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Dynamic Portfolio Optimization Using TMFG Financial Networks: A Centrality-Based Multi-Strategy Framework

Communication Info

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Abstract

This paper develops a dynamic portfolio optimization framework that integrates financial network topology with evolving asset dependencies in the Casablanca Stock Exchange. Using daily log-returns from the Moroccan All Shares Index over 2013–2022, time-varying correlations are modeled via the Dynamic Conditional Correlation GARCH model [1]. Financial networks are constructed by filtering correlation matrices through the Minimum Spanning Tree [2] and the Triangulated Maximally Filtered Graph [3]. Centrality measures are used to identify systemically important assets and construct multiple portfolio strategies, benchmarked against classical Minimum-Variance and Equal-Weighted portfolios. Portfolio performance is evaluated using standard risk-adjusted and downside risk measures, including Sharpe ratio and drawdown-based metrics [4,5]. The empirical results indicate that while the Minimum-Variance Portfolio provides effective downside protection, it tends to underperform during bullish market phases. In contrast, network-based strategies, particularly the TMFG Selection Portfolio, exhibit more stable risk adjusted performance over time. ESG-integrated portfolios achieve competitive returns but with higher volatility, underscoring the importance of appropriate risk control. Overall, the findings suggest that combining dynamic correlation modeling with financial network topology enhances portfolio robustness in emerging markets.

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