The Role of Macroeconomic Factors and Macro Attention Indices in Forecasting Equity Risk Premia

Aaron Arauz Baumender
Michael Adrian Geiser Pasquel
Zhiyi Tang
Andreas Stavropoulos

University of Zurich

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Abstract

In demonstration of our proficiency in digital tools acquired through the course "Digital Tools for Finance," we submit a concise paper wherein we conduct equity risk premia forecasts (S&P 500). Our analysis focuses on the utilization of macroeconomic features, particularly emphasizing macroeconomic factors (MEF) and macroeconomic attention indices (MAI).

Keywords: Equity risk premia; Forecast; Macroeconomic features; Macroeconomic factors; Macro economic attention indices

Outline

Introduction

- **Background**
  - Traditional focus on macroeconomic factors (interest rates, inflation, growth). Behavioral finance introduces macro attention indices reflecting market
  - Behavioral finance introduces macro attention indices reflecting market sensitivity to information.
  - Study recognizes interplay between macroeconomic factors and macro attention indices, and aims to contribute predictive models using linear and neural networks.

- **Objectives**
  - Assess predictive capacity of macroeconomic factors using linear regression and neural networks.
  - Evaluate effectiveness of macro attention indices in prediction via linear and neural network models.
  - Investigate combined predictive power of both sets of variables in integrated models.

- **Significance of the Study**
  - Goes beyond traditional forecasting methods.
  - Comprehensive analysis with linear and neural network models.

Literature Review

- **Macroeconomic Factors:**
  - Historical emphasis on dividends and book value.
  - Insights from Fama and French (1988) and Goyal and Welch (2003).
  - Recent studies (Karolyi and Shue, 2019; Al Saud, 2019) use advanced techniques, revealing intricate dynamics.

- **Macro Attention Indices:**
  - Revolutionize understanding of information impact on markets.
  - Studies by Johnson et al. (2006) and Korkeamäki et al. (2011) highlight the role in shaping investor sentiment.
  - Recent research (Ma et al., 2022) emphasizes improved predictive accuracy during market uncertainty.

- **Integration of Factors and Indices:**
  - No existing exploration of joint influence.
  - Combining variables may offer a more robust framework.
  - Study uses linear regression models and neural networks for a comprehensive analysis.

Theoretical Framework

- **Market Dynamics Beyond Efficiency:**
  - Challenges traditional Efficient Market Hypothesis (EMH).
  - Acknowledges anomalies and deviations from efficiency, especially during heightened investor attention.
  - Highlights the need for alternative frameworks beyond complete market efficiency.

- **Behavioral Finance and Investor Attention:**
  - Integrates behavioral finance insights into decision-making.
  - Considers investor attention and herd behavior, leading to overreaction or underreaction.
  - Accounts for sentiment and attention in forecasting models, recognizing limitations of purely rational assumptions.

- **Neural Networks in Financial Forecasting:**
  - Utilizes neural networks to capture complex, non-linear relationships.
  - Addresses limitations of traditional linear models.
  - Enhances modeling of interactions between macroeconomic factors and attention metrics impacting equity risk premia.

- **Model Specification:**
  - **Macroeconomic Indexes:** Log Dividend-Price — Log Dividend Yield — Log Earnings-Price — Log Dividend-Payout — Equity Premium Vol — Book-to-Market Ratio — Net Equity Expansion — Treasury Bill Rate — Long-Term Yield — Long-Term Return — Term Spread — Default Yield Spread — Default Return Spread — Inflation
  - **Macro Attention Indexes:** Credit Rating — Gross Domestic Product — House Market — Inflation — Monetary — Oil — Unemployment Rate — US Dollar
  - **Equity risk Premia:** GSP Equity Risk Premia

Methodology

- **Data Management:**
  - Historical data from 1985 to 2018, daily, monthly, and quarterly frequencies.
  - Collected from various repositories, organized chronologically for model training.

- **Data Collection (Raw Data):**
  - MEF and MAI data collected from specific GitHub repositories.
  - GSPC data collected from Yahoo Finance.

- **Data Cleaning (Interim Data):**
  - Preprocessing steps applied to address missing values in MAI raw databases.

- **Data Processing (Processed Data):**
  - MEF and MAI data undergo processing to construct data for model training.
  - Calculations include transformations and interpolations to derive key macroeconomic factors and attention indexes.

Methodology (continued)

- **Model Training:**
  - Two approaches: linear regression and neural network models.
  - Linear regression uses the standard equation with gradient descent and Ridge regularization.
  - Neural network employs feedforward architecture with specific parameters.
  - Root Mean Squared Error (RMSE) used to assess model performance.

- **Comparison and Interpretation:**
  - Comparative analysis of results from linear regression and neural network models.
  - Evaluation based on RMSE for different combinations of economic data (MAI and MEF) and target variable (1-month GSPC equity risk premia).
  - Daily and monthly frequencies considered.

Empirical Analysis

Discussion

- Practical Implications - Page 13
- Limitations - Page 13
- Future Research Directions - Page 13

Conclusion

- Summary of Findings - Page 15
- Limitations and Caveats - Page 15
- Recommendations for Future Research - Page 15

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Appendices

- On Page 17