

Machine Learning for Regression Coefficient Forecasting of Momentum Factors: Applications to Market Portfolio Construction

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Abstract

This study examines whether machine learning improves the timing of momentum and reversal factors in the Taiwan stock market by forecasting their time-varying cross-sectional regression coefficients (RC), the monthly slope of next-month stock return on each standardized factor, an approach compared against forecasting each factor's rank correlation with returns (Information Coefficient, IC). Using a monthly panel of Taiwan-listed equities from January 2000 through December 2024, ten predictive architectures, linear regression, four tree ensembles (Random Forest, XGBoost, LightGBM, Gradient Boosted Regression Trees), and five feedforward neural networks, forecast six momentum and reversal characteristics, and form long-only top-percentile portfolios under equal- and value-weighting over a 156-month out-of-sample window, benchmarked against the TAIEX index. Every non-linear architecture attains positive out-of-sample predictive accuracy while linear regression fails outright. Weighting the composite stock-selection score by predicted RC rather than predicted IC raises realized gross Sharpe ratios for nine of the ten models, with Random Forest achieving the highest equal-weighted gross Sharpe ratio of 1.32 and remaining profitable net of realistic institutional transaction costs, while value-weighted portfolios offer superior resilience to trading costs for institutional-scale capital. These findings indicate that machine learning adds value primarily by timing factor efficacy through economic magnitude rather than ordinal rank, with practical implications for institutional and retail portfolio construction in emerging Asian equity markets, particularly where retail-driven trading and statutory price limits weaken conventional momentum patterns found in developed markets.

Keywords: Machine Learning, Asset Pricing, Momentum Factors, Portfolio Construction, Emerging Markets