

ABSTRACT

The growing trend of sustainable investing is driving portfolio optimization that considers not only returns and risk but also sustainability aspects. This study aims to construct an optimal stock portfolio from companies listed in the SRI-KEHATI index by considering Environmental, Social, and Governance (ESG) scores. The portfolio is optimized using Model Predictive Control (MPC) within a mean-variance framework, where optimization is performed iteratively at each rebalancing period using updated historical data. The primary variables in this study will include daily stock price data for the 2022–2025 period and ESG scores. In the initial stage, stocks listed in the SRI-KEHATI index are selected based on the completeness of stock price data and the availability of ESG scores. Several stocks that meet the selection criteria are chosen as portfolio constituents that can deliver the best results in terms of financial performance and sustainability, while considering the correlation among the selected stocks. The selected stocks are BMRI, INCO, KLBF, UNTR, and UNVR. These stocks are then optimized by applying the main constraint, including a minimum ESG score and several other constraints: a maximum weight for each stock, a total weight of all portfolio constituents equals one, and a prohibition on short selling. The results show that the MPC method can construct an adaptive portfolio that responds to data changes while satisfying sustainability constraints. To evaluate the effect of the prediction and rebalancing horizon, three values of τ are tested and compared. The most optimal result is obtained at $\tau=10$, with a total return of 28.382%. This portfolio is able to outperform both benchmarks by 0.839% against the general benchmark and 17.689% against the ESG-based benchmark. Thus, the MPC method can serve as an alternative for sustainable portfolio optimization that adapts to market dynamics while still considering ESG aspects.

Keywords: *sustainable investment, portfolio optimization, SRI-KEHATI, ESG, MPC, mean-variance*