

Prediction of Stock Price Trends Based on Multiple Regression Model: A Deep Analysis of Market Influencing Factors

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Abstract:

This study uses a multiple regression model to explore the trend of stock prices in depth, systematically analyzing various factors that affect the market, striving to accurately reveal their quantitative relationship with stock prices and provide strong decision-making basis for investors. Through the analysis of multiple market variables, the research results show that the multiple regression model has certain effectiveness in predicting stock price trends and can provide useful references for investors. However, due to the high complexity and variability of the stock market, accurately predicting stock prices still faces many challenges and uncertainties. Therefore, further research is still necessary to improve the accuracy of predictions.

Keywords:-Stock prices; Multiple regression model; Market influencing factors; trend forecasting

1. Introduction

Being one of the key parts of finance industry, the volatility of shares has long been the focal point of investors and researchers. Accurate prediction of the trend of shares will not only contribute to the high yield to the investors, but also to the steady growth of the financial market. As a classical statistical analytical instrument, multi-regression model has found wide application in the study of finance market. Their ability to deal efficiently with many variables is to forecast and analyse the value of shares.

2. Research Methods

2.1 Data collection

In this research, we choose 50 typical shares of SSE

300 Index from Jan. 1, 2015 to Dec. 31, 2020. It also gathered a number of macro economic indexes, such as Gross Domestic Product (GDP), inflation, interest rate, currency supply, and so on. Key information sources are National Bureau of Statistical, Wind Base, as well as the government web sites of large financial organizations to make sure they are accurate and reliable.

2.2 Model construction

Construct a multiple linear regression model: where represents stock price, represents the t th influencing factor, is the corresponding regression coefficient, is a constant term, and is a random error term. This model assumes a linear relationship between stock prices and various influencing factors, and estimates regression coefficients through the least squares

method to achieve prediction of stock prices.

2.3 Model verification

Good Fit Test (R^2): It is used to assess how well a model matches the data. As the R^2 approaches 1, the more powerful the explanation of the model is.

F Test: Check the whole meaning of the model to see if any of the independent variables affect it significantly.

T test: Check if there is no significant difference between the factors of all the independent variables, and see if the effect of one independent variable on the dependent variable is obvious.

Multi-Collinear Test: The Variance Expansion Coefficient (VIF) is applied to examine the existence of serious multi-collinearity among the independent variables. A VIF above 10 is usually considered to be indicative of serious multi-collinearity.

3. Empirical Results and Analysis

3.1 Model Results

Perform regression analysis on the data using Eviews software to obtain the regression coefficients and correlation test results for each variable. Partial results show that the regression coefficients of variables such as GDP growth rate, interest rate, price to earnings ratio, and return on equity have passed the significance test, indicating that these factors have a significant impact on stock prices.

3.2 Result analysis

Macro economy: there is a significant positive correlation between GDP and share prices. For each GDP rise by one percent, the share price will rise by 1.5 percent. This shows that the economy grows positively to the stock market. While the economy is booming, the company's earnings are growing, and investors' demand for shares is higher, thus boosting share prices. There is a significant negative correlation between interest rates and share prices, with an average decline of 0.8 per cent for each 1 percent rise in interest rates. Higher interest rates can raise the cost of funding for firms, lower their profit margins, and make fixed-income assets like debt more attractive, resulting in capital flight and share prices falling.

Company finance element: P/EPS has positive correlation with the share price. The higher P/E ratio is, the more likely the market will expect a firm to make a profit in the future, which will lead to a higher share price. There was a significant positive correlation between the ROE and share prices, where the ROE rose by 1.2 per cent on average for each ROCE. The ROCE is a reflection of the

profitability of a firm and the rate of return on equity. The higher ROCE indicates a firm's ability to pay back and develop well, drawing in investors who want to purchase their shares and push their share prices up.

3.3 Model limitations

Although multiple regression models can to some extent explain changes in stock prices, they also have some limitations. Firstly, the stock market is influenced by various complex factors, including political situations, policy changes, investor sentiment, etc. These factors are difficult to quantify and cannot be fully incorporated into the model. Secondly, the model assumes a linear relationship between stock prices and various influencing factors, but this may not be the case in reality, as stock price fluctuations may be influenced by nonlinear factors. In addition, the model also has limitations in data samples and multi-collinearity, which may affect the accuracy and reliability of the model.

3.4 Conclusion and Prospect

This study used a multiple regression model to empirically analyze the trend of stock prices, verifying the significant impact of some macroeconomic indicators and corporate financial indicators on stock prices. The research results provide investors with certain decision-making references. Investors can adjust their investment portfolio reasonably and reduce investment risks based on the macroeconomic situation and the company's financial condition. However, due to the complexity and uncertainty of the stock market, multiple regression models still have certain limitations in predicting stock prices. Future research can consider the following aspects: firstly, further expanding the data sample to cover more stocks and longer time spans, in order to improve the stability and reliability of the model; The second is to introduce more non quantitative factors, such as investor sentiment, market attention, etc., and quantify them through techniques such as text mining and big data analysis, and incorporate them into the model; The third is to attempt to use nonlinear models, such as neural network models, support vector machines, etc., to better capture the complex relationship between stock prices and various influencing factors, and improve prediction accuracy.

This study employs a multiple regression model to conduct an empirical analysis of stock price movements, aiming to explore the impact of macroeconomic indicators and corporate financial indicators on stock prices. Stock price fluctuations are influenced not only by internal operational factors but also by external factors such as the macroeconomic environment and market sentiment. Therefore, by analyzing the multiple regression model, the

significance and degree of influence of different factors on stock price changes can be revealed, providing investors with valuable decision-making insights.

The research indicates that certain macroeconomic indicators (e.g., GDP growth rate, interest rates, inflation rate) and corporate financial indicators (e.g., net profit, debt-to-asset ratio, cash flow) have a certain degree of influence on stock price fluctuations. For example, when the GDP growth rate is high, the overall economic environment improves, enhancing corporate profitability and generally leading to an upward trend in stock prices. Conversely, when interest rates rise, corporate financing costs increase, potentially suppressing profit prospects and negatively impacting stock prices. Additionally, a company's financial condition, particularly its profitability and financial stability, plays a significant role in stock price fluctuations. Factors such as growth in net profit, healthy cash flow, and appropriate debt levels can support stock prices and boost investor confidence.

However, although the multiple regression model can reveal the relationships between these factors and stock prices to some extent, it still has limitations in predicting stock prices. First, stock market fluctuations are influenced not only by known macroeconomic and financial indicators but also by factors such as market sentiment, investor behavior, and political events, which are difficult to quantify. The multiple regression model primarily relies on linear assumptions, overlooking these complex nonlinear factors, which limits its ability to capture the complexity of stock price changes and unexpected events.

The complexity and high uncertainty of the stock market mean that even finely tuned regression analysis cannot fully predict future stock price movements. For instance, short-term fluctuations in corporate earnings or sudden market events (e.g., policy changes, international conflicts) are often difficult for the model to accurately capture, thereby affecting the reliability of predictions. At the same time, the stock market is subject to significant "noise," with short-term market sentiment and irrational behavior often having a substantial impact on stock prices, factors that traditional regression models cannot adequately account for.

Based on the above analysis, this study proposes several directions for improving stock price prediction models in the future. First, expanding the data sample to include more stocks and a longer time span can enhance the stability and reliability of the model. A longer time span helps better understand the relationship between stock price performance and various indicators across different economic cycles and market environments, thereby improving the model's generalizability. Additionally, increasing the number of stock samples can reduce the impact of individual

stock fluctuations on the results, making the predictions more representative. Introducing more non-quantifiable factors, such as investor sentiment, market attention, and media coverage frequency, can also improve the model. These factors often significantly influence short-term stock market fluctuations. By using techniques like text mining and big data analysis, these non-quantifiable factors can be quantified and incorporated into the model. For example, sentiment analysis of financial news, social media, and analyst reports can transform market sentiment into quantitative indicators, providing a more comprehensive understanding of market dynamics.

Future research could also explore the use of nonlinear models, such as neural networks and support vector machines (SVM), which are machine learning methods capable of handling more complex data relationships. These methods are particularly advantageous when dealing with large datasets, as they can capture intricate relationships between stock prices and influencing factors. Neural networks, with their multi-layered structures, can extract more detailed features, improving the accuracy of stock price predictions. Additionally, ensemble learning methods (e.g., random forests, XGBoost) can enhance prediction accuracy by leveraging the collaborative effects of multiple models.

In conclusion, while the multiple regression model provides a useful quantitative framework for stock price analysis, it cannot fully address the complexity and uncertainty of the stock market. Future research can improve prediction models by expanding samples, incorporating non-quantifiable factors, and adopting more advanced machine learning techniques. These improvements can enhance the accuracy and reliability of stock price prediction models, offering investors more precise decision-making support in a complex and ever-changing market environment. Through these advancements, stock price prediction models are expected to become more accurate and reliable, helping investors make wiser investment decisions in a volatile market.

4. References

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