

# Multi-Factor ETF Return Prediction Based on Momentum Strategies

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## Executive Summary

This paper explores the presence of lead-lag relationships among sector-based Exchange-Traded Funds (ETFs), established factor portfolios, and macroeconomic indicators. We focus on 11 SPDR Sector ETFs and integrate them with various factor sets derived from Fama-French models, as well as momentum, reversal, and macroeconomic signals such as Treasury yields and gold prices. By employing rigorous data preprocessing, we isolate market-neutral sector returns and engineer a range of lagged return features. These features are then tested for statistical significance using Fisher's  $Z$ -transformation, followed by clustering-based feature selection.

The selected lead-lag features are used in predictive models to forecast one-month-ahead residual ETF returns. We conduct extensive out-of-sample backtests with different weighting (e.g., equal, minimum variance) and rebalancing schemes, including dynamic rolling refits. The best performing portfolios achieve high Sharpe ratios and maintain low correlation with the broad market, indicating substantial diversification potential. For instance, certain equal-weighted strategies achieve test-period Sharpe ratios exceeding 3.0, and minimum-variance optimized portfolios can yield Sharpe ratios above 3.6 in the test phase.

Our approach extends the literature on factor timing and sector rotation by demonstrating that dynamic, data-driven feature selection can generate economically significant trading strategies. These findings suggest that temporal dependencies between sectors, factors, and macro signals are exploitable and robust, contributing to both academic research on factor momentum and practical portfolio management strategies.