Loreal Stock Time Series analysis

Submission to

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Loreal Stock:

For Analysis Loreal adjusted stock prices were taken and analysis is done.

This id the graph of the stock

Step 1: Checking stationarity of the stocks

We can check this by using Augmented Dickey-Fuller (ADF) test.

The Augmented Dickey-Fuller (ADF) test assesses whether a time series is stationary or not by examining the presence of a unit root. The test statistic is compared to critical values: rejecting the null hypothesis suggests stationarity. A small p-value (< 0.05) further supports the conclusion. The ADF test is a fundamental tool in time series analysis for selecting appropriate models.

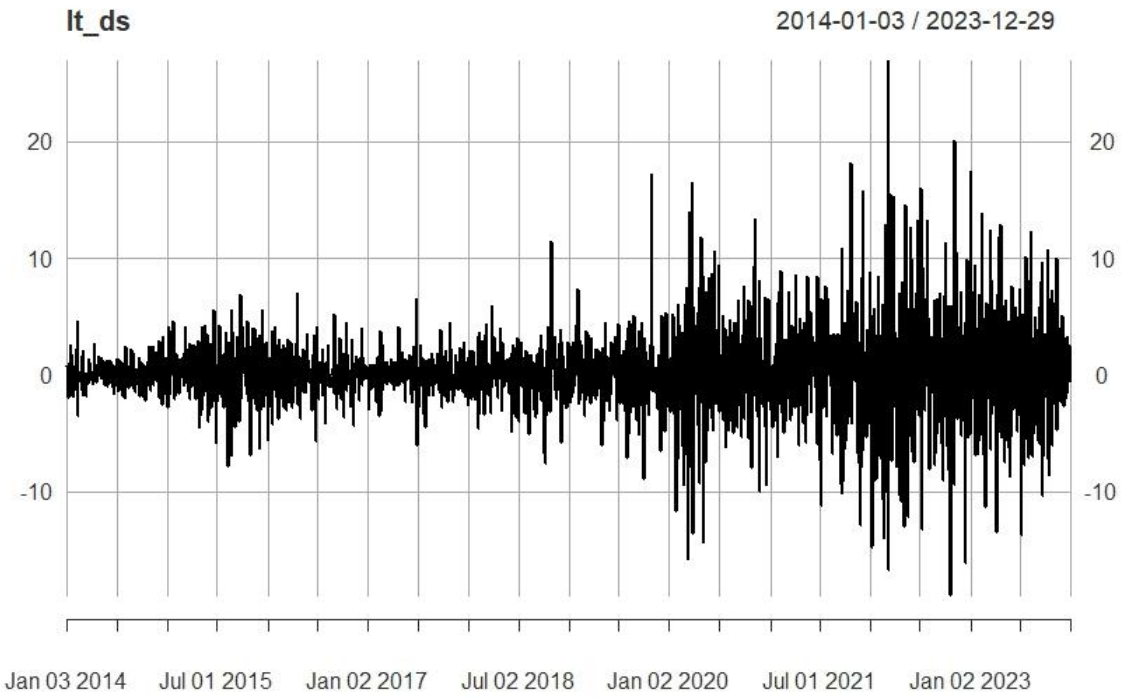
Null Hypothesis H0 : No Stationarity

Alternative Hypothesis H1 : Stationarity

Result : No Stationarity

Remodeling data

Taking first difference an again running ADF test



Result : Stationarity

Step 2: Checking Auto correlation of the stocks

We can check this by Ljung-Box Test

Null Hypothesis H0 : No Autocorrelation

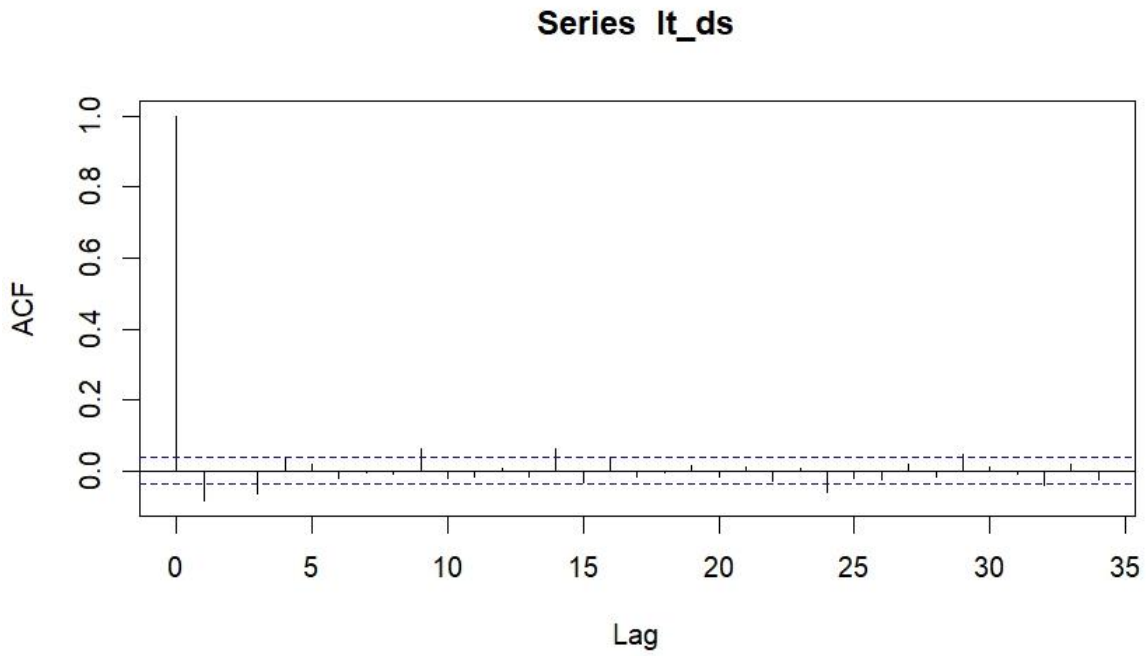
Alternative Hypothesis H1 : Autocorrelation

The Ljung-Box test is used to assess the presence of autocorrelation in a time series. It examines whether any autocorrelation exists at different lags. The test compares observed autocorrelation coefficients to their expected values under the null hypothesis of no autocorrelation. A significant test statistic indicates rejection of the null hypothesis, suggesting the presence of autocorrelation in the data.

Result : Autocorrelated

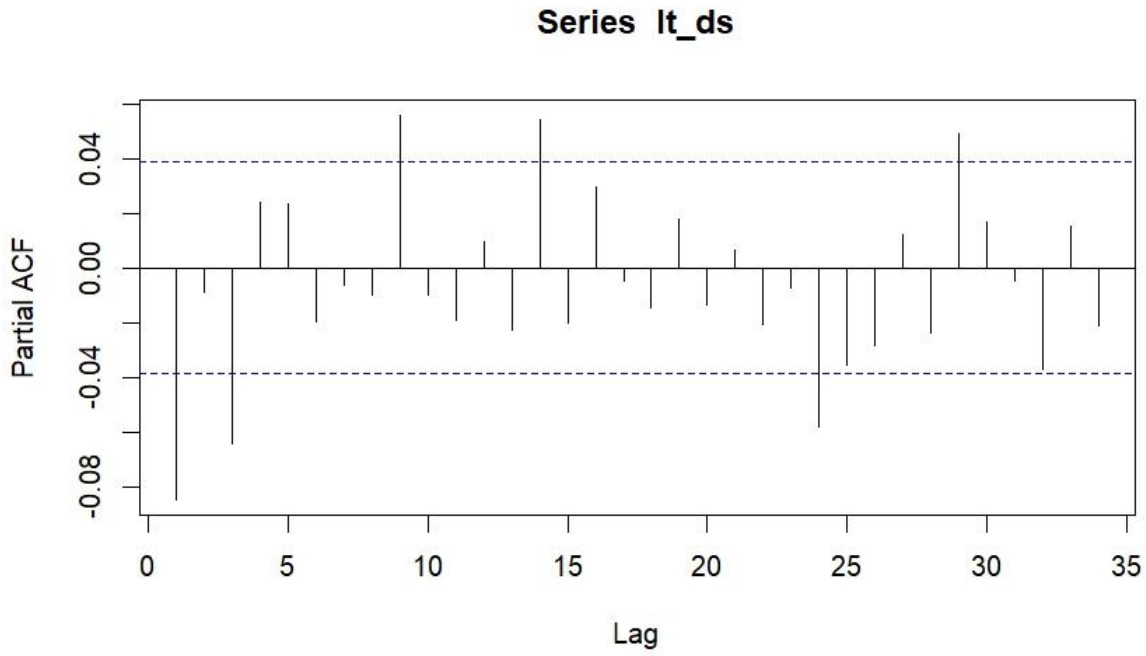
Step 3: ARIMA Modelling

ACF



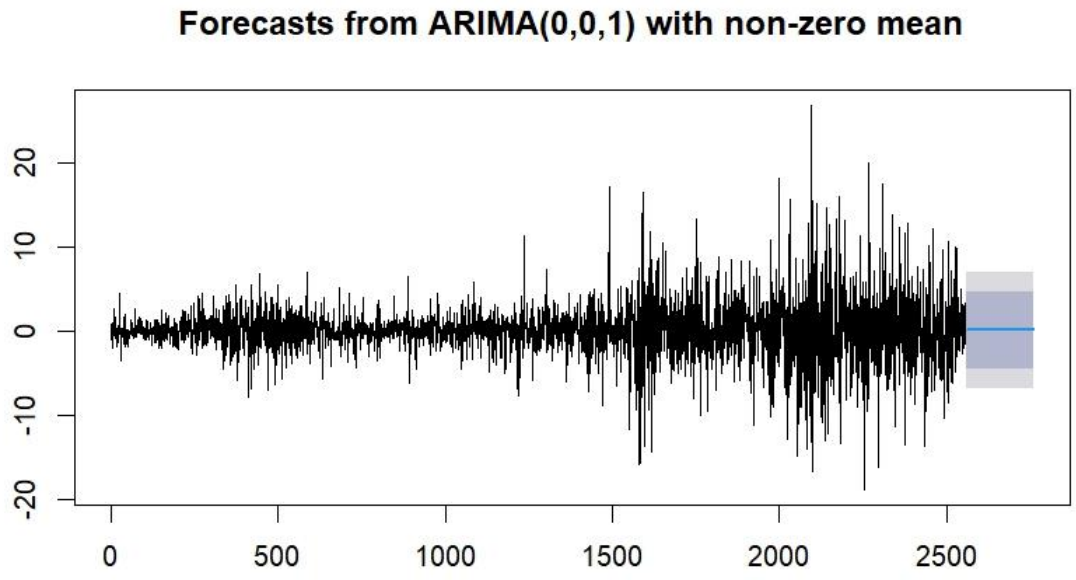
Lag is around 1

PACF



Lag is around 10

Using auto Arima to model
Result : (0,0,1)
Forecasting though auto arima



Checking residuals are auto correlated using box test
Result: No correlation

Step 4: Heteroskedasticity
Using ARCH test for finding Heteroskedasticity
Null Hypothesis H0 : No Heteroskedasticity

Alternative Hypothesis H1 : Heteroskedasticity

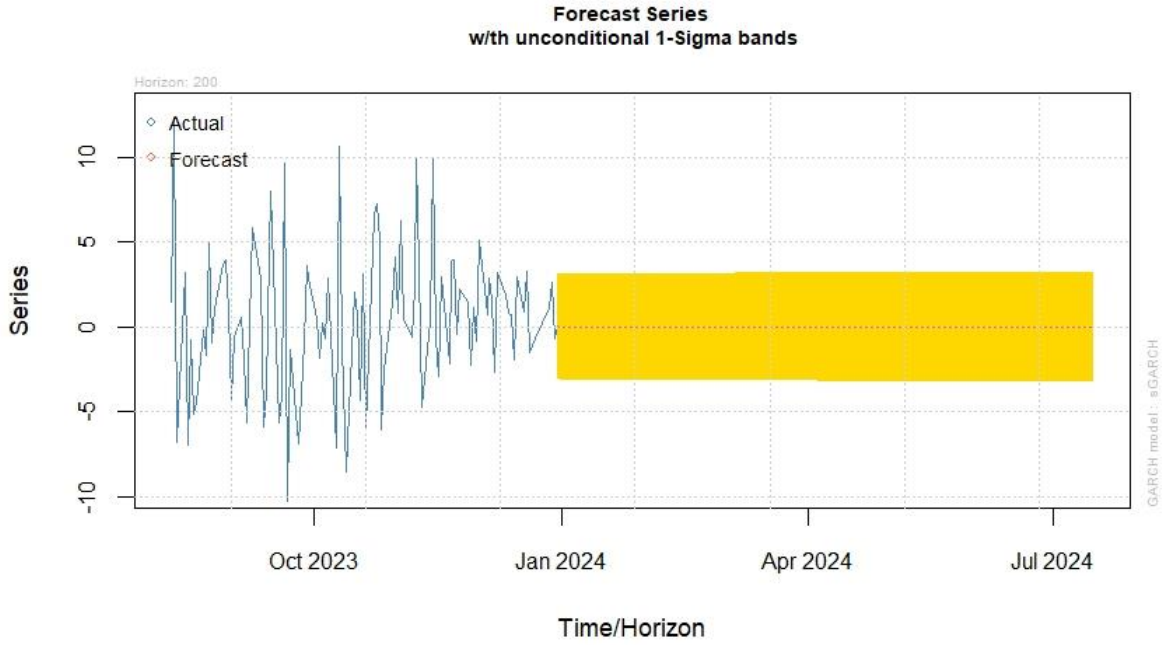
The ARCH test assesses for conditional heteroskedasticity in the residuals of a time series model. It examines whether the squared residuals exhibit significant autocorrelation. A significant test statistic suggests the presence of ARCH effects. Use the `ArchTest()` function in R, specifying the number of lags (`lags`), to perform the test and interpret the results.
Result : presence of Heteroskedasticity

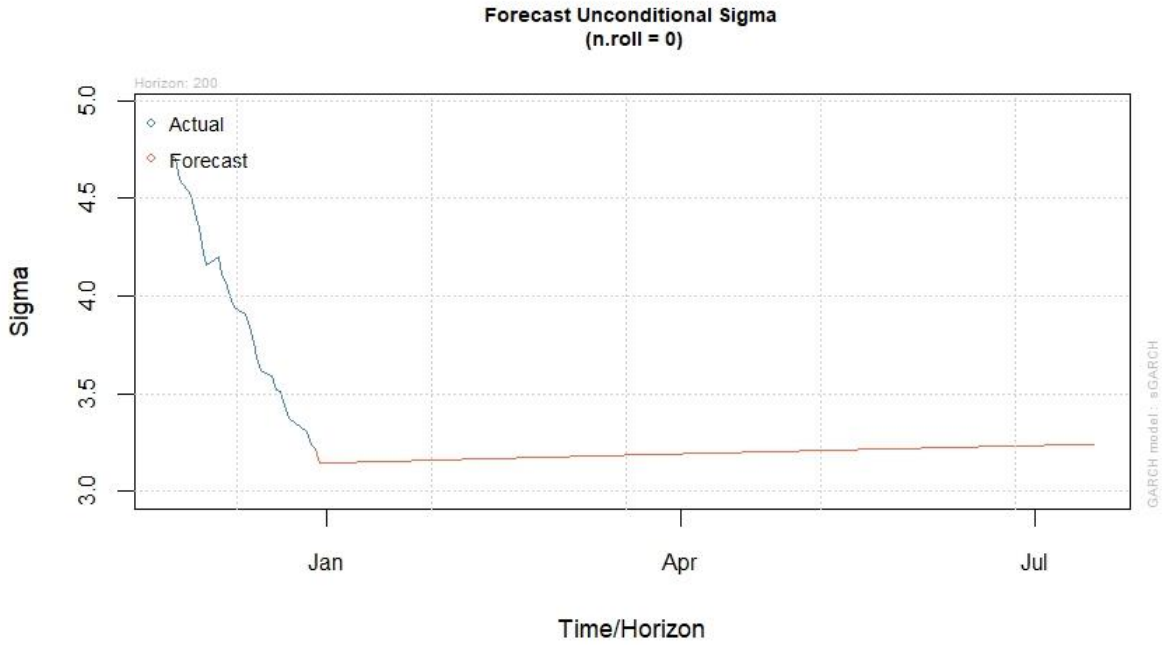
Step 5: GARCH modelling

GARCH, or Generalized Autoregressive Conditional Heteroskedasticity, is a type of time series model used to analyze and forecast volatility in financial data. It extends autoregressive models by incorporating past variance or squared residuals to capture time-varying volatility patterns, such as volatility clustering. GARCH models are characterized by their ability to model the conditional variance of a time series as a

function of its own past values and past squared residuals. They are widely used in finance for risk management, option pricing, and portfolio optimization due to their ability to capture volatility dynamics over time.

Forecasting of 200 points is done through Grach model, the results are





Conclusion :
The forecast suggests that the returns will be increasing over next few months.