we extend this analysis by including an additional dummy that can let us compare the performance of the 25% $INDEX_{High}$ companies. The results of this specification can be considered as Difference-in-Difference-in-Differences (DIDID) regressions and are reported in Table 13. Here, as before $INDEX_{High}$ refers to a dummy that takes the value of 1 for the top 25% of companies using the ESG, ENV, SOC or GOV scores, in each case (see Table 13 models (1)–(4) respectively). The first thing we observe is that during the Covid-19 crisis the Australian and South Korean Companies performed much better than their counterparts in Europe as witnessed the positive and significant *Covid*DB* coefficient. However, the ESG_{High} companies did significantly worse overall throughout the entire period as witnessed by the $INDEX_{High}$ coefficient when it is ESG_{High}. When we look at the Coronavirus period we find some evidence that the GOV_{High} companies in Australia and Korea performed less well than their counterparts in the Eurozone area. A result that is unusual as these countries introduced strict travel restrictions and strong controls on production and social distances. It is this strong response that could have contributed to the larger reduction in corporate profits for Non-EU companies.

Finally, in Table 14 we look at how the DIDID approach can let us compare the performance of the 25% $INDEX_{Low}$ companies (here $INDEX_{Low}$ refers to the bottom 25% companies using the ESG, ENV, SOC or GOV scores – see Table 14 models (1)–(4) respectively). From these results we find that the GOV_{Low} companies seem to outperform during the Covid period (in the Eurozone area, South Korea and Australia) but no other evidence of significant effects. There seems to be no statistically significant difference in the performance of the Eurozone countries compared to South Korea and Australia when it comes to using the Governance pillar.

5 | CONCLUSIONS

The interest in ESG investing has been growing in recent years and the Covid-19 pandemic provides an interesting case study to examine the performance of high and low ESG stocks during a period of financial and economic stress. Our reported results tend to suggest that ESG scores are not especially important in determining the fate of investor returns in recent years in the Eurozone area. Indeed, if anything our evidence tends to suggest that the lower ESG rated companies provide more protection for investors than high ESG scoring stocks. While this result it somewhat contrary to what one may expect on an a priori basis it can make sense if the recent rise in investors interested in ESG stocks is leading to overpricing of these stocks and a potential underpricing of lower rated ESG stocks. The results are somewhat consistent with those reported by Cao et al. (2022). Importantly, however, once we control for country level governance score we find that ESG_{Low} companies underperform the ESG_{High} companies in countries with high levels of Governance.

Future research could explore issues like the effects of excluding certain industries from the sample and also exploring industry effects since sectors like utilities (such as oil, electricity and gas) may perform very differently

compared to industries such as telecoms, automotive, technology, travel, retail, leisure, media and financial services such as insurance and banking. Another possible extension could be to see how other country wide indicators apart from the country-level of governance interact with company ESG scores such as the Environmental and Social scores of the countries.

There is no doubt that the financial sector in Europe will have even more interest in ESG issues in the future since the European Union's Sustainable Finance Disclosure Regulation which commenced in March 2021 will increase harmonization of standards and lead to greater transparency in relation to sustainable financial products. Under the new Regulation Fund managers can classify their products as either Article 9, which means fully focused on sustainable objectives, or Article 8, which means fully or partly focused on environmental, social or sustainability issues. Investments classed as Article 6 means they are not focused on sustainability. According to Morningstar around 24% of the ESG open-end funds and exchange-traded funds either Article 8 or 9 based with combined assets in excess of €2 trillion. According to Morning Star, around 25% of EU funds can be classified as sustainable under the new rules.

From a corporate perspective, our attempts to look at the three issues of Environment, Social and Governance pillars individually may be of relevance in informing them when designing their ESG strategies. It is clear that different companies have different priorities in respect of ESG, some companies may be more concerned with Environmental issues while others may be more concerned with Social or Governance issues. How these different pillars affect shareholder returns is clearly an important issue for them when formulating their ESG strategies and when setting their capital expenditure budgets. Informed investments in these three areas could potentially lower their cost of capital, improve their revenue, and thereby boost both their share price and expected future returns.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from https://www.refinitiv.com/en. Restrictions apply to the availability of these data, which were used under license for this study.

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ENDNOTES

[i] See https://www.pwc.com/gx/en/news-room/press-releases/2022/awm-revolution-2022-report.html.

[ii] See https://rpubs.com/Olly_z08/1006164.

[iii] See https://www.jdpower.com/business/press-releases/2021-us-full-service-investor-satisfaction-study.

[iv] In their study, Hong and Kostovetsky (2012), find that there can be a political dimension to ESG investing with fund managers that invest in socially responsible companies being more likely to be democrats and make donations to the democratic party.

[v] When the sample is restricted in size to common data Reuters Bloomberg and KLD, the positive alpha disappears showing results are sample size dependent.

[vi] Halbritter and Dorfleitner (2015) show that ESG scores have low temporal variability so that the current ESG score is largely dependent on the rating in prior periods.

[vii] The Sortino ratio differs from the Sharpe ratio by only looking at the standard deviation of negative returns as the denominator rather than the standard deviation of all returns.

[viii] We include the additional control variables in order to standardize better our results, since they certainly affect returns and therefore allow us to provide more accurate estimates of the possible ESG related effects. Also, the regressions with the additional variables can be seen as robustness tests to the simple dummy variables only specification of Equation (1).

[ix] One possible problem that might emerge from adding those additional explanatory variables is that of endogeneity. To address this, we have used Principal Component Analysis on the four additional regressors to identify a component (with its respective weights) to be used in our regressions instead. The results of those specifications were very similar with those reported in the paper. Namely, the component comprising of the four variables was statistically significant and the conclusions regarding High and Low ESG, ENV, SOC and GOV portfolios, were not substantially different. Tables and results are not reported here for economy of space but are available from authors upon request.

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APPENDIX A

TABLE A1 Summary statistics for all countries and three major European countries.

	All	Europe	Non-Europe	Australia	S. Korea	Germany	Italy	Spain
Panel A: Stock data								
No. of Obs	67,560	37,200	30,360	21,660	8700	10,320	5160	4080
No of Stocks	1126	620	506	361	145	172	86	68
Market Cap	21.287	21.661	20.830	20.383	21.942	21.746	21.595	21.649
	(1.798)	(1.664)	(1.850)	(1.878)	(1.194)	(1.807)	(1.352)	(1.658)
Sharpe	0.026	0.022	0.031	0.052	−0.020	0.008	0.039	0.048
	(0.138)	(0.135)	(0.140)	(0.138)	(0.132)	(0.126)	(0.134)	(0.145)
Sortino	0.081	0.067	0.099	0.136	0.006	0.054	0.089	0.111
	(0.267)	(0.257)	(0.278)	(0.287)	(0.229)	(0.298)	(0.238)	(0.261)
Beta	1.103	1.056	1.160	1.218	1.017	1.019	1.004	0.944
	(0.631)	(0.635)	(0.621)	(0.683)	(0.396)	(0.649)	(0.396)	(0.463)
Panel B: ESG data								
WGI	7.582	7.425	7.773	8.131	6.882	7.914	6.124	6.694
	(0.739)	(0.823)	(0.564)					
ESG	49.623	55.877	41.959	40.709	45.072	(53.590	(58.708	63.819
	(22.286)	(19.530)	(23.049)	(21.077)	(27.099)	21.273)	17.884)	(18.607)
ENV	41.653	50.879	30.348	25.825	41.610	47.405	54.935	61.947
	(29.916)	(27.085)	(29.337)	(26.610)	(32.603)	(27.852)	(24.719)	(25.100)
SOC	53.697	62.222	43.251	43.204	43.368	59.688	65.192	74.728
	(25.248)	(21.884)	(25.170)	(22.486)	(30.856)	(22.905)	(19.852)	(18.746)
GOV	49.935	50.579	49.147	49.415	48.478	49.686	(51.657	49.577
	(23.241)	(22.612)	(23.966)	(23.223)	(25.711)	(23.553)	21.745)	(22.337)

Note: The values reported are medians and standard deviations are reported in parentheses.

TABLE A2 Correlation matrix for all countries (obs = 67,380).

	WGI	ESG	ENV	SOC	GOV	Market cap	Sharpe	Sortino	Beta
WGI	1.000								
ESG	−0.111	1.000							
ENV	−0.163	0.878	1.000						
SOC	−0.095	0.916	0.775	1.000					
GOV	−0.001	0.724	0.465	0.484	1.000				
Market Cap	−0.106	0.577	0.555	0.521	0.387	1.000			
Sharpe	0.047	−0.078	−0.109	−0.046	−0.058	0.151	1.000		
Sortino	0.057	−0.120	−0.143	−0.079	−0.107	0.088	0.914	1.000	
Beta	0.114	−0.025	−0.048	−0.028	0.006	−0.160	0.025	0.097	1.000

TABLE A3 Correlation matrix for European countries (obs = 37,200).

	WGI	ESG	ENV	SOC	GOV	Market cap	Sharpe	Sortino	Beta
WGI	1.000								
ESG	−0.019	1.000							
ENV	−0.006	0.863	1.000						
SOC	−0.016	0.888	0.730	1.000					
GOV	−0.003	0.703	0.407	0.422	1.000				
Market Cap	0.139	0.485	0.431	0.422	0.351	1.000			
Sharpe	−0.069	−0.049	−0.086	−0.032	−0.011	0.185	1.000		
Sortino	−0.050	−0.067	−0.117	−0.029	−0.053	0.100	0.889	1.000	
Beta	0.073	0.017	0.013	0.007	0.027	−0.176	−0.081	0.061	1.000

TABLE A4 Correlation matrix for Australia and South Korea (obs = 30,180).

	WGI	ESG	ENV	SOC	GOV	Market cap	Sharpe	Sortino	Beta
WGI	1.000								
ESG	−0.082	1.000							
ENV	−0.241	0.867	1.000						
SOC	0.001	0.924	0.758	1.000					
GOV	0.021	0.802	0.567	0.601	1.000				
Market Cap	−0.379	0.606	0.616	0.542	0.432	1.000			
Sharpe	0.232	−0.096	−0.124	−0.043	−0.110	0.139	1.000		
Sortino	0.209	−0.150	−0.149	−0.099	−0.163	0.106	0.943	1.000	
Beta	0.146	−0.017	−0.061	−0.003	−0.014	−0.111	0.148	0.131	1.000