

The Impact of ESG Screening on Risk-Adjusted Returns: Evidence from U.S. Equity ETFs

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Abstract

This study investigates the impact of ESG ratings on the risk-adjusted performance of U.S. exchange-traded funds (ETFs). Specifically, it compares the iShares ESG Aware MSCI USA ETF (ESGU) and the iShares Core S&P 500 ETF (IVV) to examine whether an ESG-focused investment strategy can achieve superior financial outcomes relative to traditional market investing. Using daily data from 2017 to 2024, the study employs descriptive statistical analysis, comparative performance metrics, correlation analysis, and paired sample t-tests to evaluate differences in performance, volatility, and risk-adjusted returns between the two ETFs. Empirical results indicate that ESGU exhibits a slightly higher average return than IVV; however, this difference is economically small and statistically insignificant. From a risk perspective, ESGU shows marginally higher volatility, suggesting that ESG screening does not necessarily reduce overall market risk exposure. ESGU's Sharpe ratio is slightly higher, indicating a modest improvement in return per unit of risk, although this advantage is also not statistically significant. Overall, the findings suggest that ESG screening does not meaningfully enhance or reduce investment performance in the U.S. equity ETF market. This study contributes to the literature by providing updated empirical evidence on ESG screening effectiveness in passive investment strategies and assessing whether ESG-focused ETFs can deliver competitive risk-adjusted returns compared to traditional benchmarks. The results offer practical implications for investors seeking to balance financial performance with sustainability objectives.

Keywords

environmental, social, and corporate governance screening (ESG), risk-adjusted returns, exchange-traded funds, sustainable investing

1. Introduction

In recent years, as the concept of sustainable development has deepened, Environmental, Social, and Corporate Governance (ESG) investing has emerged as a major trend in global capital markets. Increasing numbers of investors now consider firms' environmental practices, social responsibility, and governance structures in their decision-making processes. In this context, ESG investing is not only viewed as a mechanism for promoting corporate responsibility, but also as a potential tool for enhancing risk management and long-term value creation. However, the academic literature has not reached a consensus on whether ESG investing

leads to superior financial performance. Some studies suggest that ESG investing can improve risk-adjusted returns by reducing corporate risk exposure, improving governance quality, and enhancing long-term stability. In contrast, other studies argue that ESG screening may constrain investment universes and reduce diversification, thereby limiting returns or altering risk profiles. Consequently, whether ESG investing improves performance or primarily reflects value preferences remains an open question. Although prior research has examined ESG and financial performance, several gaps remain. First, findings are inconsistent, particularly regarding passive investment vehicles such as ETFs. Second, most studies focus on broad equity markets or actively managed funds, while fewer examine ESG ETFs relative to traditional benchmark ETFs in the U.S. market. Third, rapid ESG market development requires updated empirical evidence. Accordingly, this study selects the iShares ESG Aware MSCI USA ETF (ESGU) and the iShares Core S&P 500 ETF (IVV) as research objects, using daily data from 2017 to 2024 for comparative analysis [1]. By calculating mean returns, volatility, and Sharpe ratios, and applying correlation and t-tests, this study evaluates whether ESG investing significantly outperforms traditional index investing in risk-return terms. The main contributions of this paper are twofold: first, it provides a systematic empirical comparison of ESG and traditional investment performance using real market data; second, it offers updated evidence on ESG effectiveness in passive investment contexts. These findings assist investors in making more informed allocation decisions.

2. Literature Review

As ESG investing becomes more prominent, whether it improves financial performance has become a central research question. Existing studies generally evaluate ESG effects across returns, risk, and risk-adjusted performance, yet findings remain mixed. First, regarding returns, several studies report a positive relationship between ESG and financial performance. Friede, Busch, and Bassen find that most empirical evidence supports a positive ESG–performance association [1]. Similarly, Khan, Serafeim, and Yoon show that firms with strong material ESG performance tend to achieve higher future returns [2]. These results suggest ESG may enhance returns through improved governance and reduced long-term risk exposure. However, other studies report insignificant or negative effects in certain contexts [3], potentially due to reduced diversification caused by screening constraints. Second, regarding risk, many studies find ESG reduces risk exposure. Giese et al. show that high-ESG firms generally exhibit lower systematic and tail risk [4]. Lins, Servaes, and Tamayo further find that firms with strong stakeholder relations demonstrate higher resilience during crises [5]. These findings suggest ESG can improve stability under market stress. However, some studies argue ESG screening may increase risk by narrowing investment universes. Exclusion of sectors such as energy or tobacco may reduce diversification and increase volatility [6]. Third, regarding risk-adjusted performance, evidence remains inconclusive. Derwall et al. report that environmentally efficient firms achieve higher Sharpe ratios [7]. In contrast, Statman and Renneboog et al. find no persistent outperformance of ESG funds relative to traditional benchmarks [8,9]. Finally, performance may depend on market conditions. Nofsinger and Varma find that ESG funds tend to outperform during downturns but may underperform in bullish markets [10]. This suggests ESG functions more as a defensive strategy than a consistent source of excess returns. Overall, the literature remains divided, and limited recent evidence compares ESG ETFs with benchmark ETFs in the U.S. market, motivating this study.

3. Theoretical Analysis

From a theoretical perspective, ESG investing is often considered to improve portfolio risk-return efficiency. Based on risk management theory, ESG screening may reduce legal, reputational, and regulatory risks by excluding firms with poor ESG performance, thereby lowering exposure to extreme adverse events [4]. In addition, strong governance mechanisms can reduce agency conflicts and improve operational efficiency, contributing to lower systemic risk [5]. From a long-term investment perspective, firms with strong ESG performance tend to exhibit higher resource efficiency and sustainable growth potential, which may support stable cash flows and long-term returns [2]. Meta-analytical evidence further suggests a generally positive ESG–financial performance relationship [1]. Based on this theoretical foundation, the study proposes the following hypotheses:

H1: The average return of ESGU differs significantly from IVV.

H2: ESGU exhibits lower return volatility than IVV.

H3: ESGU has a higher Sharpe ratio than IVV.

However, ESG indices are typically constructed based on benchmark indices with substantial overlap [9], meaning theoretical advantages may not be strongly reflected in empirical results.

4. Methodology

This study mainly compares the differences in risk and return performance between ESG investment and traditional index investment. To achieve this objective, two representative exchange-traded funds (ETFs) were selected: the iShares ESG Aware MSCI USA ETF (ESGU) and the iShares Core S&P 500 ETF (IVV). ESGU represents an ESG-screened investment strategy, while IVV serves as a traditional market benchmark reflecting the overall performance of the U.S. stock market. ESGU was selected because it is one of the largest and most representative ESG ETFs in the U.S. market, while IVV is a widely used benchmark ETF tracking the S&P 500 Index. Since both ETFs mainly invest in large-cap U.S. equities, they have strong comparability in terms of market coverage and investment style. The data were obtained from publicly available financial databases and consist of daily closing prices from January 2017 to December 2024. Considering the existence of missing values and inconsistent trading dates, missing observations were deleted and the two datasets were matched based on common trading dates. Eventually, 1885 valid observations were retained for analysis. In terms of data processing, the daily return of each ETF is calculated using the logarithmic return formula:

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (1)$$

In terms of variable construction, the analysis focuses primarily on two key dimensions: return and risk. In terms of income, the average rate of return is used as the main measurement indicator and combined with the median to improve the robustness of the results; in terms of risk, the standard deviation of the rate of return is used to characterize the degree of volatility. In addition, in order to comprehensively evaluate the relationship between risk and return, the Sharpe Ratio is also calculated to measure the level of excess return corresponding to unit risk. The Sharpe Ratio is calculated as follows:

$$\text{Sharpe Ratio} = \frac{R_p - R_f}{\sigma_p} \quad (2)$$

In terms of specific methods, this article combines the descriptive statistical analysis, correlation analysis and hypothesis testing to conduct research. First, the return distribution characteristics of the two ETFs were compared through descriptive statistics, including mean, standard deviation and extreme values. Secondly, the Pearson correlation coefficient was used to examine the linear relationship between the two groups of returns. since Pearson correlation is suitable for measuring the degree of linear association between two continuous return series. Regression analysis was not adopted because the main purpose of this study is comparative performance evaluation rather than causal relationship identification or prediction. Finally, the paired sample t-test was used to analyze whether there was a significant difference in the average returns between the two, so as to determine the performance difference between ESG investment and traditional investment. The paired sample t-test was selected because the return observations of ESGU and IVV were matched based on the same trading dates, making the two samples naturally paired. The test mainly examines whether the mean difference between the paired returns is statistically significant. Through the comprehensive application of these methods, we strive to comprehensively evaluate the actual effect of ESG investment strategies.

5. Results

5.1 Descriptive Statistics

As shown in Table 1, ESGU and IVV exhibit highly similar return distributions. ESGU has a slightly higher mean return (0.000625 vs. 0.000595), but also marginally higher volatility (0.012238 vs. 0.011723). Extreme values are comparable, indicating similar tail risk exposure.

Table 1: Descriptive Statistics (ESGU vs IVV).

Variable	count	mean	std	min	25%	50%	75%	max	median
ESGU return	1885	0.000625	0.012238	-0.120019	-0.004207	0.000855	0.006508	0.096910	0.000855
IVV return	1885	0.000566	0.012057	-0.115808	-0.004014	0.000759	0.006309	0.094493	0.000759

5.2 Comparative Analysis

As reported in Table 2, ESGU slightly outperforms IVV in both mean return and Sharpe ratio. However, the differences remain economically small. Volatility is also slightly higher for ESGU, suggesting no clear risk reduction effect.

Table 2: Comparative Performance Metrics.

Metric	ESGU	IVV
Mean Return	0.000625	0.000595
Volatility	0.012238	0.011723
Sharpe Ratio	0.051071	0.050777

5.3 T-test Results

The paired sample t-test results are presented in Table 3. The mean difference is 0.000059 with a p-value of 0.2447, indicating no statistically significant difference between ESGU and IVV returns.

Table 3: Paired Samples T-Test Results.

Mean Difference	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	t	df	p-value
0.000059	0.002205	0.000051	-0.00004	0.000159	1.163629	1884	0.244722

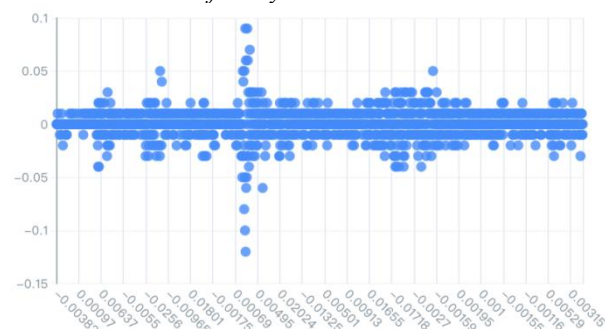
5.4 Correlation Analysis

As shown in Table 4 and illustrated in Figure 1, the Pearson correlation coefficient between ESGU and IVV is 0.9836, indicating extremely strong co-movement. This suggests substantial overlap in portfolio composition and similar market exposure.

Table 4: Correlation Analysis (ESGU vs IVV).

Variable 1	Variable 2	Pearson Correlation	N
ESGU Return	IVV Return	0.983641	1885

Figure 1: Correlation of Daily Returns between ESGU and IVV.



6. Discussions

It can be seen from the comparison results that the overall performance of ESGU and IVV across the three core indicators, average return, volatility, and Sharpe ratio, is highly similar, although minor differences still exist, which may carry limited economic implications. Overall, the results suggest that ESG screening does not significantly enhance short-term investment performance, but may offer marginal benefits in optimizing the risk–return structure. First, in terms of mean return, ESGU (0.000625) is slightly higher than IVV

(0.000595). This indicates that during the sample period, ESG screening did not reduce returns, and instead generated marginally higher returns. From a theoretical perspective, ESG investing may enhance return stability by excluding firms with weak governance structures or higher environmental risk exposure, thereby reducing long-term downside effects. However, the return difference is very small and not statistically significant in the t-test, implying that this advantage is not stable in the short run and is more likely to reflect a long-term tendency rather than a persistent source of excess returns. This result is broadly consistent with studies supporting a positive ESG–financial performance relationship, such as Friede, Busch, and Bassen, although the observed economic effect remains limited [1]. Therefore, H1 is not supported. Second, in terms of volatility, ESGU (0.012238) is slightly higher than IVV (0.011723). This finding partially contradicts the common expectation that ESG portfolios exhibit lower risk. Theoretically, ESG investing should reduce risk by improving corporate quality; however, in practice, ESG indices are constructed from benchmark indices and thus have limited structural deviation, meaning systemic risk is not substantially reduced. In addition, ESG screening may induce sector concentration effects (e.g., higher exposure to the technology sector), which may increase volatility in certain market environments. This may explain the slightly higher volatility of ESGU. The result aligns with studies suggesting that ESG screening may weaken diversification benefits and increase portfolio risk under certain conditions, such as Hong and Kacperczyk [6]. Therefore, H2 is not supported. Finally, in terms of the Sharpe ratio, ESGU (0.051071) is slightly higher than IVV (0.050777). As the Sharpe ratio measures excess return per unit of risk, this implies that despite slightly higher volatility, ESGU's return compensation is proportionally marginally greater, resulting in a slightly improved risk-adjusted performance. This finding is consistent with studies suggesting that ESG investing may not necessarily increase absolute returns but can improve the risk–return trade-off. However, the difference is extremely small and not statistically significant, indicating that the advantage has limited practical relevance. Therefore, H3 receives only limited support.

7. Conclusion

This article systematically compares the risk and return performance of ESG ETFs (ESGU) and traditional market index ETFs (IVV) using daily data from 2017 to 2024. The primary objective is to examine whether ESG screening generates additional financial value relative to traditional index investing, particularly in terms of risk-adjusted returns. To address this question, the study employs descriptive statistics, comparative analysis, correlation analysis, and paired sample t-tests to empirically evaluate ESG investment performance. Although the results indicate that ESG investing does not significantly reduce returns, there is insufficient evidence that it meaningfully improves risk-adjusted performance. In other words, the value of ESG investing is more reflected in enabling investors to jointly consider sustainability objectives and financial outcomes at the portfolio level, rather than consistently generating higher returns than traditional investments. Specifically, from a return perspective, ESGU's average return is slightly higher than IVV's, but the difference is very small. From a risk perspective, ESGU exhibits slightly higher volatility, which does not clearly support the notion of lower risk. From a risk-adjusted perspective, ESGU's Sharpe ratio is marginally higher, but the improvement remains limited. Further evidence from the paired sample t-test shows that the return difference between the two ETFs is not statistically significant. In addition, correlation analysis indicates a very high degree of co-movement between ESGU and IVV, suggesting that their return patterns are highly similar over time. From a statistical perspective, ESG ETFs do not differ substantially from traditional index ETFs. From an economic perspective, the observed differences are insufficient to demonstrate a clear advantage of ESG investing. Therefore, this study does not find strong evidence that ESG investing outperforms traditional investing in terms of risk and return. Instead, ESG and traditional index strategies exhibit broadly similar performance. This implies that, under current market conditions, ESG strategies primarily serve as a parallel or complementary approach to traditional investing rather than a persistent source of excess returns. However, ESG investing also does not impose a significant performance penalty. As a result, for investors balancing financial objectives with sustainability and social responsibility considerations, ESG investing represents a relatively neutral and balanced allocation choice. Future research may extend the sample period, incorporate different market regimes, or include more granular ESG indicators to further assess the long-term effectiveness of ESG investing.

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Conflicts of Interest

The authors declare no conflict of interest.

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