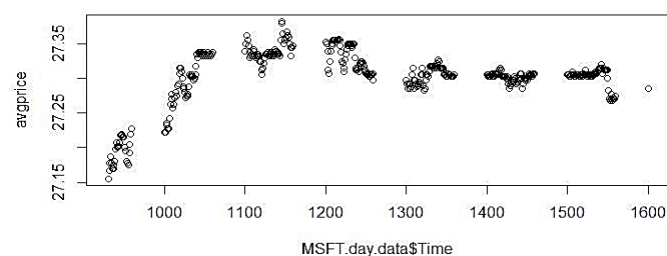
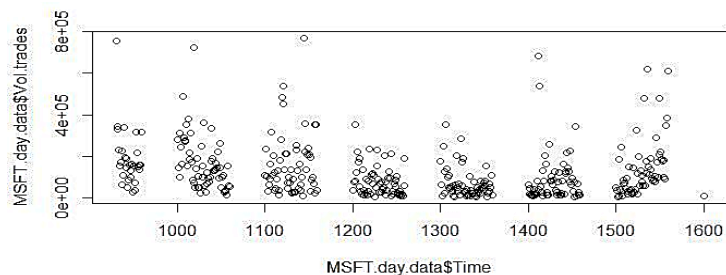


Time series forecasting using Microsoft stock data

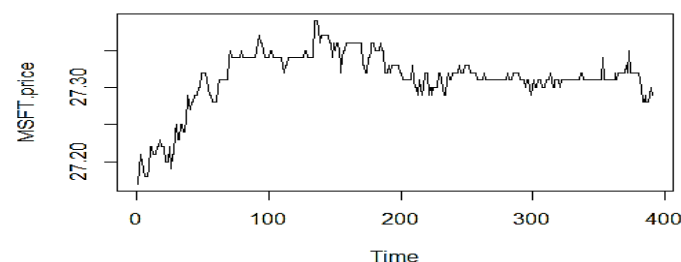
Average stock price



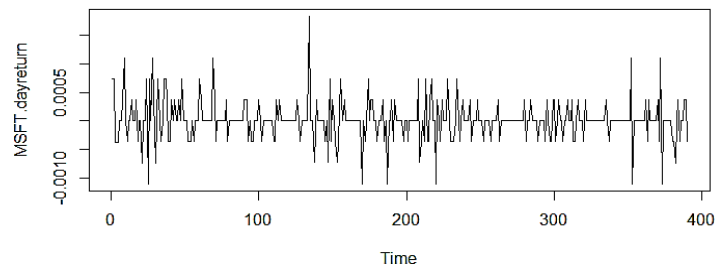
Volume of trades



Before differencing



After differencing



Fitting ARIMA Model

```
> model15=arima(MSFT.dayreturn, order=c(3,0,3))
```

```
> summary(model15)
```

```
arima(x = MSFT.dayreturn, order = c(3, 0, 3))
```

Coefficients:

| | ar1 | ar2 | ar3 | ma1 | ma2 | ma3 | intercept |
|------|--------|---------|--------|---------|--------|---------|-----------|
| | 0.3739 | -0.6744 | 0.3638 | -0.4925 | 0.6407 | -0.5845 | 0e+00 |
| s.e. | 0.1786 | 0.1755 | 0.1633 | 0.1598 | 0.1674 | 0.1415 | 1e-04 |

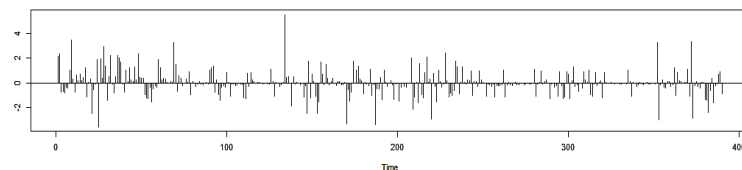
sigma^2 estimated as 1.08e-07: log likelihood = 2574.47, aic = -5132.95

Training set error measures:

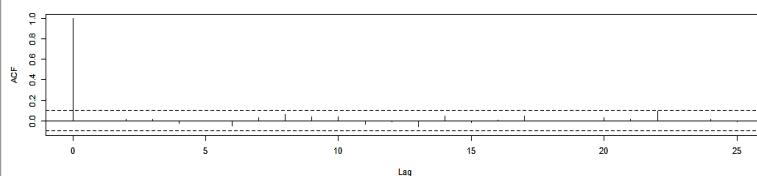
| | ME | RMSE | MAE | MAPE | MASE | ACF1 |
|--------------|--------------|--------------|--------------|------|-----------|--------------|
| Training set | 1.108385e-06 | 0.0003286605 | 0.0002090057 | Inf | 0.6788577 | -0.003045335 |

The below ACF plot shows that there is no auto correlation. The third plot below is the result of Ljung Box test, we can see that all the p-values are above the significance level, which means we can accept the null hypothesis of independence.

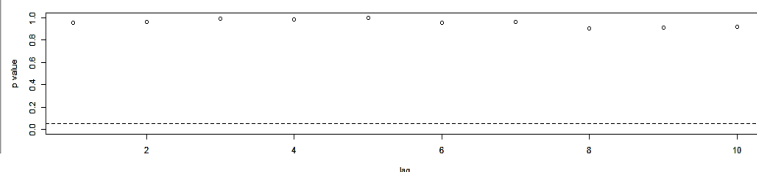
Standardized Residuals



ACF of Residuals



p values for Ljung-Box statistic



Forecasts from ARIMA(3,0,3) with non-zero mean

