

ESG ETF Performance Across Market Regimes:

Dissertation Methodology Sample

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Research design

This study adopts a quantitative longitudinal design to compare the risk-adjusted performance of environmental, social and governance (ESG) exchange-traded funds with conventional equity benchmarks across different market regimes. The design is motivated by evidence that sustainable investment performance can vary materially between normal, bullish and crisis conditions. Pavlova and de Boyrie (2022), for example, found that higher ESG ratings did not insulate ETFs from COVID-19 losses, although ESG ETFs did not significantly underperform the market. More recent evidence suggests that highly rated ESG ETFs may exhibit lower volatility and smaller jumps during major disruptions (Supatgiat et al., 2025). A regime-sensitive design is therefore preferable to a single full-period average.

Sample and data

The analytical sample should contain liquid equity ETFs with sufficient return history, transparent benchmark exposure and consistent ESG classification. A matched-pair structure can be used where each ESG ETF is paired with a conventional fund that has similar geographical and market-cap exposure. Daily adjusted closing prices should be converted to continuously compounded returns. The risk-free rate and factor returns should be collected at the same frequency. To avoid survivorship bias, inclusion rules should be defined before observing performance outcomes and should not depend on whether a fund performed well.

Variables and performance measures

The dependent variable is excess ETF return relative to the risk-free rate. Descriptive performance measures should include annualised mean return, annualised volatility, Sharpe ratio and maximum drawdown. Risk-adjusted abnormal performance should then be estimated using multifactor models. At minimum, the Fama-French factors should be included; momentum can be added where data quality supports a Carhart-style specification. The estimated alpha captures average abnormal performance conditional on factor exposures, but it should not be interpreted as proof of managerial skill because ETF returns may also reflect index construction, sector tilts, fees and omitted risk factors.

Market-regime specification

Market regimes can be defined exogenously around well-identified stress events or endogenously using a regime-switching model. Duong (2025) demonstrates the value of Markov regime-switching methods when comparing green and conventional equity indices across long samples. An event-based specification is more transparent for a dissertation with limited scope, while a Markov model provides a stronger test where the objective is to identify latent bull and bear states. A robust design can use one approach as the primary specification and the other as a sensitivity test.

Econometric model

A baseline factor model can be specified as: $R_{it} - R_{ft} = \alpha_i + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + \beta_6 MOM_t + \epsilon_{it}$. The model should be estimated separately for ESG and conventional funds and then across market regimes. Standard errors should be adjusted for heteroskedasticity and serial correlation where diagnostics indicate. If the analysis uses pooled fund observations, fund fixed effects and clustered standard errors should be considered. The central test is not simply whether ESG alpha is positive, but whether the ESG-conventional performance difference changes across regimes.

Robustness and interpretation

Robustness checks should include alternative ESG classifications, exclusion of sector-specific funds, different crisis windows, net versus gross return sensitivity where available, and matched conventional benchmarks. Supatgiat et al. (2025) show that ESG ratings can relate to volatility and jump behaviour during crises, so tail-risk measures are also useful. Duong (2025) reports regional differences in the resilience of green indices, implying that results should not be generalized across developed and emerging markets without testing heterogeneity. Statistical significance should therefore be reported alongside economic magnitude.

Ethical and reproducibility considerations

The study uses secondary financial data and ordinarily does not involve human participants. Nevertheless, reproducibility remains an ethical research requirement. Data sources, cleaning rules, fund inclusion criteria, code and model specifications should be documented clearly. Where proprietary ESG scores are used, the methodology should acknowledge rating-provider disagreement and avoid presenting one score as an objective measure of sustainability. The dissertation should also distinguish financial resilience from broader environmental impact; an ETF can perform defensively without necessarily producing superior real-world sustainability outcomes.

Research questions and hypotheses

The methodology can be structured around three questions. RQ1 asks whether ESG ETFs differ from matched conventional ETFs in average risk-adjusted performance. RQ2 asks whether any performance difference changes between normal and stressed market regimes. RQ3 asks whether ESG classification is associated with downside-risk characteristics such as drawdown, volatility or jump intensity. Corresponding hypotheses should be directional only where the literature provides a sufficiently consistent basis. Given mixed prior evidence, a two-sided hypothesis for abnormal-return differences is defensible, while a resilience hypothesis can test whether ESG funds exhibit lower downside risk during stress periods.

Data cleaning and diagnostics

Before estimation, prices should be checked for missing observations, duplicate dates, fund inception gaps, splits and distribution adjustments. Return series should be aligned to common trading days and extreme observations inspected rather than automatically winsorised. Descriptive statistics and correlation matrices should precede regression analysis. Residual diagnostics should assess heteroskedasticity and serial dependence, and multicollinearity among factors should be reported. If multiple ETFs track highly similar indices, dependence across funds should be acknowledged through clustered or panel-robust inference. These steps are necessary because statistically sophisticated models cannot compensate for inconsistent return construction or misaligned dates.

Conclusion

A rigorous ESG ETF methodology should combine matched benchmarks, factor-adjusted returns and explicit market-regime analysis. This approach responds to the mixed evidence in the literature: sustainable funds may show resilience in some periods and markets but not others. The proposed design therefore tests conditional performance rather than assuming either an ESG premium or an ESG penalty in advance.

References

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