Project Overview

Title: Comprehensive Analysis of Option Sentiment Measures (Call-Put Ratio) as Predictors of Equity Returns

Gauri Lad

Objective: To explore the predictive capacity of option sentiment measures, particularly the ISEE Index, in forecasting equity returns with the help of Python

ISEE Index and Investor Sentiment

The ISEE Index is the central element of this study and provides a unique perspective on investor sentiment in the options market. Unlike traditional call-put ratios, the ISEE Index uniquely tracks the open long positions of call and put options purchased by retail investors. This focus on investor behavior provides a more direct measure of their sentiment, bypassing the noise typically associated with institutional trading patterns. The index is essentially a real-time barometer of retail investor optimism or pessimism.

Understanding ISEE Sentiment Indicator

Understanding the nuances of the ISEE Index is key to interpreting market trends. Higher values of the ISEE Index indicate a greater proportion of call options, suggesting that investors are bullish and expect the market to rise. This could lead to increased buying activity, which could potentially drive-up stock prices. On the other hand, the lower the ISEE Index, the greater the dominance of long put options, indicating a stronger bearish sentiment, which may create selling pressure and lead to a decline in stock prices. This study examines the extent to which these changes in the ISEE Index, which reflects retail investor sentiment, coincide with actual equity returns.

As a unique gauge of market sentiment, the ISE Sentiment Index (ISEE) claims to rely only on opening long customer transactions and put/call value. Customers' opening long transactions are considered to best reflect the mood of the market because investors frequently purchase call and put options to reflect their true opinions about a given stock; they typically purchase calls to hedge against down markets and puts to protect themselves when they anticipate increases in prices.

It is calculated as follows:

$$\text{ISEE} = \left(\frac{\text{Long Calls}}{\text{Long Puts}} \right) \times 100$$

Where:

ISEE=ISE Sentiment Index

Long Calls=Number of long call options purchased

Long Puts=Number of long put options purchased

Research Questions

The main question of this study is whether these indicators of options sentiment (particularly the ISEE Index) accurately predict daily equity returns.

Data & Methodology:

This study uses a robust dataset consisting of daily returns on the SP500 and ISEE index data from January 2006 to November 2023.

$$\text{Daily Return} = \frac{\text{Closing Price Today} - \text{Closing Price Yesterday}}{\text{Closing Price Yesterday}} \times 100$$

The methodology employed includes linear regression models to analyze the correlation between these sentiment indicators and S&P 500 returns. Thorough data processing and rigorous statistical analysis are an integral part of this study. We used linear regression for modeling the relationship between a S&P 500 return and ISEE index. The goal of linear regression is to find the best-fitting linear relationship that explains the variation in the dependent variable based on the values of the independent variables.

The basic form of our model is

$$\text{S\&P 500 Return} = \beta_0 + \beta_1 \times \text{ISEE (Call/Put Ratio)} + \varepsilon$$

Here's a breakdown of the terms:

Y: S&P 500 Daily Return (dependent variable).

X: ISEE (Call/Put Ratio) Daily (independent variable).

β0: Intercept term (the expected value of S&P 500 Return when the ISEE ratio is zero).

β1: Coefficient for the ISEE ratio (the expected change in S&P 500 Return for a one-unit change in the ISEE ratio).

ε: Error term (captures unobserved factors affecting S&P 500 Return not included in the model).

We are testing:

Hypothesis:

Null Hypothesis (H_0):

$$H_0 : \beta_1 = 0$$

Alternative Hypothesis (H_1):

$$H_1 : \beta_1 \neq 0$$

Null Hypothesis (H0): There is no significant relationship between option sentiment measures (call-put ratios) and equity returns. The sentiment indicators do not provide predictive information about future s&P500 price movements.

Alternative Hypothesis (H1): There is a significant relationship between option sentiment measures (call-put ratios) and S&P500 returns. The sentiment indicators are predictive of future S&P500 price movements.

Our findings:

1. **Coefficients:**

- Coefficient for ISEE(Call/Put) Ratio (b): 0.0046934
- Intercept (a): -0.6804957853745122

2. **R-squared (R^2) Scores:**

- R-squared (training): 0.02299204200472371
- R-squared (testing): 0.022352942795029862

Detailed Regression Analysis

Data Preparation: The study involved complex data processing, including adjusting dates from various sources and calculating daily returns, particularly for the S&P 500 Index.

ISEE Index Coefficient (0.00469):

The coefficient for ISEE(Call/Put) Ratio is 0.0046934. This indicates that, on average, a one-unit increase in the ISEE(Call/Put) Ratio is associated with an increase of 0.0046934 units in the predicted S&P 500 return, assuming all other variables are held constant.

Intercept (a):

The intercept is -0.6804957853745122. This is the estimated value of S&P 500 return when the ISEE(Call/Put) Ratio is zero. However, since the ISEE(Call/Put) Ratio is likely always positive, the interpretation of the intercept might not have a direct practical meaning in this context.

Model Scores:

The R-squared score for training data (0.02299204200472371) suggests that the model explains approximately 2.3% of the variance in the training set.

The R-squared score for testing data (0.022352942795029862) indicates that the model performs similarly on the testing set.

Extended Discussion on ISEE Index and Investor Sentiment

The present study reveals the intricate relationship between the ISEE Index and S&P500 returns. The ISEE Index summarizes investor sentiment and plays a vital role in understanding market dynamics. The study reveals how investor psychology, as reflected through the index, drives market trends and influences stock market buying and selling behavior. A nuanced understanding of this relationship is essential for investors and analysts to make informed decisions.

Implications and Future Research

This study demonstrates the importance of incorporating investor sentiment into broader market analysis and emphasizes the need for an integrated approach that combines sentiment measures with other financial indicators. This study prove the way for future research and encourages the exploration of larger datasets, longer time frames, and more advanced analytical methods to further unravel these complex relationships.

Conclusion.

1. Coefficient Significance:

•The coefficient for the ISEE(Call/Put) Ratio is statistically significant (non-zero), given the hypothesis that b=0.

2. Effect Size:

•The effect size of the ISEE(Call/Put) Ratio on S&P 500 return is small, given the low R-squared values. The model, as it stands, explains only a small portion of the variance in S&P 500 returns.

3. Practical Significance:

•While the coefficient is statistically significant, we should also consider the practical significance. The small R-squared values suggest that the ISEE(Call/Put) Ratio alone may not be a strong predictor of S&P 500 returns.

4. Further Considerations:

•It's essential to conduct additional analysis and consider other factors that may influence S&P 500 returns. The model may benefit from including additional relevant variable.

5. Hypothesis Testing:

•Since the coefficient for the ISEE(Call/Put) Ratio is statistically significant, we reject the null hypothesis ($H0:\beta0=0$) in favor of the alternative hypothesis ($H1:\beta\neq0$). This implies that there is evidence to suggest that the ISEE(Call/Put) Ratio has a significant effect on S&P 500 returns.