AMA4602-Project

Data analysis using financial time series data

Group member:

Lai Ka Yuen - 20017365d

Wong Chun Wah – 20017388d

1. Introduction

In this report, we are doing a data analysis using financial time series data. We had chosen a stock database for tesla, which is an American electric vehicle and clean energy company.

2. Previous work

For the Previous work, it was mostly related to data collection. We just downloaded a CSV file by using the python function.

3. Data description

There are 1008 data and 7 attributes for the database. The 1008 data correspond to the last 4 years of tesla's stock data, which is from 31/12/2015 to 2 /1/2020. We are just using two attributes to create the time series model, which is the Date and Closing price of the stock.

4. Potential importance of study or results

The stock of tesla is one of the most-watched stocks in the world. Following the google statistic, Tesla is the most Googled stock of 2021. It can reflect that the market attention for tesla is huge. Therefore, doing data analysis for stock tesla would be helpful for Stockholders to generate strategies.

5. Layout of report

The report will provide the code and corresponding comment of the data analysis.

The code:

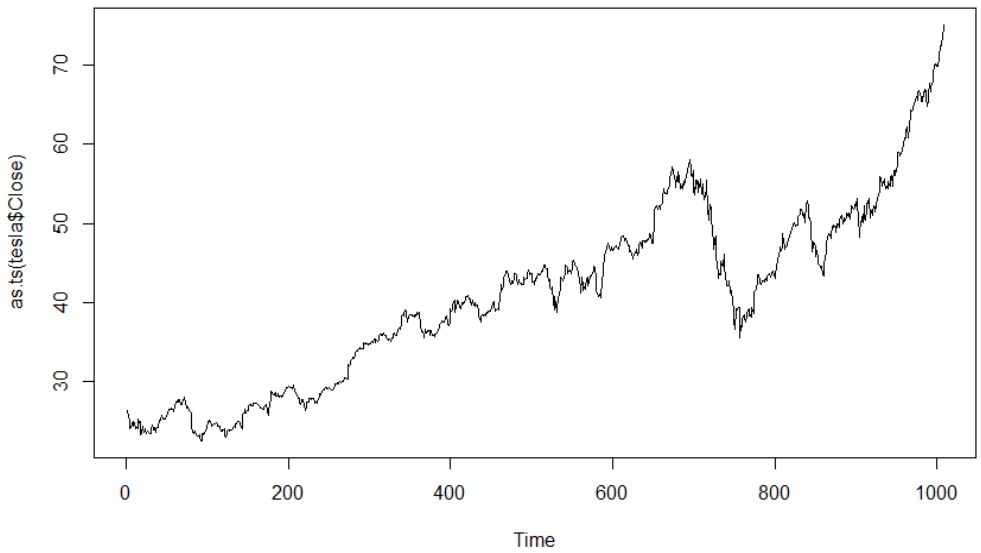
In this project, we are using R programming to write the code.

1. First, import libraries in r. After that read the csv file into a data frame and plot line graph with the closing price of the tesla from 31/12/2015 to 2 /1/2020.

The r code:

```
1  library(TSstudio)
2  library(xts)
3  install.packages("forecast")
4  library(forecast)
5
6  #using 4 years tesla stock data (2016-2019)
7  tesla <- read.csv(file = 'tesla.csv')
8
9  plot(as.ts(tesla$Close))
```

The line graph:



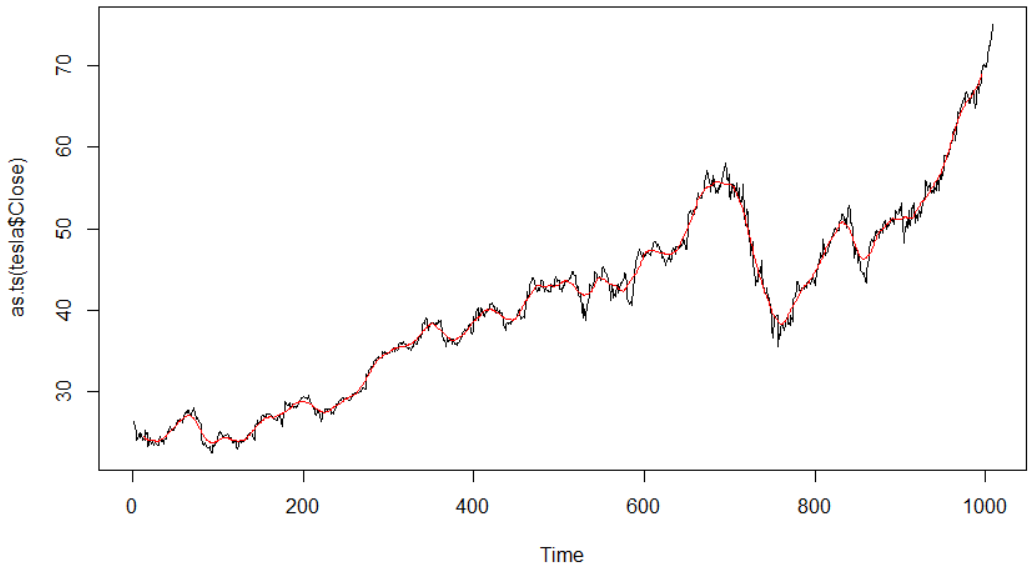
2. Second, we try to detect the trend by using a moving average window of 24 for de-seaonalization and plot the line of the trend.

The r code:

```
#detect the trend
#using moving average window of 24 for de-seaonalization
trend_tesla = ma(tesla$close, order = 24, centre = T)
plot(as.ts(tesla$close))

#ma line
lines(trend_tesla,col="red")
```

The line of the trend (the red one):

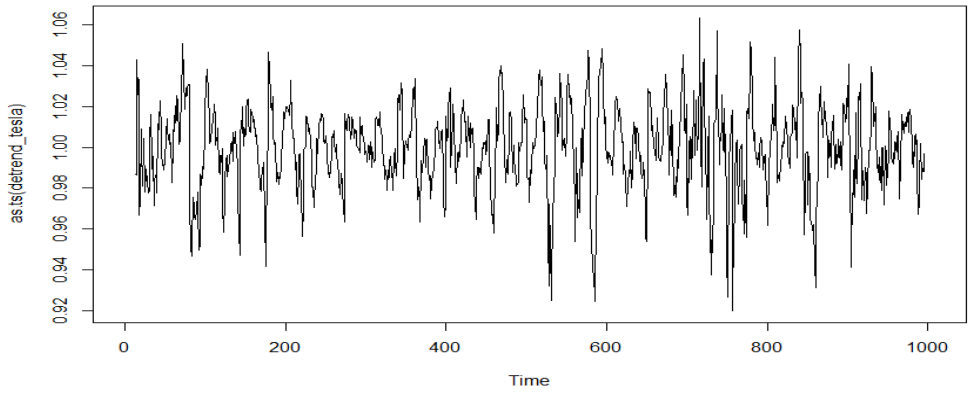


We can find it is not straight line. However, we could still conclude the trend of stock of tesla is mostly positively increased.

3. Then, we try to detrend the Time Series for finding the seasonality.
The r code:

```
#Detrend the time-series
detrend_tesla = tesla$Close / trend_tesla
plot(as.ts(detrend_tesla))
```

The graph:

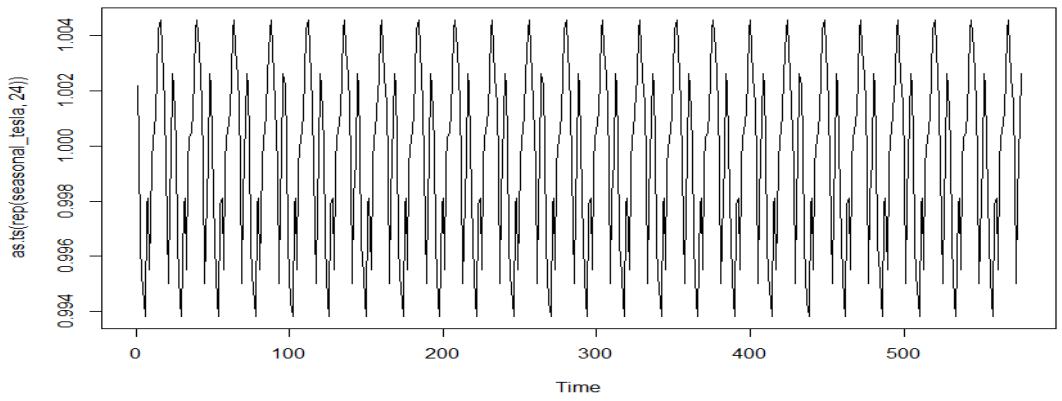


4. Next, we calculate the average of the Seasonality by using matrix.

The r code:

```
#Using matrix to calculate the average of the Seasonality
m_tesla = t(matrix(data = detrend_tesla, nrow = 24))
seasonal_tesla = colMeans(m_tesla, na.rm = T)
plot(as.ts(rep(seasonal_tesla,24)))
```

The graph:



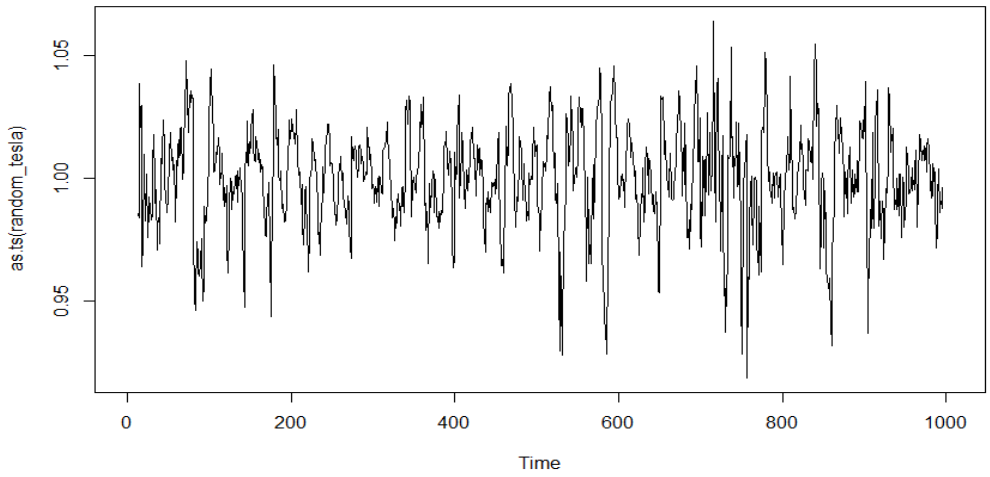
We can find that the graph has present by a pattern, which is a monthly seasonality.

5. To the following, we find the remaining part which is the random noise and plot it.

The r code:

```
#check the random noise
random_tesla = tesla$Close / (trend_tesla * seasonal_tesla)
plot(as.ts(random_tesla))
```

The graph:

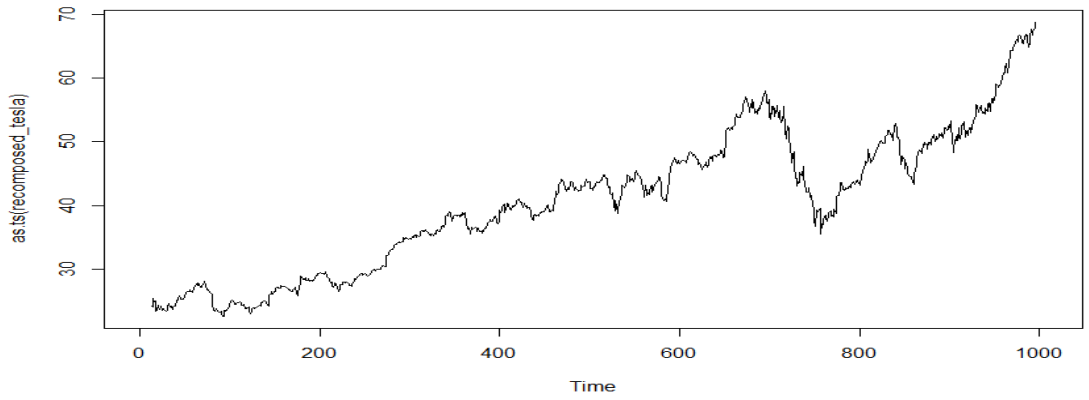


6. Finally, we find the model by two methods. One is a recomposition of decomposed time series model and the other one is using the decomposition.

The r code of Method1:

```
32  #recompoistion of decomposed time series model
33  recomposed_tesla = trend_tesla*seasonal_tesla*random_tesla
34  plot(as.ts(recomposed_tesla))
```

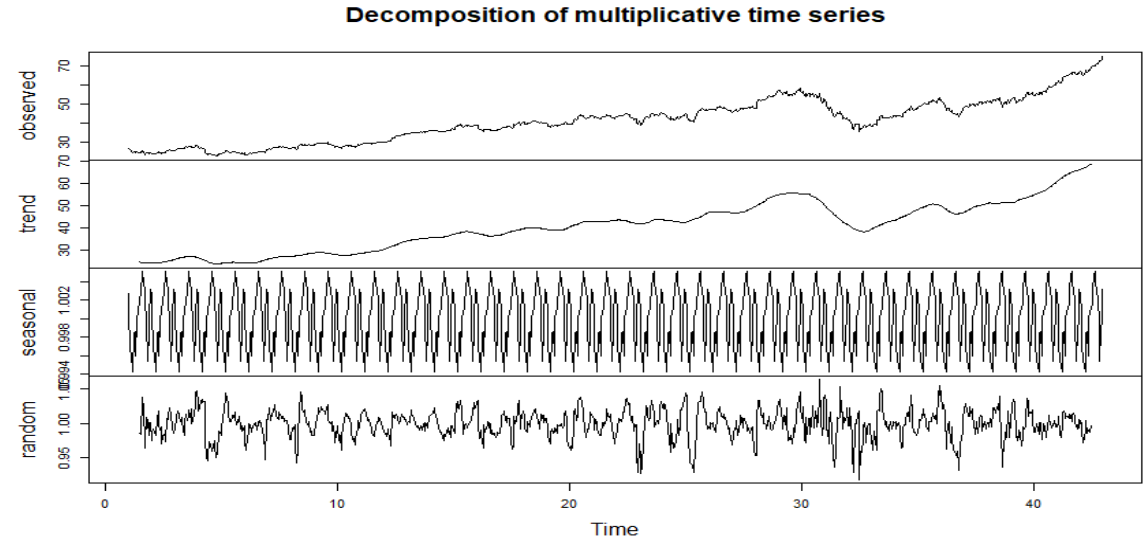
The graph of method1:



The r code of Method2:

```
32  #recompoistion of decomposed time series model
33  recomposed_tesla = trend_tesla*seasonal_tesla*random_tesla
34  plot(as.ts(recomposed_tesla))
35
```

The graph of method2:



Conclusion

After the whole data analysis, we did find the trend and seasonality exist on the stock closing price of tesla. This finding is very useful for all stockholders as a reference to predict the future stock price of tesla and build up the following strategies.