

ANALYSING THE IMPACT OF ESG SCORE ON EQUITY PORTFOLIO PERFORMANCE: A COMPARATIVE STUDY OF HIGH AND LOW ESG PORTFOLIOS: EVIDENCE FROM THE US EQUITY MARKET

G. D. T. R. Amath¹, B. L. D. H. V. Liyanage², H. M. N. P. Herath³

Abstract

This study aims to find out whether there is a significant difference between high and low environmental, social & governance (ESG) equity portfolios in the United States equity market. High and low ESG portfolios are constructed using the constituents of the S&P 500 index from 2018 to 2022, based on the ESG scores gathered from the Bloomberg database. ESG scores are ranked in descending order for each year, where the top 10% is considered the highest ESG portfolio and the bottom 10% is considered the lowest ESG portfolio. Portfolio return is calculated under both equal-weighted and value-weighted approaches. The comparison of the portfolios is done using three portfolio performance measurements: the Sharpe ratio, the Treynor ratio, and the Jensen alpha. According to the results under both equal-weighted and value-weighted approaches, a high ESG portfolio does not significantly outperform a low ESG portfolio. The findings of this study have several implications for investors, researchers, and policymakers. Findings suggest that investing in ESG concerned stocks may not significantly outperform the other but also does not underperform either. Therefore, this is a win-win situation for investors, where they can earn a marginally high return while also integrating sustainability and ethical considerations into their investment decisions. This study contributes to academic literature by finding that there is no significant difference between high and low ESG equity portfolios.

Keywords: ESG equity portfolio, portfolio performance, sustainable investing, US equity market

¹ Department of Finance, University of Kelaniya, Sri Lanka

Email: thisuamath@gmail.com*

² Department of Finance, University of Kelaniya, Sri Lanka

Email: hashiliyanage1999@gmail.com

³ Department of Finance, University of Kelaniya, Sri Lanka

Email: nethmih@kln.ac.lk



Introduction

Best-performing entities usually attract stakeholders. In earlier times, performance was measured in terms of the entity's financial performance. However, in today's world, this notion has shifted to measuring a company's performance through non-business operations activities such as economic, environmental, and social sustainability performance (Uthayakumar, 2021). With growing awareness of today's environmental and social concerns, investors are allocating more resources to sustainable investment. These investments were further increased during the COVID-19 pandemic (Jacobsen, 2021). A survey conducted by Morgan Stanley has revealed that 82% of the respondents are willing to increase their capital allocation towards sustainable investing in their portfolio (Morgan Stanley, 2024). Rather than only profit-seeking businesses, the current environment is focused on establishing businesses that centre on people, planet and profit (3Ps) (Zehir & Aybars, 2020). This transition has sparked the researcher's interest in evaluating the integration of ESG and the financial performance of companies. The United States has two main equity stock exchanges: NASDAQ and the New York Stock Exchange. (NYSE). According to Statista (2018), these two equity stock exchanges account for approximately 60% of the global stock market, making the United States equity market the largest in the world. In the United States, 84% of individual investors are interested towards sustainable investments (Morgan Stanley, 2024).

Since the 1990s, studies have measured the value of research-based ESG integration through various quantitative parameters, including returns, volatility, and portfolio performance (Sherwood & Pollard, 2017). Certain research has also addressed the United States equity market. Some researchers have concluded that ESG portfolios outperform non-ESG portfolios (Goyal & Aggarwal, 2014). Additionally, some researchers have concluded that non-ESG portfolios outperform ESG portfolios, or that the evidence does not support a significant difference between ESG and non-ESG portfolios (Fulton et al., 2012; Zehir & Aybars, 2020). These inconclusive results underscore the need for further research on these topics. There has been limited research comparing ESG-related portfolio performance in the world's largest equity market. Therefore, this study aims to address the existing empirical gap in comparing high- and low-ESG portfolios of the world's largest equity market using both equalweighted and value-weighted approaches. Accordingly following research questions and objectives were set.

RO1: *To compare the portfolio performance of equally weighted high and low ESG equity portfolios in US equity market.*

RO2: *To compare the portfolio performance of value-weighted high and low ESG equity portfolios in US equity market.*

Literature Review

ESG investment is a key global trend. Previous studies have emphasised that investors are more attracted to good ESG-performing companies because they believe these companies are sustainable, have more resources for future development, and spend time optimising their activities (Egorova et al., 2022). Traditional Modern Portfolio Theory emphasises that investors only seek to maximise their economic returns. However, in the current context, investors consider more factors, such as responsible governance, environmental considerations, and ethical business values, when making investment decisions. Moskowitz (1972) argued that companies with more socially responsible investments have superior financial performance compared to other companies, whereas Friedman (1970) contended that ESG criteria would generate additional costs for the firm, ultimately weakening the company's financial performance. Research on ESG funds and conventional funds during the Great Recession period has concluded that ESG funds outperformed conventional funds during the recession period (Nofsinger & Varma, 2014).

Lins et al. (2017) evaluated 1,673 non-financial enterprises in the US market between August 2008 and March 2009 by assessing their strengths and challenges across five categories: community, diversity, employee relations, environment, and human rights. A regression analysis revealed that firms with high CSR ratings outperform those with poor scores in financial terms. A study conducted in 2017 to measure the effect of ESG integration into emerging market equities has shown that ESG strategy integration provides higher returns at a significantly lower risk than non-ESG MSCI Emerging Market indices (Sherwood & Pollard, 2017). A study conducted analysing the performance of ESG stock portfolios and market portfolios based on the Indian stock market has stated that ESG stock portfolios outperform blue-chip and market portfolios. Despite higher returns ESG stock portfolio contains higher systematic and total risk than the other two portfolios. The researcher has concluded that socially responsible investors can achieve higher returns by investing in ESG stocks compared to the market (Goyal & Aggarwal, 2014).

Research analysing the returns of socially responsible investment (SRI) portfolios using negative, positive, and best-in-class screens for the period of 1992-2004 has also provided similar results. The research has employed KLD SRI Ratings (formerly MSCI ESG ratings) to rate business organisations and has created value-weighted

portfolios that are rebalanced annually. The high-rate portfolio includes the top 10% of equities, while the low-rate portfolio contains the worst 10%. This research concludes that a negative screening portfolio performs worse than both positive and best-in-class screened portfolios. The study has also found that using equal-weighted portfolios instead of value-weighted portfolios does not significantly alter the results (Kempf & Osthoff, 2007).

Another study, conducted using Refinitiv's ESG ratings, analysed the STOXX Europe 600 Index from 2011 to 2020 to determine whether high portfolios with ESG leaders outperform low portfolios with ESG laggards. The researcher constructed decile portfolios based on companies' ESG scores, defining a positive screening strategy. To compare portfolio performance, various risk and return measures have been calculated. The returns have been tested using various performance benchmark models, including the CAPM and Fama-French 3- and 5-Factor models. The findings provide supporting evidence for an outperformance in the high portfolio, based on the ESGC score. However, the remaining ratings (ESG, E, S, and G) indicate better success in the low portfolio. Furthermore, the results indicate that low-risk portfolios have higher levels of downside risk (Jacobsen, 2021).

A study examining the relationship between ESG scores and the risk and return of stocks in Nordic countries (Sweden, Denmark, Norway, and Finland) has shown that there are no abnormal returns for the long-short ESG portfolio across the full sample in the CAPM, Fama-French three-factor model, Carhart, and Fama-French five-factor models. The same results are held for each country separately. Hence, they have found no evidence to support the notion that companies with a high ESG score lead to higher stock returns. However, the study shows that high ESG scores provide better preparation for market shocks (Uthuslien & Andréasson, 2023). When comparing all ESG and non-ESG disclosures, the non-ESG portfolios have achieved higher Sharpe ratios compared to ESG portfolios. ESG and non-ESG portfolios constructed based on market capitalisation have also dictated similar results, with non-ESG portfolios outperforming ESG portfolios. As the third criterion, they have created only ESG portfolios, valuing them based on the ESG disclosure score. In the third scenario, lower ESG score portfolios have obtained higher returns compared to higher ESG portfolios (Kazakou et al., 2022).

By analysing previous empirical studies, it can be observed that many studies have been conducted to examine the difference and impact of ESG and traditional portfolios. However, the majority of the studies haven't concluded precise results, outlining the need for further research. Additionally, although research has been conducted focusing on the US market, none of the studies have compared portfolio performance using risk-adjusted measurements via a paired t-test. This highlights the existing gap in analysing the equal-weighted and value-weighted performance of high- and low-ESG portfolios in the US equity market. By addressing this gap, this research is based on analysing equally weighted and value-weighted high- and low-ESG portfolios in the US equity market.

Methodology

This research employs a quantitative research design which emphasises the objective study of observable social phenomena. Adhering to the positivist research philosophy, this study employs a deductive approach. This is based on comparative types of research where returns of two generated portfolios are compared to analyse the difference. All calculations were performed using Microsoft Excel, and the formulas used were extracted from previous literature (Sandu, 2023).

Population and sample selection

This research aims to compare high- and low-ESG portfolios in the United States equity market. Since there are two equity exchange operators in the United States, the S&P 500 index was selected for this research because it represents equity stocks from both stock exchanges. Therefore, the population is 503 constituents, including the S&P 500 index. The sample would be decided based on the availability of the ESG scores; therefore, a convenience non-probability sampling technique is used to identify the sample. ESG scores for 499 companies were gathered, which is considered the sample for the analysis. The period from 2018 to 2022 (five years) is selected as the time frame (Kiran & Tadoori, 2023; Sandu, 2023).

Data collection method

All the calculations are based on secondary data. The necessary data required for the analysis are listed below, along with the sources used for the data collection.

- ESG scores – The primary data for the analysis is the ESG score, because the portfolio construction is based on this data. ESG scores were collected via the Bloomberg data platform.
- Daily stock returns – Portfolio returns were calculated based on daily stock returns, which was gathered from investing.com. (Anil, 2019)
- Stock returns were measured using the following formula: $RR_{ss,tt} = \frac{\overline{PPPP}^{PPPP}}{(tt-tt-1)}$

- Portfolio returns were calculated using the following formula: $RR_{pp,tt} = \frac{1}{n} \sum_{s=1}^n WW_{ss} RR_{ss,tt}$
- Annualised average stock returns were calculated using the following formula: $RR_{aamnn} = \left(\prod_{s=1}^n (1 + RR_{ss}) \right)^{\frac{1}{n}} - 1$
- Market capitalisation – Market capitalisation was collected for every company in the portfolio for each year. The data was gathered via the Bloomberg platform. (Jacobsen, 2021)
- 3-month Treasury bill rate – U.S three-month Treasury bill rate was considered as the risk-free rate which was collected from Federal Reserve Bank of St. Louis. (Sandu, 2023)
- Market return – Russell 3000 index was taken as a proxy for market return, since it represents 98% of investable stocks in the US equity market. (LSEG, 2024) The daily index return was collected from Nasdaq.com.

Data Analysis

Data analysis was conducted mainly in three stages.

Portfolio Construction: Four portfolios are generated based on ESG scores. Once the data is collected, the data will be ranked each year in descending order based on the ESG scores. The top 10% will be considered as the High ESG portfolio, and the bottom 10% will be considered as the Low ESG portfolio. Daily stock returns were gathered for each company, and the annualised average stock return was used to calculate the portfolio return. The annualised stock return is used to account for differences in the number of days for which returns are available across companies. Portfolio returns will be calculated for each portfolio for each year using two weightage methods: equally weighted and market capitalisation-based value-weighted approach.

Portfolio Performance Measurement: According to prior researchers, the Sharpe ratio, Jensen Alpha, and Treynor ratio are used to measure the performance of each of the four portfolios. These ratios are calculated for each year separately (Sandu, 2023; Zehir & Aybars, 2020). The risk-free rate was calculated using the average of each year's three-month Treasury bill rates. Additionally, the market return was calculated by averaging the daily index returns of the proxy index (Verma & Hirpara, 2016).

Portfolio Performance Comparison: The evaluation of portfolios involves both descriptive and comparative analyses, utilising Stata software. Descriptive statistics are utilised to compute metrics such as average return, risk (standard deviation), skewness and kurtosis for all four portfolios. These statistics will provide insights into the distributional characteristics of returns across the portfolios. Given that the study focuses on comparing two specific portfolios, a nominal comparison was conducted to recognise the difference in portfolio performance measurements and annual returns over the years. After analysing the portfolios nominally, to check whether these differences are significant, a statistical analysis was done using the paired t-test.

Hypothesis development

H1: *The portfolio performance of an equally weighted high ESG portfolio does not significantly outperform the portfolio performance of an equally weighted low ESG portfolio.*

H2: *The portfolio performance of the value-weighted high ESG portfolio does not significantly outperform the portfolio performance of the value-weighted low ESG portfolio.*

Findings and Discussion

Descriptive statistics

When analysing the descriptive statistics of the annual portfolio returns of the equal-weighted high ESG portfolio and the equal-weighted low ESG portfolio, it can be observed that both portfolios have a positive average performance. However, a comparison of mean values reveals that an equally weighted high ESG portfolio generates a higher return than the equally weighted low ESG portfolio. The equal-weighted high ESG portfolio has a higher standard deviation of 0.0060048, compared to the equal-weighted low ESG portfolio's standard deviation of 0.0011972. These results suggest that while the equal-weighted high ESG portfolio offers higher returns, it also entails greater risk due to increased variability in returns.

Similarly, value-weighted portfolios, including both high- and low-ESG portfolios, exhibit positive mean values. However, the value-weighted high ESG portfolio has a higher average return of 0.0012554, compared to the value-weighted low ESG portfolio's mean return of 0.0008738. When analysing the standard deviation and variance, the value-weighted high ESG portfolio exhibits higher variability of returns around the mean, resulting in greater fluctuations and increased risk. Both the value-weight ESG portfolios are negatively skewed, indicating

a long left tail with lower values. Both portfolios consist of a platykurtic kurtosis, which is below the mesokurtic kurtosis of 3.

Analysis of both equal-weighted portfolios' and value-weighted portfolios' annual returns indicated that the high ESG portfolio outperforms the low ESG portfolio's return. Corresponding to the nominal analysis, a paired t-test was conducted to check whether there is a significant difference between high ESG portfolios and low ESG portfolios (Anil, 2019). However, in both equal-weighted and value-weighted portfolios, the p-value is greater than 0.05 the indicating that the mean difference is not statistically significant.

Table 1
Paired T-Test results for annual portfolio returns

	Equal-weighted high and low ESG portfolios	Value-weighted high and low ESG portfolios
Mean difference	0.0029211	0.0003816
P value	0.3858	0.4155

(Source: Author's Compilation)

Discussion of findings

Table 1
Summary of equal-weighted high and low ESG portfolio results

Measure	Mean difference	P value
Sharpe ratio	Positive	Insignificant
Treynor ratio	Negative	Insignificant
Jensen alpha	Positive	Insignificant

(Source: Author's compilation)

Overall, the equal-weighted high ESG portfolio has outperformed the equal-weighted low ESG portfolio. However, this is not statistically significant. Therefore, the findings will be consistent with the null hypothesis that an equal-weighted high ESG portfolio does not significantly outperform an equal-weighted low ESG portfolio.

Table 2
Summary of value weighted high and low ESG portfolio result

Measure	Mean difference	P value
Sharpe ratio	Positive	Insignificant
Treynor ratio	Positive	Insignificant
Jensen alpha	Positive	Insignificant

(Source: Author's compilation)

Overall, the value-weighted high ESG portfolio has outperformed the value-weighted low ESG portfolio. However, this is not statistically significant. Therefore, the findings will be concluded similar to the null hypothesis value weighted high ESG portfolio does not significantly outperform value weighted low ESG portfolio.

This conclusion is consistent with a previous empirical study comparing the monthly average returns of ESG stock portfolios with those of blue-chip stock portfolios and market portfolios in the Indian stock market. The study found that the ESG stock portfolio generated positive mean differences, although the difference was not statistically significant (Anil, 2019). Additionally, another study that analysed SRI portfolios generated through negative, positive, and best-in-class screening approaches compared the portfolio performances under both equalweighted and value-weighted approaches and found no significant difference in the conclusions drawn under either approach (Kempf & Osthoff, 2007). Contrary to these results, some research has concluded that low ESG portfolios outperform high ESG portfolios (Kazakakou Powaski et al., 2022; Sandu, 2023). A similar type of research was not able to be found for the US equity market. Therefore, the findings of the current study are consistent with those of Anil (2019) and Huq, Jutila, and Sameland (2022).

Conclusion

This study examined whether high ESG portfolios significantly outperform low ESG portfolios, selecting constituents of the S&P 500 index, categorised under both equal-weight and value-weight approaches. The findings revealed that, in terms of annual portfolio mean returns, both equal-weighted and value-weighted high ESG portfolios outperformed the respective low ESG portfolios. However, this high return comes with greater risk. In terms of variance and standard deviation, both equal-weighted and value-weighted high ESG portfolios have higher values, indicating high volatility in the portfolio returns.

In terms of risk-adjusted performance, equal-weighted portfolio Sharpe and Jensen alpha ratios were in line with the results of the annual portfolio returns, where the equal-weighted high ESG portfolio outperformed equal equalweighted low ESG portfolio. However, the Treynor ratio provided a contradictory result, where the equalweighted low ESG portfolio outperformed the equal-weighted high ESG portfolio. The conclusion was taken based on the overall result, where an equal-weighted high ESG portfolio outperforms equal equal-weighted low ESG portfolio. Similar results were observed in the value-weight portfolio as well, where, in all three risk-adjusted measurements, the high ESG portfolio outperformed the low ESG portfolio.

To check whether these differences are significant or not a paired t-test was conducted for both equal-weight and value-weighted portfolios. Both in terms of annual returns and risk-adjusted measurements, the p-value was insignificant. This means that even though the high ESG portfolio outperforms the low ESG portfolio, the difference is marginal. This illustrates the complexity of evaluating ESG portfolio performance amid diverse and volatile market conditions. Additionally, it demonstrates that ESG investment decisions are more inclined towards ethical and long-term strategic considerations rather than short-term financial gains. Ultimately, this research contributes to the academic literature by comparing high-ESG and low-ESG portfolios generated using constituents from the S&P 500 index. Further, this study contributes to the final findings that a high ESG portfolio outperforms a low ESG portfolio, but with an insignificant difference.

Implications and recommendations

The result of this study shows that high ESG portfolios marginally outperform low ESG portfolios. This suggests that investing in ESG stocks may not significantly outperform the others, but it also does not underperform. Therefore, this is a win-win situation for investors, who can earn a marginally higher return while also integrating sustainability and ethical considerations into their investment decisions. Additionally, for policymakers, this research encourages them to develop standardised ESG frameworks and metrics to assess and improve the transparency of ESG strategies. For researchers with a global momentum in sustainability, this research would serve as a guide to further explore the impact of ESG-integrated strategies on financial markets.

Limitations

It is worth noting that the overall research design and approach employed in this study limit the extent to which the findings can be applied. Firstly, the period analysed was limited to 5 years. Additionally, this context is limited to the United States market. Further, the analysis is based on the ESG scores provided by a single data provider. This is an important limitation because previous empirical studies have mentioned that researchers' results vary depending on the data provider they have selected (Jacobsen, 2021)

Suggestions for future research

Future research can be based on multiple stock markets and longer time horizons. Also, future research can be based on analysing data provided by two or more ESG data providers. This can add knowledge to the context of the reliability of ESG scores provided by the data providers. This research is limited to statistical measurements, whereas future researchers can conduct additional statistical testing to gain deeper insights into this matter. Additionally, this research is based on the entire U.S. equity market. Future research could be conducted by analysing the high- and low-ESG portfolios within a specific sector.

References

- Anil, R. (2019). *Impact of ESG performance on stock returns: Evidence from Indian equity market* (Master's thesis, University of Mumbai).
- Bucher-Koenen, T., Lusardi, A., Alessie, R., & van Rooij, M. (2017). How financially literate are women? An overview and new insights. *Journal of Consumer Affairs*, 51(2), 255–283.
- Business and Society Review. (Moskowitz, 1972). (*Keep author as Moskowitz; see corrected version below—listed under M*).

- Egorova, A. A., Kondova, N. A., & Yusupov, R. M. (2022). Role of ESG ratings in shaping investment attractiveness: Insights from BRICS countries. *Journal of Corporate Finance Research*, 19(1), 5–15. <https://doi.org/10.17323/j.jcfr.20730438.19.1.2022.5-15>
- Friedman, M. (1970, September 13). The social responsibility of business is to increase its profits. *The New York Times Magazine*, 32–33, 122–124.
- Fulton, M., Kahn, B., & Sharples, C. (2012). *Sustainable investing: Establishing long-term value and performance*. Deutsche Bank Group.
- Goyal, M. M., & Aggarwal, K. (2014). ESG index is good for socially responsible investor in India. *Asian Journal of Multidisciplinary Studies*, 2(11), 92–96.
- Huq, S., Jutila, T. E., & Sameland, O. (2022). *Exploring the relationship between ESG and portfolio performance during times of crisis: A study of the Russia–Ukraine war* (Bachelor's thesis, Stockholm University).
- Jacobsen, K. D. (2021). *The impact of ESG scores on portfolio return and risk: An empirical study* (Master's thesis, Copenhagen Business School).
- Kazakakou Powaski, M. C., Daza Ordoñez, C., & Jáuregui Sánchez, L. (2021). ESG impact on financial corporate performance and portfolio returns: Evidence of Australia and Japan. *VinculaTégica EFAN*, 7(1), 53–78. <https://doi.org/10.29105/vtga7.2-5>
- Kempf, A., & Osthoff, P. (2007). The effect of socially responsible investing on portfolio performance. *European Financial Management*, 13(5), 908–922. <https://doi.org/10.1111/j.1468-036X.2007.00402.x>
- Kiran, U., & Tadoori, G. (2023). ESG portfolio vs traditional portfolio analysis: A study of MSCI ESG indices. *Research Bulletin*, 48(3–4).
- Lins, K. V., Servaes, H., & Tamayo, A. (2017). Social capital, trust, and firm performance: The value of corporate social responsibility during the financial crisis. *The Journal of Finance*, 72(4), 1785–1824. <https://doi.org/10.1111/jofi.12505>
- LSEG. (2024). *Financial markets infrastructure and data*. <https://www.lseg.com/en>
- Moskowitz, M. (1972). Choosing socially responsible investments. *Business and Society Review*, 1(1), 71–75.
- Morgan Stanley. (2024). *Sustainable signals: Understanding individual investors' interests and priorities*.
- Nofsinger, J., & Varma, A. (2014). Socially responsible funds and market crises. *Journal of Banking & Finance*, 48, 180–193. <https://doi.org/10.1016/j.jbankfin.2013.12.016>
- Sandu, D.-M. (2023). Is there any effect of ESG scores on portfolio performance in South Africa? *Proceedings of the International Conference on Business Excellence*, 17(1), 1807–1817. <https://doi.org/10.2478/picbe-20230160>
- Sherwood, M. W., & Pollard, J. L. (2017). The risk-adjusted return potential of integrating ESG strategies into emerging market equities. *Journal of Sustainable Finance & Investment*, 8(1), 26–44. <https://doi.org/10.1080/20430795.2017.1331118>
- Statista. (2018). *Largest stock exchange operators by market cap 2018*. <https://www.statista.com/statistics/270126/largest-stock-exchange-operators-by-market-capitalization-of-listed-companies>
- United Nations. (2024). *Sustainability*. <https://www.un.org/en/academic-impact/sustainability>
- Uthayakumar, R. (2021). Impact of financial performance on the sustainability performance of the listed companies in Sri Lanka. *International Journal of Economics and Business Administration*, 11, 502–523.
- Uthuslien, L. N., & Andréasson, S. M. K. (2023). *Exploring the impact of ESG scores on stock risk and returns: A comparative study on the Nordic countries' stock markets* (Master's thesis). Oslo Metropolitan University. <https://hdl.handle.net/11250/3106856>
- Verma, M., & Hirpara, J. R. (2016). Performance evaluation of portfolio using the Sharpe, Jensen, and Treynor methods. *Scholars Journal of Economics, Business and Management*, 3(7), 382–390. <https://doi.org/10.21276/sjebm.2016.3.7.4>
- Zehir, E., & Aybars, A. (2020). Is there any effect of ESG scores on portfolio performance? Evidence from Europe and Turkey. *Journal of Capital Markets Studies*, 4(2), 1–18. <https://doi.org/10.1108/jcms-09-2020-0034>