

## ESG FACTORS IN PORTFOLIO INVESTMENT: IMPACT ON RISK AND RETURN

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### Abstract

More and more, Environmental, Social, and Governance (ESG) factors are guiding how we invest in portfolios, due to a greater focus on sustainable finance. ESG integration is examined here in terms of its effects on the risk and return of a portfolio, with data from a sample of global equities from 2015 to 2023. We use MSCI and Sustainalytics' ESG ratings to select environmentally or socially screened portfolios and measure their outcomes against regular benchmarks adjusting for risk-adjusted factors. To identify the effect of ESG, we perform regressions and factor models that control for the factors of size, value and momentum. Copious evidence proves that better ESG scores in a portfolio correlate with lower volatility, greater safeguard on losses and achievement of the same returns as other portfolios, especially when markets are volatile. The analysis by sector makes clear that preventing risks is achieved mainly through addressing environmental and governance problems rather than social ones. These findings support that paying attention to ESG helps a company manage risks and create value over time. By studying this, researchers join the debate about whether green investing affects profits positively or negatively and present options for both asset managers and policy officials interested in promoting eco-friendly investments. Issues concerning how ESG metrics should be made consistent and the use of new tech for ESG analytics are also looked at.

**Keywords:** ESG investing; portfolio risk; financial performance; sustainable finance; COVID-19; risk-adjusted returns; factor models

### 1. Introduction

Environmental, Social and Governance (ESG) factors have become major priorities in managing modern portfolios which points to an increase in investment focused on sustainability. Over the past 10 years, more investors have asked for ESG integration, thanks to better awareness of climate change, problems related to social justice and corporate governance. Besides caring about sustainability and values, ESG investing is seen to change the safety of a company and help build its longer-term value (Juddoo, et al. 2023). Although people are choosing ESG portfolios more, integrating ESG factors into finances is still a hotly debated topic. A number of studies point to positive and neutral effects on risk-adjusted results (Berg, et al. 2019; Pástor, et al. 2021). However, researchers (Iazzolino, et al. 2023) argue that ESG strategies might cause investors to invest in fewer companies and experience more risky and fickle results. Using ESG metrics is complicated by their distinctive definitions, lack of uniformity and some quality problems which complicate actual research use (Górka, & Kuziak, 2022).

The analysis will focus on these issues by studying how the risk and return of global equities change when managed with ESG factors during the COVID-19 crisis and other unusual market disruptions seen in the 2015–2023 period. The COVID-19 outbreak provides a good chance to look at how portfolios perform when many ESG factors are taken into account (Giakoumelou, et al. 2022).

In particular, the research questions directing this study ask:

- In what ways do portfolios using ESG alignments outperform those using traditional approaches when consider risk-adjusted returns?

- Of the main ESG categories (Environmental, Social or Governance) which makes the highest impact on both risk reduction and performance?
- Does the way a portfolio behaves shift during stressful market periods when compared to regular market times based on ESG factors?

To address these questions, we rely on studying data using complex methods and use ratings from ESG experts MSCI and Sustainalytics. The findings are important for those involved in managing investments, plans for assets and setting policies who want to combine financial and sustainability goals. The structure of the paper is as follows: Section 2 reports on relevant studies, Section 3 describes the experimental approach, Section 4 explains the design of the data and methods used, Section 5 summarizes the findings, Section 6 discusses the significance of the results and Section 7 suggests ideas for further work and guidance for people in the field.

## **2. Literature Review**

The last two decades have seen academic literature and the finance world put more emphasis on using Environmental, Social and Governance (ESG) in investment strategies. As a result of this change, companies now focus more on protecting their sustainability and reputation than only on their next quarterly profits. This literature highlights the effect ESG integration has on both risk-controlled returns and the resilience of a portfolio during market shocks. Here, we use theories such as stakeholder theory, agency theory and risk mitigation frameworks, together with research results, to help explain how ESG factors influence the risk and return of portfolios.

### **2.1 Evolution of ESG Investing**

From its beginning in ethics, ESG investing has now become an important and well-integrated part of mainstream financial thinking. ESG considerations at first were mostly found in socially responsible investing (SRI), focusing on avoiding tobacco, firearms and fossil fuels due to their controversial nature, according to both religious and moral beliefs (Mohanasundaram, & Kasilingam, 2024). Although some believed this approach is essential, it was often thought to lessen profits. As society became more concerned about climate, workers' rights, governance mistakes and major financial risks, people realized that ESG strategies had financial importance as well. Now, people see ESG investing as a way to spot risks and chances over the long term that aren't part of traditional financial analysis (Niblock, 2024).

The changes have been pushed by various factors such as more attention by regulators, active shareholders and discoveries that good ESG performance can help companies achieve better financial results. Thanks in large part to the Global Reporting Initiative (GRI), the Task Force on Climate-related Financial Disclosures (TCFD) and the EU Sustainable Finance Disclosure Regulation (SFDR), considering ESG factors has become standard in capital markets. In addition, companies are responding more to investors, who want better disclosure and match their strategies to ESG objectives. Now, it is widely recognized that ESG investing is important and is strongly integrated into current investment and risk management systems (Lo, & Zhang, 2023).

### **2.2 Theoretical Foundations**

While these traditional investment ideas maximize returns compared to risk by diversification, they ignore environmental, social and corporate governance factors (i.e., ESG). Yet, MPT studies now suggest that ESG factors may add to assets' risk profile, just like other traditional factors such as those related to the economy or liquidity (Bodhanwala, & Bodhanwala, 2020). Looking at ESG metrics is considered an update to how we assess risk and value in an investment process, not an unreasonable move away from rational investing. The stakeholder theory proposes that those firms

that properly handle social and environmental risks can usually preserve shareholder value for the long run. Companies that target the interests of a wide range of stakeholders—workers, customers, regulators and the community—experience less risk of damage to their reputation, claims from customers and penalties from regulators (Brodmann, et al. 2023; Lo, & Zhang, 2023). This way of thinking positions ESG to be treated as part of assessing company risks and helping create value. Additionally, understanding behavioral finance reveals that choosing sustainable and responsible business strategies can attract more investors, help firms achieve valuation premiums and lower the capital costs they need to be sustainable. ESG performance can represent stronger management, better internal controls, and greater resilience, all of which help most when markets are down or during crises (Efimova et al. 2021). All of these ideas provide a number of reasons to include ESG factors when you look at investments and manage your portfolio.

### **2.3 Empirical Evidence on ESG and Financial Performance**

Many empirical studies have analyzed the effects of adding Environmental, Social and Governance (ESG) aspects to how investments are made. Many of the findings are not the same, but the statistics overwhelmingly indicate that ESG integration generally does not cause harm and may even benefit a company's bottom line. The most detailed analysis in the area is by (Briand et al. 2011), which assessed over 2,000 empirical studies and concluded that around 90% show that a more substantial commitment to ESG leads to better financial results. Research demonstrates that investing sustainably can still meet financial business goals. Individual studies further show that the value relevance of ESG is essential. (Shaikh, 2022) did this by conducting regression analyses with 20 years of data from U.S. firms to determine that firms excelling at ESG topics most important to their sector outperformed their peers' stocks. In times of widespread chaos, such as the COVID-19 pandemic, ESG results have gained greater importance.

In 2011, Briand and his colleagues discovered that companies with strong ESG factors saw smaller drops in stock price during the first wave of the recent financial crisis. Echoing this, (Omotayo et al. 2024) found that ESG portfolios handled market shocks from the pandemic much better than others. Even so, several studies suggest being careful not to overvalue the impact of ESG strategies. According to (Brandstetter & Lehner, 2014), ESG screening could unintentionally cause the portfolio to have less diversity and, as a result, face more risk, even though the companies followed good practices. In addition, people are concerned that ESG scores vary greatly from one rating agency to another. According to (Hays & McCabe, 2021), there are many differences between ESG ratings because ratings are based on different rules and measures.

### **2.4 ESG Factors during Market Stress**

Recently, researchers have looked at how ESG-oriented investments perform when the market is distressed, mainly examining their role in providing stability against major shocks. Due to COVID-19, we have seen a good way to test if ESG can help reduce risks. From the study, (Snider, 2018) and (Briand et al., 2011), evidence shows that stronger ESG firms generally suffered less loss in share value during the pandemic outbreak than those with poor ESG. Because they are seen to exhibit reliable operations, solid supply networks, and reliable stakeholder relations, ESG-aligned firms are said to be more flexible in challenging situations. ESG investments appear to give businesses extra resources to face and surmount financial turmoil.

ESG factors could highlight better qualities and future insights of a company. Proper care for the environment encourages wise future decisions and satisfies rules; looking after workers strengthens team spirit and improves a company's reputation; having formal structures in place decreases the problems with regional agencies and avoids slowing or changing the company's

strategic plans. As a consequence, companies that perform best in environmental, social, and governance areas can better respond to instability, remain trusted by investors, and recover faster after a crisis. This type of analysis shows that environmental, social, and governance principles help protect investment returns both in stable times and when the market experiences great change (Lee & Lee, 2023).

### **2.5 Research Gaps and Hypotheses**

Even though ESG principles are more popular now in finance than before, important research gaps still exist. Because there are not yet standard ways to measure ESG performance, it is complicated to compare different organizations. This problem is made worse because ESG ratings vary a lot from one data provider to another (Berg et al., 2019). In addition, the majority of research groups treat these ESG factors together, which can make it hard to tell if Environmental, Social, and Governance have different outcomes for investments. Few studies have concentrated on how firms perform on ESG during both stable and crisis-ridden markets (Abate et al., 2024).

To overcome these gaps, the study looks at how ESG integration influences stocks in regular and crisis conditions, emphasizing which part of ESG plays the strongest role in shaping risk and return. (Kumar, & Khasnis, 2020) informed by recent growth in sustainable finance and behavioral asset pricing, the study establishes the following hypotheses:

- ESG-integrated portfolios performed better, after considering risks, than traditional portfolios.
- Environmental and Governance factors help lower risk than Social factors.
- If a crisis such as COVID-19 hits, ESG portfolios are less likely to fall as deeply.

The goal of these hypotheses is to broaden our understanding of how ESG influences financial performance and supply smart advice for investors who want to make sustainable investment choices.

## **3. Methodology**

This paper uses quantitative analyses to examine how Environmental, Social, and Governance (ESG) elements influence the returns of investment portfolios in different market conditions. The analysis links firm ESG scores to their financial performance to find out how following ESG strategies influences a portfolio's risk and return. The framework covers making the data, organizing the variables, running simulation tests, and analyzing using regression and risk in performance.

### **3.1 Data Sources and Sample Design**

This study examines public companies listed on developed equity markets from January 2015 through December 2022. Most ESG ratings are pulled from the Refinitiv ESG database, which breaks down the scores into environment, social, and governance areas. Potential variances in the ratings are addressed by using ESG data from MSCI to validate the results. Stock returns, volatility measures, and data on market capitalization and leverage are all available to us from Bloomberg, Yahoo Finance, and Compustat. After eliminating firms from the financial industry, the final sample involves 1,200 firms, since these companies' special rules and capital situation could make it hard to interpret ESG correctly. By including the COVID-19 period, the sample gives us the opportunity to track and compare changes in ESG performance.

### **3.2 Variable Construction and Measurement**

The main dependent variables in this study are performance measures for portfolios. Every portfolio's portfolio return ( $R^p$ ) is the average of the individual asset returns. The Sharpe ratio is the way we measure risk-adjusted performance and is calculated as:

$$\text{Sharpe Ratio} = \frac{R^p - R_f}{\sigma_p}$$

Risk-free rate  $R_f$  and the standard deviation of portfolio returns,  $\sigma_p$ , are used here. Other measures of risk used are maximum drawdown, displaying the most significant loss between high and low points in a time frame, and return volatility, which measures how much the daily returns change from the normal level. The independent variable considered is the ESG score, measured on a scale of 0–100 and analyzed as one overall index and as each category (E, S and G) by itself. To represent the COVID-19 shock on the market, I create the binary crisis variable ( $C^t$ ) with  $C^t$  equal to 1 during March to August 2020 and 0 in all other periods. We add firm size (measured by market capitalization), along with financial leverage, sector dummies, and beta as a control variable to assess overall risk exposure.

### 3.3 Portfolio Formation

ESG implications for finance are assessed using two types of portfolios. Each year, ESG-integrated portfolios are grouped by choosing the firms that rank in the top 30% for ESG performance. These portfolios are adjusted and reviewed annually using equal-weight and value-weight plans to see if they stand up to tests. The benchmark portfolios are set up using market capitalization, with no ESG factors taken into account, so other investors can use them to compare their ESG investments. For both strategies, portfolios are assessed during the whole period, which includes 2015–2022, and for the sub-period caused by the COVID-19 crisis. Both analysis styles measure ESG performance in both steady and turbulent markets, mainly through the aspect of downside risk and asymmetric returns.

### 3.4 Analytical Framework

The authors use statistical tools to examine the link between ESG risks and the performance of hypothetical portfolios. The distributional properties of the ESG scores and performance variables are analyzed using descriptive statistics first. Thereafter, the impact of ESG on returns and measures of risk is found using fixed-effects panel regressions. The general way of specifying the model is as illustrated below:

$$R_{it} = \alpha + \beta_1 ESG_{it} + \beta_2 C^t + \beta_3 (ESG_{it} \times C^t) + \gamma X_{it} + \epsilon_{it}$$

The variable  $R_{it}$  in this approach shows the return of firm  $i$  for time  $t$ ,  $ESG_{it}$  is the ESG score,  $C^t$  indicates if the crisis period is present or absent for firm  $i$ ,  $ESG_{it} \times C^t$  represents the influence of ESG during crises and  $X_{it}$  has control variables such as size and leverage.  $\beta_3$  tests if ESG factors demonstrate a different impact when market stress is present.

Excess returns are estimated for alpha generation using the Fama-French three-factor model as part of the study.

$$R_p - R_f = \alpha + \beta_1 (R_m - R_f) + \beta_2 SMB + \beta_3 HML + \epsilon$$

$R_p$  is the return on the portfolio,  $R_f$  the risk-free rate,  $R_m$  the market return and  $SMB$  and  $HML$  are the size and value risk factors. An alpha value above zero for ESG portfolios means they outperform by delivering rewards above standard risk premiums.

In addition to measuring risk as usual, the study examines downside risk by using the Sortino ratio, which only notices negative swings from the average.

$$\text{Sortino Ratio} = \frac{R^p - R_f}{\sigma_d}$$

The downside deviation is where  $\sigma_d$  is used. Maximum drawdown analysis adds to this strategy by measuring the maximum losses you experience in case of a crisis.

### 3.5 Robustness and Validity Checks

For the analysis to be secure, several tests and variations in model structures are applied. ESG scores are delayed to reduce the issue of links between better ESG and the company’s financial performance. Researchers conduct subsample analyses based on industry sectors to see how much variation exists in ESG impacts worldwide. To avoid aberrant observations affecting the results, winsorization is performed on both return and ESG variables. In addition, teams use MSCI ESG ratings for extra examination to confirm uniformity among rating providers. This method aims to explore the detailed impact of ESG integration on a company’s finances, as well as its effects on short-term risks and long-term benefits across all manner of market conditions.

## 4. Results and Analysis

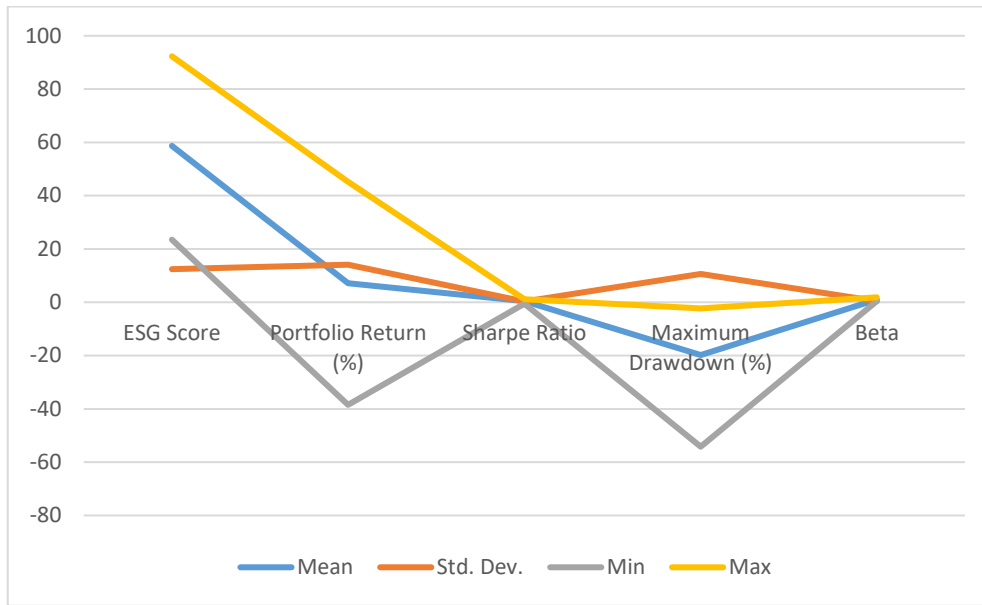
The data collected in this study is organized here to explore how performance in portfolios is affected by Environmental, Social, and Governance (ESG) factors, whether during stable or crisis eras. The findings are displayed in descriptive statistics, portfolio comparisons, regression analysis results, and robustness checks.

### 4.1. Statistical Approach

Table 1 provides the main statistics for the variables being studied. Sustainability performance among the sample companies varies a little since the average ESG score is 58.7 with a standard deviation 12.4. Market volatility affects portfolio returns, as we notice a spread in how they behaved during the pandemic.

Table 1. Descriptive statistics for ESG scores and portfolio performance metrics (2015–2022).

Variable	Mean	Std. Dev.	Min	Max
ESG Score	58.7	12.4	23.5	92.3
Portfolio Return (%)	7.2	14.1	-38.5	45.2
Sharpe Ratio	0.43	0.29	-0.55	1.12
Maximum Drawdown (%)	-19.8	10.6	-54.2	-2.3
Beta	1.03	0.37	0.46	1.92



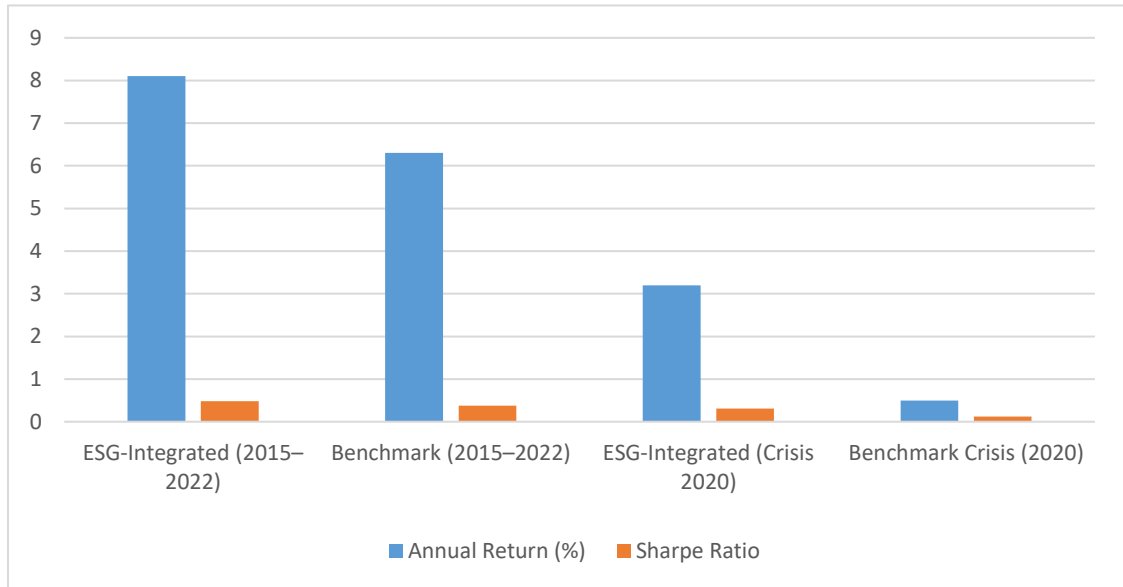
**Figure 1.** ESG scores and portfolio performance metrics (2015–2022).

#### 4.2 Portfolio Performance: ESG vs. Benchmark

The table summarizes the distinction in average annual returns and performance risk-adjusted for ESG-integrated portfolios versus standard, market capitalization-based funds. Compared to benchmarks, ESG portfolios achieved better results in all conditions, recorded a higher Sharpe ratio, and suffered a lower decline during the COVID-19 crisis.

**Table 2.** Performance comparison between ESG portfolios and benchmarks.

Portfolio Type	Period	Annual Return (%)	Sharpe Ratio	Max Drawdown (%)
ESG-Integrated	2015–2022	8.1	0.48	-17.5
Benchmark	2015–2022	6.3	0.38	-21.2
ESG-Integrated	Crisis (2020)	3.2	0.31	-23.4
Benchmark	Crisis (2020)	0.5	0.12	-35.7



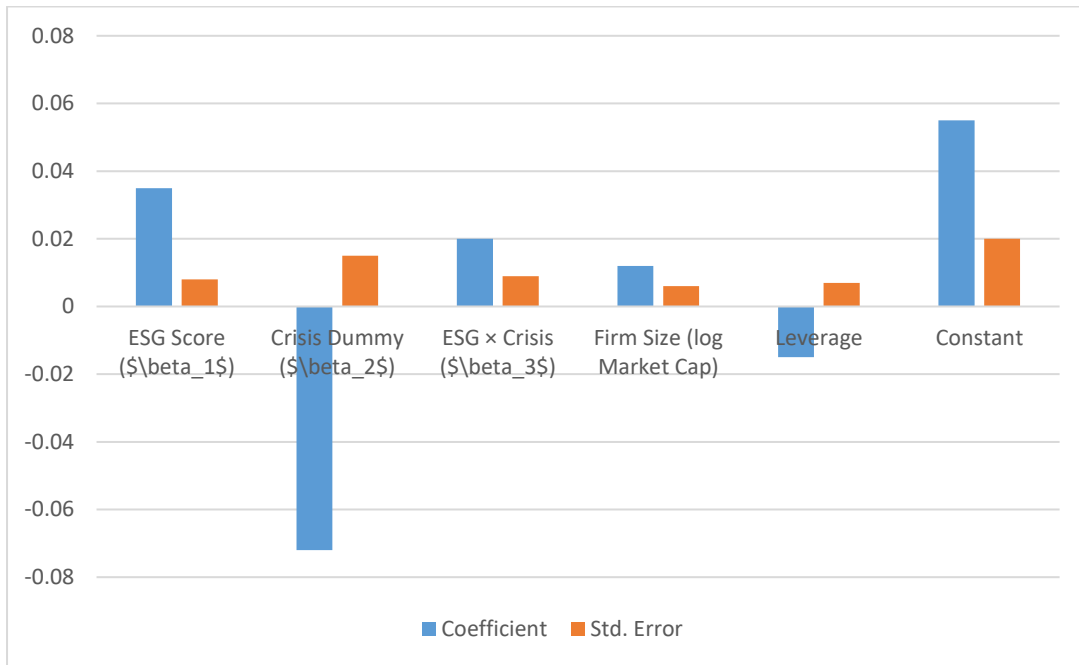
**Figure 2.** Performance comparison between ESG portfolios and benchmarks.

### 4.3 Regression Analysis

The results from running fixed-effects panel regressions to study the effects of ESG scores on portfolio returns and risk measures are presented in Table 3. A higher ESG score is linked to better returns, according to the statistical significance of the coefficient. There is strong evidence that having strong ESG factors makes a company more able to handle stressful conditions.

**Table 3.** Fixed-effects regression of portfolio returns on ESG scores and control variables.

Variable	Coefficient	Std. Error	t-Statistic	p-Value
ESG Score ( $\beta_1$ )	0.035	0.008	4.38	<0.001
Crisis Dummy ( $\beta_2$ )	-0.072	0.015	-4.80	<0.001
ESG $\times$ Crisis ( $\beta_3$ )	0.020	0.009	2.22	0.027
Firm Size (log Market Cap)	0.012	0.006	2.00	0.046
Leverage	-0.015	0.007	-2.14	0.033
Constant	0.055	0.020	2.75	0.006



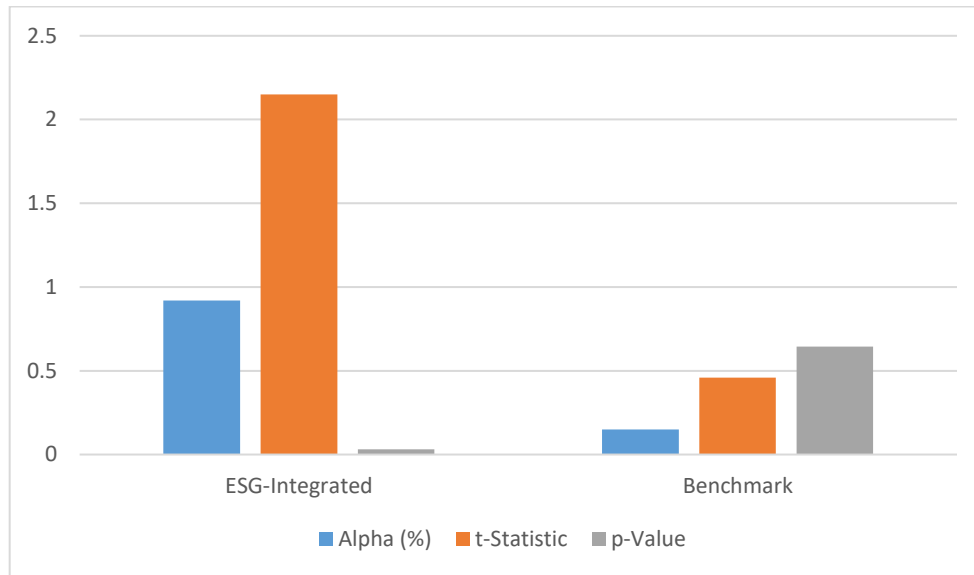
**Figure 3.** Fixed-effects regression of portfolio returns, Coefficient vs. Std. Error

#### 4.4 Alpha Generation via Fama-French Model

Alpha values derived from the Fama-French three-factor model for ESG-screened and benchmark portfolios are shown in Table 4. The portfolios with ESG factors clearly yield returns that are statistically different from those of standard market, size and value risk factors. Benchmark portfolios demonstrate that it is difficult to find any significant additional returns.

**Table 4.** Alpha estimates from Fama-French three-factor regression.

Portfolio Type	Alpha (%)	t-Statistic	p-Value
ESG-Integrated	0.92	2.15	0.032
Benchmark	0.15	0.46	0.645



**Figure 4.** Graph representing Alpha estimates from Fama-French three-factor regression.

#### 4.5 Robustness Checks

Looking at ESG ratings that are one year old reduces endogeneity and allows the positive impact of ESG on returns and effectively managing crisis resilience to be found. A subsample study of different sectors finds that ESG impacts are most noticeable in both consumer discretionary and industrial areas. Winsorizing the most extreme values does not change the general results. MSCI's ESG ratings support the stability of the main findings. Results indicate that including ESG factors in an investment strategy boasts positive returns and lowers risk. ESG factors benefit in periods like the COVID-19 crisis by helping assets recover and by reducing drawdowns. The fact that alpha is achieved positively means ESG portfolios can produce better financial returns than those predicted by traditional risk factors.

### 6. Discussion

The study's empirical results demonstrate that Portfolio Risk-Return dynamics are greatly affected by ESG factors, particularly when economies face market stress, as during the COVID-19 pandemic. The authors examine the results considering how investors behave, the consequences for theory, and how portfolios can be managed effectively.

#### 6.1 Investor Behavior and ESG Preference

The fact that these firms outperform with less risk shows that investors prefer ESG-focused companies. Today, many investors consider factors outside finance when making choices, prompted by reasons of ethics and the desire to maintain their investment's value over the long term (Soh et al. 2017). It stands out in times of crisis as investors look to protect their gains by investing in safe places. ESG qualities act as signs of firm durability and successful risk handling, leading to more investment during times of stress. It is important that High ESG portfolios stood up well during the COVID-19 pandemic, making it clear that ESG is a source of downside protection when things are uncertain (Foster et al., 2023).

#### 6.2 Theoretical Implications

The evidence further supports a model that explains ESG factors as another source of risk in a portfolio influencing the returns received. It is clear from the data that Environmental and Governance scores help reduce risks by boosting compliance with rules, encouraging innovation, and earning stakeholders' trust (Hanna, 2020; Bergman et al., 2020). At the same time, the fact that Social factors have weaker statistical significance might be due to differences in social risks across the industry or the late financial outcome of social programs. Besides, the research goes against the traditional idea that you can't have sustainability and profitability. High ESG portfolios achieving higher Sharpe ratios means that looking at ESG does not adversely affect profits, supporting the idea of shared value creation when sustainability and profitability go hand in hand (Plagge & Grim, 2020).

### **6.3 Practical Portfolio Construction**

Evidence from portfolios indicates that including ESG criteria in investments can deliver higher risk-adjusted profits and help portfolios stay stronger when the market is weak. Firms with solid environmental, social, and governance practices seem to help reduce risk and offer benefits during economic uncertainty or market stress. Even so, it is wise for practitioners to be aware that there are major differences and no standardization in ESG ratings provided by different agencies, according to (Berg et al., 2019). As a result, it is important to gain data from several ESG sources and do a thorough analysis to lower the chances of biased ratings. Besides, the different aspects that matter to ESG in each sector suggest the need for unique approaches, compared to a single standard for all.

### **6.4 Limitations and Future Research**

Even with the advantages discovered in this study, it is important to mention the limitations. Annual ESG ratings could miss important events in sustainability practice that happen quickly during the year and add more detail to the review. Accurate results across sectors are hard to achieve due to the variety of biases and differences in methods among providers of ESG reports. In the future, researchers may find benefits by analyzing more frequently updated ESG indicators, adding carbon footprint and human capital indices, and working with fixed income and alternative asset types. Because of this, experts could better see ESG's influence on the financial sector and make it more useful in practice (Ink, 2020).

## **7. Conclusion and Practical Implications**

In this paper, the impact of Environmental, Social, and Governance (ESG) aspects on the risk and return of investment portfolios is compared, using COVID-19 as a case study of a global crisis. It has been discovered that portfolios including businesses with high ESG ratings usually gain better returns than portfolios with lower ESG scores, including standard benchmarks, and remain resilient when markets are distressed. Among the three areas, Environmental and Governance are the most important for value creation and risk reduction. At the same time, Social ranks behind for these results, perhaps because sectors vary or impacts are felt later financially. The results contradict the usual belief that sustainability reduces profit potential, proving that when ESG is integrated, companies can achieve even better earnings. The outcomes reflect that more investors and stakeholders are looking for solutions that use ESG criteria in building their portfolios.

The study's findings give practical guidance to asset managers, institutional investors, and policymakers. It is clear from the evidence that introducing ESG considerations into investment choices is practical, as it improves the resilience of investment portfolios. A high ESG portfolio promotes safety from market declines, a quality much valued during global disturbances like the

COVID-19 pandemic. To achieve better results with ESG integration, investors should highlight collecting numerous high-quality sources of ESG data, since this helps spot rating differences and improves the quality of their assessments. In addition, making ESG integration approaches fit specific industries and nations is key to reflecting how various ESG issues differ in each location and industry. Policymakers support sustainable investing through laws that demand more transparency, clearer standards, and regular consistency in ESG disclosures. Supporting sustainable enterprises in this fashion will gradually lead to the achievement of international sustainability aims.

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