Abstract

This thesis consists of three papers investigating stock returns forecasting, empirical asset pricing, and portfolio selection through the application of machine learning and quantitative methods. The first paper examines out-of-sample returns on 153 documented anomalies in equities, demonstrating that machine learning techniques, which aggregate these anomalies into a single mispricing signal, are profitable globally and effective even within a liquid universe of stocks. Notably, while past performance of quantitative strategies outside the U.S. does not reliably predict out-of-sample success within the U.S., U.S.-based evidence is broadly predictive of returns in international markets. The second paper introduces a novel method for predicting the full distribution of stock returns using a comprehensive set of 194 stock characteristics and market variables. This approach, free from restrictive model assumptions, leverages a two-stage quantile neural network with spline interpolation to explore non-Gaussian, heavy-tailed data and their non-linear interactions. The results indicate that this method outperforms traditional models in terms of out-of-sample losses and provides valuable alternative empirical estimates for mean estimation and forecasting across a wide range of U.S. and international data. The third paper investigates the out-of-sample performance of portfolios constructed by investors with quantile preferences, which focus on maximizing the τ-quantile of future portfolio returns rather than relying on expected utility. The study reveals significant differences in portfolio diversification and turnover based on varying τ-quantiles and shows that for risk-averse investors, a global minimum variance portfolio often yields a higher out-of-sample τ-quantile of returns compared to direct quantile maximization approaches. Through Monte Carlo simulations, the research attributes the underperformance of τ-quantile maximizers to small sample bias, which leads to deviations from optimal portfolio weights.

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Keywords	Cross-section of stock returns, Anomalies, Quantile forecasting, Machine learning, Neural networks, International markets, Portfolio selection, Distribution forecasting, Quantile preferences
Title	Asset Pricing and Portfolio Selection via Machine Learning