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Revisiting ESG performance: do high scores translate to higher returns? A risk-adjusted analysis of S&P 500 portfolios☆

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ABSTRACT

The rise of ESG investing is often underpinned by the belief that sustainability enhances long-term financial performance. Research suggests ESG scores correlate with superior stock market returns, but the evidence remains mixed. We contribute to the debate by directly comparing the performance of top- and bottom-ranked ESG portfolios within the S&P 500 over the period 2005–2024. Using raw returns, we find that low ESG-rated portfolios consistently outperform their higher-rated counterparts in absolute terms. However, when accounting for risk, using risk-adjusted metrics — specifically the modified Sharpe ratio — no statistically significant differences emerge. These findings challenge prevailing assumptions about ESG investing and highlight the need for a more nuanced understanding of the trade-offs between sustainability and profitability in portfolio construction.

1. Introduction

Environmental, Social, and Governance (ESG) concerns have become central to corporate strategy and investment decision-making, driven by the belief that sustainability enhances long-term financial performance (Wijeweera et al., 2026). Firms increasingly adopt ESG practices to meet regulatory standards, improve reputational capital, and attract investor interest (Boudt et al., 2013; Khan, 2022; Khemir, 2019). ESG scores are widely used by stakeholders as indicators of a firm's resilience and value-creation potential (Capelli et al., 2023). There is an increasing reliance on ESG scores by investors and policymakers, and a need to assess their predictive power for financial returns. Though numerous studies have linked higher ESG ratings to superior market performance (Fang and Parida, 2022; Horky et al., 2024), the empirical evidence remains inconclusive. While some research suggests that markets reward ESG certification (Wong et al., 2021) and ESG performance (Goto & Sueyoshi, 2020; Clare et al., 2025), other studies (e.g., Papathanasiou and Koutsokostas, 2024a) argue the opposite. Other research highlights the complexity of this relationship. For instance, Ardia et al. (2022) and Pástor et al. (2022) show that ESG outperformance may depend on climate-related sentiment, while Pedersen et al. (2021),

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Zhang et al. (2021), and Edmans (2023) argue that ESG investing may not yield consistent excess returns in efficient markets. Similarly, Vu et al. (2025) report a weak and inconsistent link between ESG ratings and expected returns across developed economies. Furthermore, Kathan et al. (2025) argue that companies with high ESG scores are more likely to be accused of greenwashing.

In such an inconclusive context, examining a long-term horizon and incorporating an analysis of the ESG pillars may yield valuable insights. We make a novel and timely contribution by directly comparing the financial performance of top- and bottom-ranked ESG portfolios (aggregated and by individual pillars) within the S&P 500 over a 20-year period (2005–2024). Unlike prior work, we examine both raw and risk-adjusted returns using the modified Sharpe ratio (MSR), which accounts for returns' skewness and kurtosis. We also estimate a Fama-French five-factor regression and perform robustness checks using small-cap companies from the Russell 2000 index. This enables us to assess whether ESG ratings accurately predict superior investment outcomes.

Our findings challenge conventional wisdom: portfolios composed of low ESG-rated portfolios consistently outperform high-rated ones in terms of raw returns, with no statistical difference in risk-adjusted performance regardless of company size. This has implications for investors, policymakers, and researchers, suggesting that ESG ratings may not reliably signal financial advantage and that market pricing of ESG-related risks and benefits remains incomplete. Focusing on the largest and most scrutinized equity market, our study provides granular insights into the ESG investing's evolving dynamics and a clearer understanding of its financial trade-offs.

2. Methodology

2.1. Method

We investigate the relationship between ESG scores and financial performance by constructing eight portfolios based on ESG ratings. For each of the three ESG pillars — Environmental, Social, and Governance — we form two portfolios: one comprising the top 25 firms and another comprising the bottom 25 firms. Two more are based on the aggregated ESG score.

Each portfolio is rebalanced annually using the most recent ESG scores available at the end of the previous year. This approach allows us to capture the dynamic nature of ESG performance and its evolving impact on stock returns. By comparing the top- and bottom-ranked portfolios across each ESG dimension, we aim to isolate the financial implications of ESG.

2.2. Data and variables

Our sample includes all constituents of the S&P 500 index from January 2, 2005, to December 31, 2024. ESG scores are sourced from LSEG/Eikon, one of the few providers with comprehensive historical ESG data available for this entire timeframe. LSEG employs a robust and transparent methodology ensuring objectivity and reproducibility while reducing concerns over subjective assessment. Their scores are calculated based on publicly disclosed information (https://www.lseg.com/en/data-analytics/sustainable-finance/esg-scores). ESG has an average score of 53.60, and the individual pillars exhibit averages of 52.66 (E), 56.01 (S), and 53.07 (G).

Daily adjusted closing prices, which account for dividends and corporate actions, are obtained from Datastream and calculated using the natural logarithm of price relatives:

Table 1
Performance summary of top- and bottom-ranked ESG portfolios for S&P500 constituents. AR and TR denote the annual return and total return, respectively, over the 2005–2024 period. The portfolios are formed based on the ESG pillars and the aggregated score.

Year	Top-ESG	Bottom-ESG	Top-Env.	Bottom-Env.	Top-Social	Bottom-Social	Top-Gov.	Bottom-Gov.	S&P500
2005	9.0%	5.6%	4.1%	4.5%	16.3%	11.8%	14.0%	-3.5%	3.8%
2006	14.6%	16.8%	11.0%	13.5%	16.0%	11.9%	15.6%	19.8%	11.1%
2007	12.5%	11.0%	8.6%	5.4%	4.3%	4.7%	12.1%	5.3%	3.6%
2008	-60.6%	-52.2%	-81.0%	-59.2%	-57.6%	-49.5%	-45.6%	-51.9%	-47.1%
2009	40.6%	34.3%	30.5%	43.5%	38.5%	33.6%	23.3%	39.7%	18.0%
2010	8.0%	27.0%	12.4%	21.7%	11.4%	25.3%	8.2%	29.1%	10.4%
2011	-0.6%	3.4%	-12.3%	43.8%	-1.5%	11.0%	-0.3%	2.8%	-1.1%
2012	7.5%	22.5%	13.1%	25.1%	9.9%	15.0%	8.7%	28.0%	11.0%
2013	20.2%	35.3%	27.6%	31.5%	23.6%	42.0%	20.8%	36.9%	23.4%
2014	10.9%	14.3%	10.7%	7.3%	14.5%	15.4%	14.4%	18.9%	11.7%
2015	-4.4%	18.3%	-10.3%	12.3%	-2.0%	8.7%	-5.5%	17.0%	-0.7%
2016	10.6%	10.8%	17.0%	3.8%	12.3%	15.8%	22.2%	2.7%	10.6%
2017	20.3%	30.4%	14.9%	28.2%	9.8%	37.1%	14.6%	24.8%	16.9%
2018	-15.6%	0.9%	-14.4%	11.5%	-6.0%	-10.1%	-9.5%	4.2%	-7.3%
2019	24.3%	48.3%	21.2%	25.2%	18.2%	33.7%	22.6%	44.9%	25.2%
2020	3.0%	28.5%	-1.7%	41.6%	6.0%	22.9%	6.5%	27.6%	14.2%
2021	22.7%	22.3%	25.6%	14.9%	16.7%	23.0%	25.4%	26.1%	25.3%
2022	-9.9%	-23.1%	-15.0%	-23.5%	-5.7%	-13.8%	-5.3%	-30.4%	-22.3%
2023	5.1%	35.2%	0.3%	41.0%	-4.9%	31.7%	6.5%	32.0%	22.1%
2024	-1.2%	11.8%	-0.6%	13.2%	-7.3%	18.9%	9.7%	7.1%	21.5%
AR	3.2%	12.3%	-2.2%	11.8%	3.4%	12.1%	6.4%	11.0%	5.8%
TR	88.8%	923.1%	-35.9%	838.4%	94.9%	881.1%	248.4%	713.1%	306.6%

Note: Returns are annualized and based on rebalanced portfolios.

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

The annual log return is then computed as the sum of daily log returns over the year:

$$r_n = \sum_{t=1}^{N_n} r_t \tag{2}$$

where N_n represents the number of trading days in year n.

This methodology ensures consistent return measurement and robust portfolio comparisons, as well as evaluating the efficiency of ESG-based strategies using risk-adjusted performance metrics like the modified Sharpe ratio.

3. Analysis

3.1. Top vs. bottom portfolios performance

Portfolios of bottom 25% ESG-rated firms outperform top 25% ESG-rated firms in returns. Over 2005–2024, the bottom ESG portfolio achieved 923.1% cumulative return, compared to 306.6% for the S&P 500 and 88.8% for the top ESG portfolio, as presented in Table 1.

Disaggregating by ESG pillar, the top Environmental portfolio notably underperformed, with a negative total return of –35.9%, while the top Governance portfolio was the only high-rated group to outperform the benchmark. These findings suggest that ESG ratings — particularly in the Environmental and Social dimensions — may not be reliable indicators of superior financial performance. The consistent outperformance of all bottom-rated portfolios challenges the assumption that ESG leadership is rewarded by the market.

These findings call for additional analysis, which we conduct in the next sections.

3.2. Fama–French estimation

To isolate the relationship between ESG scores and stock returns, we ran the following Fama–French five-factor regression:

$$r_{i,n} - r_{f,n} = \alpha_i + \gamma \cdot ESG_{i,n-1} + \delta \cdot (Log\ Market\ Cap)_{i,n} + \sum_{j=1}^{5} \beta_j \cdot F_{j,n} + \lambda_i + \epsilon_{i,n} \tag{3}$$

where $r_{i,n}$ represents the return of firm i in year n, $r_{f,n}$ is the risk-free rate, $ESG_{i,n-1}$ denotes the lagged ESG score, (log Market Cap) is the firm's market capitalization, and $F_{j,n}$ stands for the five Fama–French factors - market risk premium (MRP), size (SMB), value (HML), profitability (RMW), and investment (CMA). These were retrieved from the Kenneth French Data Library, as was the risk-free rate. While α_i, δ, γ, and β_j are parameters, $\varepsilon_{i,n}$ is the error term. We enter sector fixed effects (λ_i) to isolate the pure ESG effect, separating it from the underlying structural advantages of firms operating within a profitable sector. Sectors are organized according to the Global Industry Classification Standard (GICS) developed by MSCI.

Table 2
Determinants of excess return: the role of ESG, size (log market cap), and Fama–French risk factors for S&P500.

	Pooled OLS		Fixed effects (FE)	
Variables	Coefficient		Coefficient	
LaggedESG	-0.0030	***	-0.0043	***
	(0.0002)		(0.0002)	
LogMarketCap	0.0378	***	0.0967	***
	(0.0028)		(0.0052)	
MRP	1.0098	***	0.09445	***
	(0.0204)		(0.0214)	
SMB	-0.2630	***	-0.0661	
	(0.0053)		(0.0567)	
HML	0.0468		0.0440	
	(0.0374)		(0.0375)	
RMW	-0.1974	***	-0.2219	***
	(0.0418)		(0.0419)	
CMA	0.3868	***	0.3339	***
	(0.0595)		(0.0602)	
Constant	-0.8247	***		
	(0.0657)			
Sector fixed effects	Yes		Yes	
Number of observations	8,372		8,372	
Adjusted R-squared	0.3176		0.3319	

Notes: Standard errors double-clustered by firm and year in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

ESG scores are lagged by one year to mitigate potential endogeneity between contemporaneous stock returns and ESG ratings.

The results in Table 2 confirm a statistically significant negative association between ESG ratings and excess returns. The strengthened ESG coefficient in the FE model increases confidence in this finding. There is no multicollinearity, as all variance inflation factors are below 5 and the ESG factor is largely orthogonal to the other factors in your model (VIF: 1.5). Specifically, we find that a 10-point increase in ESG score is associated with a 3% decrease in annual excess return.

To test the robustness of our results concerning the portfolio construction threshold, we reran the model using different percentile cutoffs (10%, 22.5%, 35%, 50%, 77.5% and 90%), a methodology in line with that of Papathanasiou and Koutsokostas (2024b). The coefficient for our variable of interest, Lagged ESG, remained statistically significant at the 1% level across all specifications. The estimated coefficients ranged from -0.0025 to -0.0023 for lower-tier portfolios, and from -0.0030 to -0.0026 for upper-tier portfolios. This robustness check strongly confirms our previous conclusions.

Furthermore, to address concerns that our results could be biased by firms entering (joiners) or exiting (leavers) the sample during the 20 years, we conducted a robustness check using a balanced panel that included only firms with continuous listings throughout the entire sample period (2005–2024) (see Table A.1). Again, our previous results are confirmed.

The inverse relationship between ESG and excess return holds across models and is robust to standard risk factors. Higher ESG scores may be associated with characteristics the market does not reward, once risk factors are accounted for.

3.3. Downside risk and performance efficiency

Despite accounting for exposure to systematic risk factors, the Fama-French five-factor model provides limited insight into the risk-return trade-off. Therefore, we supplement this analysis with the modified Sharpe ratio (MSR), which is an additional risk-adjusted performance measure that captures overall risk efficiency. This provides a complementary perspective on whether the superior returns of low ESG-rated portfolios are justified on a risk-adjusted basis. MSR adjusts for skewness and kurtosis using the Cornish–-Fisher expansion, improving the traditional Sharpe ratio by accounting for returns' non-normality and providing a more robust measure of performance in fat-tailed or asymmetric distributions (Ardia and Boudt, 2015).

We compute the MSR for each asset annually using the methodology of Gregoriou and Gueyie (2003), Eling (2008), and Ardia and Boudt (2015):

$$MSR_i = \frac{r_{i,n} - r_{f,n}}{-\left\{ r_{i,n} + \sigma_{i,n}\left[z_\alpha + \left(z_\alpha^2 - 1\right)\frac{S_{i,n}}{6} + \left(z_\alpha^3 - 3z_\alpha\right)\frac{E_{i,n}}{24} - \left(2z_\alpha^3 - 5z_\alpha\right)\frac{S_{i,n}^2}{36} \right] \right\}} \tag{4}$$

where $r_{i,n}$ is the asset's annual return, $r_{f,n}$ is the risk-free rate, $\sigma_{i,n}$ is the respective annual standard deviation computed from each year's daily return, $S_{i,n}$ is skewness, $E_{i,n}$ is excess kurtosis, and z_α is the α quantile of the standard normal distribution. This means that the MSR relates the asset's average excess return to its modified VaR. We use a significance level of 1% ($\alpha = 0.01$) to calculate the VaR-based performance measures.

We calculate MSRs for each company and group them by tier (top vs. bottom 25 ESG scores). We test for statistical differences in risk-adjusted performance using Welch's t-test, which accommodates unequal variances and sample sizes.

$$t = \frac{\overline{MSR}_1 - \overline{MSR}_2}{\left(\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}\right)^{0.5}} \tag{5}$$

$\overline{MSR}_i$ denotes the average MSR in subsample i ($1 \equiv$ top tier; $2 \equiv$ bottom tier), σ_i^2 is the variance, and N_i is the number of firms.

Table 3 shows that bottom-tier ESG portfolios generally exhibit higher mean MSRs than top-tier ones. For example, the bottom ESG portfolio has an average MSR of 1.1155 compared to 0.4957 for the top ESG portfolio. However, these differences are not statistically significant at conventional levels (e.g., $p = 0.0890$ for the aggregate ESG), indicating that although low-rated firms may offer higher returns, they are not necessarily more efficient when risk is considered. Interestingly, for higher confidence levels of the VaR-based

Table 3
Comparison of mean annual modified Sharpe Ratios (MSR) between top and bottom ESG portfolios for S&P 500 constituents (2005–2024).

Component	Subsample	Mean	Std. Deviation	N	Welch's t	DF	*p*-value
ESG	25Top	0.4957	1.5548	489	-1.7038	523.67	0.0890
	25Bottom	1.1155	7.8766	487			
Environmental	25Top	0.4973	2.6260	493	-0.5105	944.85	0.6098
	25Bottom	0.5762	2.1718	476			
Social	25Top	0.3261	4.8960	491	-1.2760	853.66	0.2023
	25Bottom	0.8376	7.4333	494			
Governance	25Top	0.3667	1.7350	491	-1.0194	503.85	0.3085
	25Bottom	0.8014	9.1066	472			

Notes: Welch's t-test is used to test the null hypothesis that the mean MSR of the two portfolios is equal. DF denotes degrees of freedom, which are adjusted for unequal variances.

performance measure ($1 - \alpha > 99\%$), the MSR p-value decreases.

3.4. Robustness checks

To ensure that our findings are not specific to large-cap equities, we replicated our analysis using constituents of the Russell 2000 index, the leading benchmark for small-cap company performance in the U.S. The results (see Tables A.2 and A.3) confirmed our core pattern: low ESG small-cap portfolios exhibited higher raw returns that became statistically indistinguishable from those of high ESG portfolios after risk adjustment via the modified Sharpe ratio. This finding aligns with Clare et al. (2025), who document that effective ESG oversight - potentially lacking in low-rated firms - influences corporate sustainability outcomes and risk exposure.

Our findings reveal a robust pattern in U.S. equities that contrasts with and complements the evidence from Papathanasiou and Koutsokostas (2024a) on European mutual funds. Crucially, our core results are consistent in both the large-cap (S&P 500) and small-cap (Russell 2000) universes, suggesting that this phenomenon is not specific to a particular market capitalization.

To analyze the influence of market turbulence periods like the 2008 financial crisis and the 2020 pandemic, we enter a dummy variable (Market Turmoil) taking the value of 1 in these periods and 0 otherwise. Our previous results are inclusively reinforced (See Table A.4), as during crisis periods (2008, 2020), the negative relationship between ESG and returns becomes 47% stronger (total ESG effect: -0.0027 + (-0.0017) = -0.0044, as compared to -0.0030). This more pronounced negative effect in the U.S. equities questions the idea that higher ESG provides downside protection during market turbulence.

4. Conclusions

This study challenges the belief that high ESG scores lead to superior financial performance. Through a comparative analysis of the performance of top- and bottom-ranked ESG portfolios in U.S. equities over 20 years, we find that although low ESG-rated firms delivered higher raw returns, this performance gap becomes statistically insignificant after adjusting for risk.

Our results suggest that the higher raw returns of low-ESG portfolios are a form of compensation for risk rather than evidence of outperformance - a risk premium demanded by investors for exposure to firms with elevated regulatory and operational risks. This builds on studies which showed that, in efficient markets, ESG investing may not provide excess returns (e.g., Pedersen et al., 2021; Zhang et al., 2021; Edmans, 2023), especially in developed economies (Vu et al., 2025).

For investors, this suggests that ESG characteristics should be analyzed through a risk-return framework rather than as direct performance indicators. For policymakers, our findings highlight the urgent need for consistent ESG disclosure standards to ensure proper risk pricing in financial markets. Our results contribute to the ongoing debate highlighted by Wijeweera et al. (2026) regarding the prioritization of ESG-related scores by many investors, who perceive high-scoring companies as being more sustainable and less risky. Thus, future research may involve exploring the reasons behind the perception that ESG is a catalyst for higher share valuation in efficient markets, while controlling for greenwashing.

Ethical approval and informed consent

This study does not contain any tests with human participants or animals and thus does not require any ethical clearance or informed consent.

Declaration of generative AI in scientific writing

The authors did not use generative AI in scientific writing upon submission of the paper.

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CRediT authorship contribution statement

Paulo V. Carvalho: Writing – review & editing, Validation, Methodology. **Pedro F. Falcão:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Formal analysis. **Carlos Manuel Pinheiro:** Writing – review & editing, Validation, Methodology, Investigation, Data curation, Conceptualization. **Diogo Carrão:** Writing – original draft, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

ANNEX

Table A.1
Determinants of excess return for S&P 500 constituents: The role of ESG, size (log market cap), and Fama-French risk factors - only firms with continuous listings from 2005 to 2024, i.e., excluding joiners and leavers.

	Pooled OLS	
Variables	Coefficient	
LaggedESG	-0.0027	***
	(0.0002)	
LogMarketCap	0.0336	***
	(0.0030)	
MRP	1.0058	***
	(0.0207)	
SMB	-0.2763	***
	(0.0053)	
HML	0.0877	**
	(0.0381)	
RMW	-0.1990	***
	(0.0427)	
CMA	0.3980	***
	(0.0608)	
Constant	-0.7396	***
	(0.0690)	
Sector fixed effects	Yes	
Number of observations	7,299	
Adjusted R-squared	0.3363	

Table A.2
Determinants of excess return: the role of ESG, size (log market cap), and Fama–French risk factors for Russell 2000.

	Pooled OLS		Fixed effects	
Variables	Coefficient		Coefficient	
LaggedESG	-0.0018	***	-0.0015	***
	(0.0003)		(0.0002)	
LogMarketCap	0.0390	***	-	
	(0.0044)		-	
MRP	1.1510	***	1.1256	***
	(0.0427)		(0.0442)	
SMB	0.3644	***	0.6085	***
	(0.1224)		(0.1330)	
HML	0.0531	***	0.5733	***
	(0.0879)		(0.0375)	
RMW	-0.3720	***	-0.4425	***
	(0.0925)		(0.0419)	
CMA	0.6366		0.0300	
	(0.1085)		(0.1120)	
Sector fixed effects	Yes		Yes	
Number of observations	6,335		6,335	
Adjusted R-squared	0.1810		0.1847	

Table A.3
Comparison of mean monthly sharpe ratios (MSR) between top and bottom ESG portfolios for Russell 2000 constituents (2005–2024).

Component	Subsample	Mean	Std. Deviation	N	Welch's t	DF	*p*-value
ESG	25Top	0.2456	0.3949	490	1.0415	645.68	0.2980
	25Bottom	0.1013	0.2769	487			

Table A.4
Determinants of excess return for S&P 500 constituents: the role of ESG, size (log market cap), and Fama-French risk factors, including a multiplicative dummy to account for market turbulence (MT).

	Pooled OLS
Variables	Coefficient

(*continued on next page*)

Table A.4 (*continued*)

	Pooled OLS	
Variables	Coefficient	
LaggedESG	-0.0027	***
	(0.0002)	
LogMarketCap	0.0398	***
	(0.0029)	
MRP	0.9667	***
	(0.0212)	
SMB	-0.0282	
	(0.0631)	
HML	0.1095	**
	(0.0436)	
RMW	-0.0954	**
	(0.0442)	
CMA	0.4342	***
	(0.0597)	
MT × *LaggedESG*	-0.0017	***
	(0.0002)	
Sector fixed effects	Yes	
Number of observations	8,320	
Adjusted R-squared	0.3215	

Data availability

The datasets used in this study were obtained under licence from Eikon/Refinitiv (LSEG) and Datastream. Due to contractual and licensing restrictions imposed by the data providers, the raw data cannot be made publicly available. Researchers interested in replicating or extending this work may access similar datasets via institutional Eikon/Refinitiv (LSEG) or Datastream subscriptions.

References

Ardia, D., Boudt, K., 2015. Testing equality of modified Sharpe ratios. Financ. Res. Lett. 13, 97–104. https://doi.org/10.1016/j.frl.2015.02.008.
Ardia, D., Bluteau, K., Boudt, K., Inghelbrecht, K., 2022. Climate change concerns and the performance of green vs. brown stocks. Manage. Sci. 69 (12), 7607–7632. https://doi.org/10.1287/mnsc.2022.4636.
Boudt, K., Cornelissen, J., Croux, C., 2013. The impact of a sustainability constraint on the mean-tracking error efficient frontier. Econ. Lett. 119 (3), 255–260. https://doi.org/10.1016/j.econlet.2013.03.020.
Capelli, P., Federica, I., Russo, A., 2023. Integrating ESG risks into value-at-risk. Financ. Res. Lett. 55 (A). https://doi.org/10.1016/j.frl.2023.103875.
Clare, A.D., Pinheiro, C.M., Pozzolo, A.F., 2025. Does the attentiveness of NEDs to ESG issues influence corporate sustainability? Corp. Soc. Responsib. Environ. Manage. 32 (6), 7938–7955. https://doi.org/10.1002/csr.70118.
Edmans, A., 2023. Applying economics—not gut feel—to ESG. Financ. Anal. J. 79 (4), 16–29. https://doi.org/10.1080/0015198X.2023.2242758.
Eling, M., 2008. Does the measure matter in the mutual fund industry? Financ. Anal. J. 64 (3), 54–66. https://doi.org/10.2469/faj.v64.n3.6.
Fang, F., Parida, S., 2022. Sustainable mutual fund performance and flow in the recent years through the COVID-19 pandemic. Int. Rev. Financ. Anal. 84, 102387. https://doi.org/10.1016/j.irfa.2022.102387.
Goto, M., Sueyoshi, T., 2020. Sustainable development and corporate social responsibility in Japanese manufacturing companies. Sustain. Develop. 28, 844–856. https://doi.org/10.1002/sd.2035.
Gregoriou, G., Gueyie, J.-P., 2003. Risk-adjusted performance of funds of hedge funds using a modified Sharpe ratio. J. Wealth Manage. 6 (3), 77–83. https://doi.org/10.3905/jwm.2003.442378.
Horky, F., Pasquali, A., Magazzino, C., 2024. ESG rating disagreement portfolios – evidence from the EuroStoxx 600. Financ. Res. Lett. 69 (A), 106117. https://doi.org/10.1016/j.frl.2024.106117.
Kathan, M.C., Utz, S., Dorfleitner, G., Eckberg, J., Chmel, L., 2025. What you see is not what you get: ESG scores and greenwashing risk. Financ. Res. Lett. 74, 106710. https://doi.org/10.1016/j.frl.2024.106710.
Khan, M.A., 2022. ESG disclosure and Firm performance: a bibliometric and meta analysis. Res. Int. Bus. Finance 61, 101668. https://doi.org/10.1016/j.ribaf.2022.101668.
Khemir, S., 2019. Perception of ESG criteria by mainstream investors: evidence from Tunisia. Int. J. Emerg. Markets 14 (5), 752–768. https://doi.org/10.1108/IJOEM-05-2017-0172.
Papathanasiou, S., Koutsokostas, D., 2024a. Sustainability ratings and fund performance: New evidence from European ESG equity mutual funds. Financ. Res. Lett. 62 (A), 105095. https://doi.org/10.1016/j.frl.2024.105095.
Papathanasiou, S., Koutsokostas, D., 2024b. A trade-off between sustainability ratings and volatility in portfolio hedging strategies. Int. J. Bank. Account. Finance 14 (3), 370–406. https://doi.org/10.1504/IJBAAF.2024.142715.
Pástor, L., Stambaugh, R.F., Taylor, L.A., 2022. Dissecting green returns. J. Financ. Econ. 146 (2), 403–424. https://doi.org/10.1016/j.jfineco.2022.07.007.
Pedersen, L.H., Fitzgibbons, S., Pomorski, L., 2021. Responsible investing: the ESG-efficient frontier. J. Financ. Econ. 142 (2), 572–597. https://doi.org/10.1016/j.jfineco.2020.11.001.
Vu, T.N., Lehkonen, H., Junttila, J.P., Lucey, B., 2025. ESG investment performance and global attention to sustainability. N. Am. J. Econ. Finance 75 (A), 102287. https://doi.org/10.1016/j.najef.2024.102287.

Wijeweera, A., Kortt, M.A., Kim, N., 2026. Dissecting ESG: do environmental, social, and governance pillars influence share returns differently? Res. Int. Bus. Finance 81, 103210. https://doi.org/10.1016/j.ribaf.2025.103210.

Wong, W.C., Batten, J.A., Ahmad, A.H., Mohamed-Arshad, S.B., Nordin, S., Adzis, A.A., 2021. Does ESG certification add firm value? Financ. Res. Lett. 39, 101593. https://doi.org/10.1016/j.frl.2020.101593.

Zhang, X., Zhao, X., Qu, L., 2021. Do green policies catalyze green investment? Evidence from ESG investing developments in China. Econ. Lett. 201, 110028. https://doi.org/10.1016/j.econlet.2021.110028.