Assignment 1
SIT3005 Time Series and Forecasting Method
Stock Price Forecasting on C3.AI (March 2023- September 2023)

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POTENTIAL GROWTH

- C3.AI Inc is a leading software company that develops and uses software based Artificial Intelligence (AI) Technology to provide solutions for businesses.
- Thomas M. Siebel, the chief executive officer of C3.AI Inc said that C3.AI has increased its market cap, roughly $4 billion and made this company recognized as a gold standard in enterprise AI[1].
- In early 2023, C3.AI has outperformed all technology giants companies like Nvidia, Microsoft and Google in terms of its performance of share price with an incredible 255.3% shares, driven by the positive buzz of potential growth of AI-enabled solutions' implementation among business[2].
- In revenue, C3.AI has increased about 23% over a two year period from $46.1 million in July 2021 to $56.9 million in April 2023 with zero debt.
- Other than that, the fiscal 2024 first quarter shows a better report than the estimates.
- This indicates the growth rate potential for this company and its opportunity to seize the AI market.

TIME SERIES PLOT
1 March 2023 - 31 AUGUST 2023

The sudden drop on 26 June 2023 was due to the misleading of accounting practices.

The maximum stock price recorded on 15 June with $46.4 was due to the company capitalization of AI application & services demand

The decreasing trend in August 2023 was due to the low earnings for quarter 1 2023 due to the company's strategy to priotize AI investment over profit.

The large drop on 2nd May 2023 was due to the low subscriptions on pricing model resulting in the revenue loss.

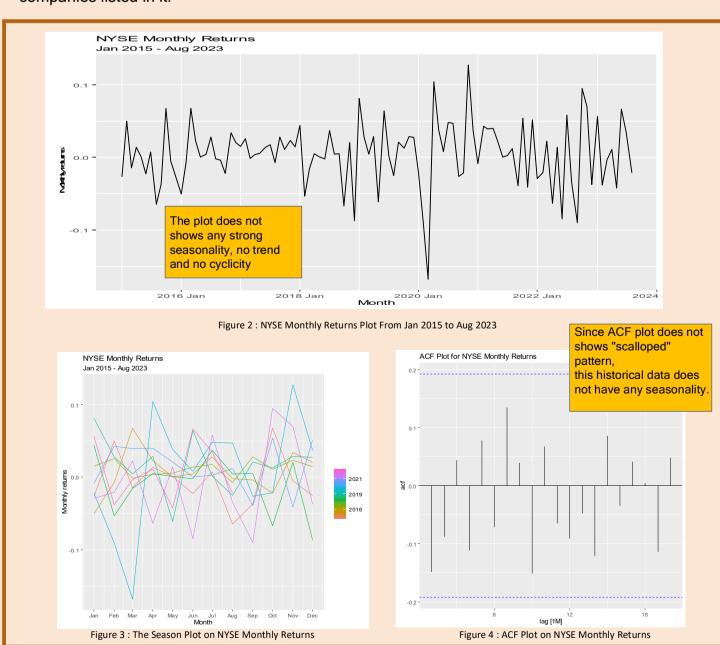Figure 1 : Closing Stock Price from March to Sept 2023

- The plot shows strong fluctuations between day 1 and day 24 (1st March to 3rd April) and between day 57 and day 106 (19th May to 1st August).
- The large drop on 2nd May (day 44) with $17.2 was due to the decrease of the business subscriptions for the pricing model, resulting in slowing down the revenues[3].
- However, the stock has been increased back due to the high demand where C3 AI has received bookings from various industries.

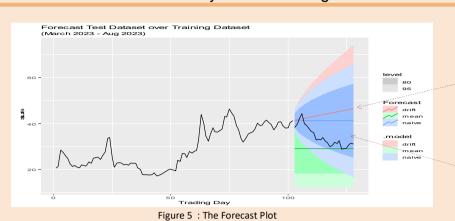## SEASONALITY FOR NYSE STOCK INDEX
1 JAN 2015 - 31 AUGUST 2023

- The New York Stock Exchange (NYSE) does influence C3.AI stock price since C3.AI is one of the companies listed in it.

The plot does not shows any strong seasonality, no trend and no cyclicity.

Figure 2 : NYSE Monthly Returns Plot From Jan 2015 to Aug 2023

Since ACF plot does not shows "scalloped" pattern, this historical data does not have any seasonality.

Figure 3 : The Season Plot on NYSE Monthly Returns

Figure 4 : ACF Plot on NYSE Monthly Returns

- From Figure 3, the monthly returns in July and December do have an increasing and decreasing trend respectively for every year except for Year 2020. This may be due to the economic changes during the pandemic Covid 19 in Year 2020.
- If the investors just rely on the Season Plot, where the investors will buy this stock markets when the return is low in December and sell when the retun is high in July every year without further analysis on other factors like news articles related to the C3 AI company, it is actually very risky.
- Hence, it is hard for the investors to get an insight into when to buy and when to sell the stock market since the monthly returns plot for NYSE Stock Index does not show any strong seasonality for the investors to make reliable decisions.

CHOOSING THE BEST FORECASTING METHOD

- To select the best forecasting method, the data set has been split into training and test set using 8:2 ratio.
- The training data set was set from 1 March 2023 to 26 July 2023 which is from day 1 to day 102 while the test set was from 27 July 2023 to 31 August 2023.

The Naive and Mean forecasting method are suitable since it gives quite close forecast on the test set while Drift forecasting method gives distant forecast where it shows an increasing trend on the declining trend of the test set.

Figure 5 : The Forecast Plot

The Naive forecast lies perfectly inside the 80% prediction interval.

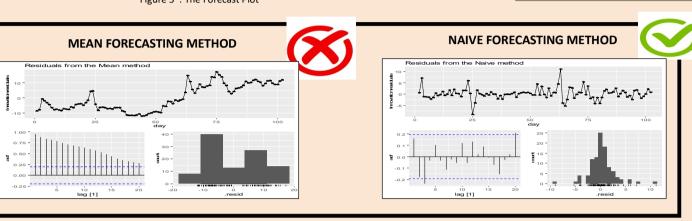**MEAN FORECASTING METHOD** ❌

NAIVE FORECASTING METHOD ✅

Figure 6 : The Residual Analysis on Mean and Naive Forecasting Method

- From Figure 6, we can see that the mean residuals for Mean forecasting method are not close to 0 and the residuals series are correlated
- So, the Mean forecasting method might not be the best forecasting method.
- The Naive forecasting method might be the best forecasting method since the mean residuals are approximately close to 0 and the residuals series are uncorrelated where it resembles white noise from the Ljung-Box Test.
- It shows that the Naive method produces forecasts that have taken into account all available information.

FORECAST 14 TRADING DAYS' CLOSING STOCK PRICE USING NAIVE FORECAST METHOD

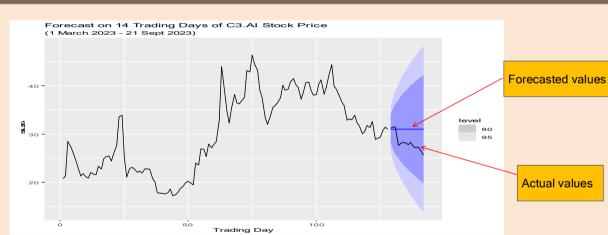Forecasted values

Actual values

Figure 7 : Forecast Plot on 14 Consecutive Trading Days (1 Sept 2023 - 21 Sept 2023)

SIMILARITIES/DIFFERENCES BETWEEN ACTUAL AND FORECASTED VALUES

- Naive forecasting method use the approach to forecast the future using the same values of the last observation and works well for economic and financial time series.
- From Figure 7, we can see that the actual values are far below than the forecast values where the forecast shows static values from the last observations.
- In this case, the forecast method is not too accurate as it does not take into account the changing market conditions, rapid fluctuations and significant factors.
- This forecast may lead to loss for investors if they believe the forecast 100%.
- However, the actual values do lie perfectly in the 80% prediction interval as the prediction interval is quite wide due to the big variation of the data.
- Hence, this type of forecast may be a benchmark to forecast the future but not 100% accurate.

CONCLUSION

- In the future, I expect that this stock price has a potential to go as high as $50 due to the higher demand of the AI software that will makes more investors to focus on this company's stock price.
- It is also expected that it will go as low as $14 and in the median of $23.5 due to some issues in the company and the mislead of the strategies that will interfere with its earnings.
- In conclusion, C3. AI stock has potential to conquer the AI market in the future.

REFERENCES

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