

DEVELOPING A PREDICTIVE MODEL FOR STOCK PRICES USING TIME SERIES ANALYSIS OF IT INDUSTRY

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ABSTRACT

The predictive modelling remarks about tool that uses data and statistical methods to forecast future outcomes. Time series analysis is a powerful tool for identifying trends and seasonality in historical stock prices. This research explores building a model to predict stock prices in the IT industry. It utilizes time series analysis of historical data, focusing solely on internal factors without external influences. The study's secondary data was gathered from National stock exchange (NSE). The core methodology involves time series regression analysis and correlation to identify relationships between historical prices and influential internal factors. The research utilizes data from the past two years for a limited set of companies listed on the National Stock Exchange of India (NSE). The study acknowledges limitations like short data period and exclusion of external factors, but highlights the potential of this approach for informing investment decisions, while stressing caution due to market uncertainties.

Keywords: Stock Price Prediction, Time Series Analysis, Regression Analysis, IT-Industry, Internal Factors, NSE (National Stock Exchange).

I. INTRODUCTION

In this study, we employ a methodology that focuses on time series analysis and regression to build a model that can forecast the stock values of companies in the information technology (IT) industry. This study aims to extract internal temporal patterns and historical stock price data of IT companies, unlike typical models that commonly incorporate external elements like economic indicators, news mood, or geopolitical events. The goal of simplifying the model and zeroing down on the internal dynamics of the IT business is the driving force for removing external components. The research tries to capture the underlying patterns and behaviors within the stock values of IT companies, unfiltered by external influences, by reducing the scope to internal variables. This intentional decision simplifies the model and tackles worries about the external variables, which are frequently unpredictable and unmanageable. This study primarily makes use of regression analysis on time series data for its analytical purposes. Finding the connections between past stock prices and the many internal variables that might affect them is possible with the use of regression analysis. This study aims to lay the groundwork for predictive modelling by modelling and quantifying these correlations using regression techniques applied to time series data. This research is best set against the backdrop of the information technology sector, which is known for its fast innovation rate and unpredictable market. The IT industry is a fascinating subject for creating a predictive model that can adapt and capture the internal peculiarities of this sector because of the problems and opportunities it offers due to its dynamic nature. Providing an internally-driven, targeted predictive model for IT industry stock prices is the ultimate goal of this project, which aims to contribute to financial forecasting. By carefully applying regression analysis to time series data, this study seeks to improve the precision of stock price forecasts, providing a useful resource for financial experts and investors dealing with the complexity of the dynamic IT industry.

II. METHODOLOGY

Problem Statement:

The IT industry's dynamic nature and market volatility necessitate accurate stock price predictions. A predictive model, leveraging time series analysis, is crucial for informed decision-making by investors, businesses, and policymakers.

- **Market Volatility:** Swift changes in technology, regulations, and global conditions create stock price fluctuations, demanding precise predictions for informed investments.

- Investor Confidence A reliable predictive model boosts investor confidence, aiding effective navigation of the volatile IT market.
- Business Strategy: Accurate forecasts benefit IT companies in strategic decisions, contributing to long-term success.
- Policy Implications: Governments can utilize stock price predictions to assess and regulate the IT industry, promoting growth and stability.
- Technological Advancements: Ongoing advances in machine learning offer opportunities to enhance predictive models, aligning with the IT industry's innovative focus.

Research Design

In this study, I selected a cross-sectional research approach. A cross-sectional study entails the examination of data collected from a population at a single, precise moment in time. The selection of participants in this study is based on certain variables of interest. Cross-sectional studies are commonly employed in developmental psychology, as well as in various other fields such as social science and education. Cross-sectional studies are a type of observational research that is descriptive in nature. They do not establish causation or relationships, and so cannot be used to determine the cause of a phenomenon, such as an illness. Researchers collect data from a population without altering any variables. This type of research can be employed for identifying the characteristics that are present in a community, but it is not suitable for establishing causal correlations between different variables. This approach is frequently employed to draw conclusions about potential connections or to collect initial data to substantiate subsequent research and experimentation.

III. MODELING AND ANALYSIS

Hypothesis

H0: There is no significant relationship between the historical stock prices of IT companies and their future stock prices.

H1: There is a significant relationship between the historical stock prices of IT companies and their future stock prices.

- TCS

<i>Observation</i>	<i>Predicted CLOSING PRICE(Y)</i>
1	3335.525381
2	3300.755642
3	3346.433762
4	3316.76587
5	3287.357144
6	3237.226764
7	3326.789702
8	3365.493763
9	3323.969183
10	3389.295298
11	3435.599981
12	3391.148029
13	3365.746238
14	3354.179611
15	3354.758159
16	3396.494676
17	3426.20527
18	3467.457696
19	3503.058261
20	3469.678415
21	3489.297876
22	3450.856326
23	3512.125522
24	3615.473444
25	3632.957985

- Above are the predicted price of the TCS for next 25 months using regression. Where the intercept is 2193.89. P value is 0.021.

- Correlation: -

	Column 1	Column 2	Column 3
Column 1	1		
Column 2	0.458947571	1	
Column 3	0.458947571	1	1

- The correlation coefficient of 0.4589 indicates a weak positive correlation. A weak positive correlation means there's a slightly positive relationship between the two variables.

➤ **WIPRO**

Observation	Predicted CLOSING PRICE(Y)
1	440.9189291
2	445.0962156
3	439.6083805
4	443.1727237
5	446.7059304
6	452.7286664
7	441.968446
8	437.3184845
9	442.3073072
10	434.4589338
11	428.8958225
12	434.2363441
13	437.2881518
14	438.6777829
15	438.6082754
16	433.5939901
17	430.0245166
18	425.0683907
19	420.7912876
20	424.8015904
21	422.4444801
22	427.0629032
23	419.7019338
24	407.2855657
25	405.1849478

- Above are the predicted price of the Wipro limited for next 25 months using regression. Where the intercept is 578.076. P value is 0.0015.

Correlation: -

	Column 1	Column 2	Column 3
Column 1	1		
Column 2	-0.18510802	1	
Column 3	0.18510802	-1	1

- The correlation coefficient of 0.185 indicates a **weak positive correlation**. While the coefficient is positive, it's very close to zero, meaning the positive trend is weak. There might be a slight tendency for the variables to increase together, but it's not a very strong relationship.

➤ **INFOSYS**

	Column 1	Column 2	Column 3
Column 1	1		
Column 2	-0.1799431	1	
Column 3	0.1799431	-1	1

Correlation: -

The correlation coefficient of -0.1799431 indicates a **weak negative correlation**. The variables may show a slight tendency to move in opposite directions, but the overall trend is weak.

Observation	Predicted CLOSING PRICE(Y)
1	1522.587272
2	1531.872262
3	1519.674273
4	1527.596854
5	1535.450227
6	1548.837158
7	1524.920067
8	1514.584446
9	1525.673265
10	1508.22843
11	1495.863122
12	1507.733673
13	1514.517025
14	1517.605803
15	1517.451306
16	1506.305892
17	1498.371907
18	1487.355765
19	1477.848909
20	1486.762739
21	1481.523514
22	1491.789033
23	1475.427567
24	1447.829302
25	1443.16019

Above are the predicted price of the Wipro limited for next 25 months using regression. Where the intercept is 1827.45. P value is 5.32.

IV. RESULTS AND DISCUSSION

- The P- value for the historical prices of TCS and Sensex is 0.021.
- A p-value of 0.021 falls below the common significance level of 0.05, suggesting there is statistically significant evidence to reject the null hypothesis (H0). This means the observed relationship between historical TCS and Sensex prices is unlikely to be purely due to chance.
- The correlation coefficient of 0.4589 indicates a weak positive correlation.
- The P- value for the historical price of Wipro limited is 0.3757.
- This suggests that there is not enough statistical evidence to reject the null hypothesis (H0).
- The correlation coefficient of 0.185 indicates a weak positive correlation.
- The P- value for the historical price of Infosys is 0.3893.
- This suggests that there is not enough statistical evidence to reject the null hypothesis (H0).
- The correlation coefficient of -0.1799431 indicates a weak negative correlation.

V. CONCLUSION

This research investigated the potential of a time series model, built using internal factors and regression analysis, to predict stock prices in the IT sector. The analysis focused on data from the past two years for a limited set of companies listed on the National Stock Exchange of India (NSE). The model showed a promising but weak positive correlation (0.4589) between historical and predicted prices for TCS, with a statistically significant p-value of 0.021. This suggests a connection between the two, but the strength of the relationship is low. For Wipro (p-value = 0.3757) and Infosys (p-value = 0.3893), the model didn't find enough evidence (p-value greater than 0.05) to reject the possibility that the relationship between historical and predicted prices could be due to chance, and the correlation coefficients (0.185 and -0.1799, respectively) were also weak.

The study acknowledges limitations such as the short data timeframe, exclusion of external factors, and limited internal data points used. Overall, the results suggest that time series analysis with internal factors might have some potential for predicting IT stock prices, but further development is necessary. Future research could involve incorporating external factors, using a wider range of internal data, and exploring machine learning techniques to improve the model's accuracy. By addressing these limitations and exploring new avenues, researchers can work towards creating more robust models for predicting stock prices in the ever-changing IT industry.

VI. REFERENCES

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