HW Quant Wk.5

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```r
library(quantmod)
```

```
## Loading required package: xts

## Warning: package 'xts' was built under R version 3.4.3

## Loading required package: zoo

## Warning: package 'zoo' was built under R version 3.4.3

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

## Loading required package: TTR

## Version 0.4-0 included new data defaults. See ?getSymbols.
```

```r
library(timeSeries)
```

```
## Loading required package: timeDate

##
## Attaching package: 'timeSeries'

## The following object is masked from 'package:zoo':
##
##     time<-
```
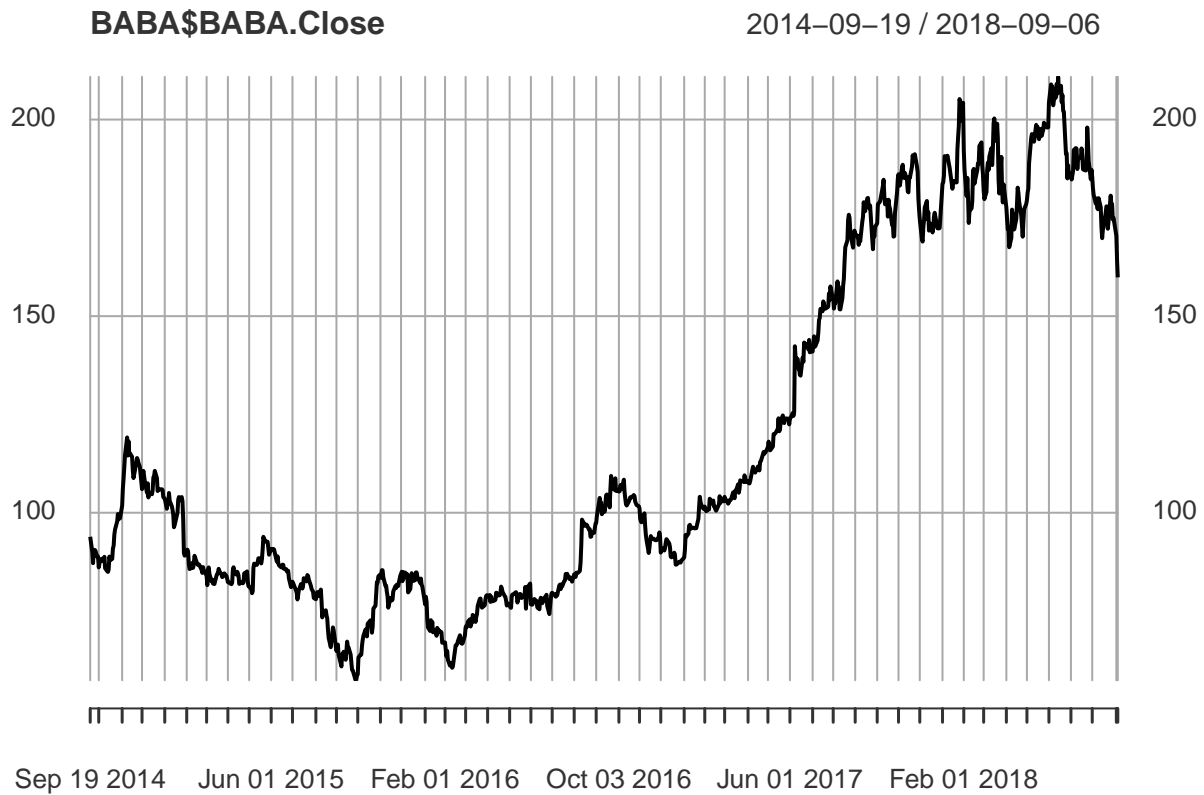
Load stock data named "Alibaba Group"(BABA)

Plot close price of BABA for investigation

```r
getSymbols('BABA')
```

```
## 'getSymbols' currently uses auto.assign=TRUE by default, but will
## use auto.assign=FALSE in 0.5-0. You will still be able to use
## 'loadSymbols' to automatically load data. getOption("getSymbols.env")
## and getOption("getSymbols.auto.assign") will still be checked for
## alternate defaults.
##
## This message is shown once per session and may be disabled by setting
## options("getSymbols.warning4.0"=FALSE). See ?getSymbols for details.

##
## WARNING: There have been significant changes to Yahoo Finance data.
## Please see the Warning section of '?getSymbols.yahoo' for details.
##
## This message is shown once per session and may be disabled by setting
## options("getSymbols.yahoo.warning"=FALSE).
```

```
## [1] "BABA"
return = na.omit(diff(BABA))
plot(BABA$BABA.Close)
```

BABA$BABA.Close   2014−09−19 / 2018−09−06

Sep 19 2014   Jun 01 2015   Feb 01 2016   Oct 03 2016   Jun 01 2017   Feb 01 2018

Create return of Alibaba group's stock price

```
return = na.omit(diff(BABA$BABA.Close))
plot(return)
```

return   2014−09−22 / 2018−09−06
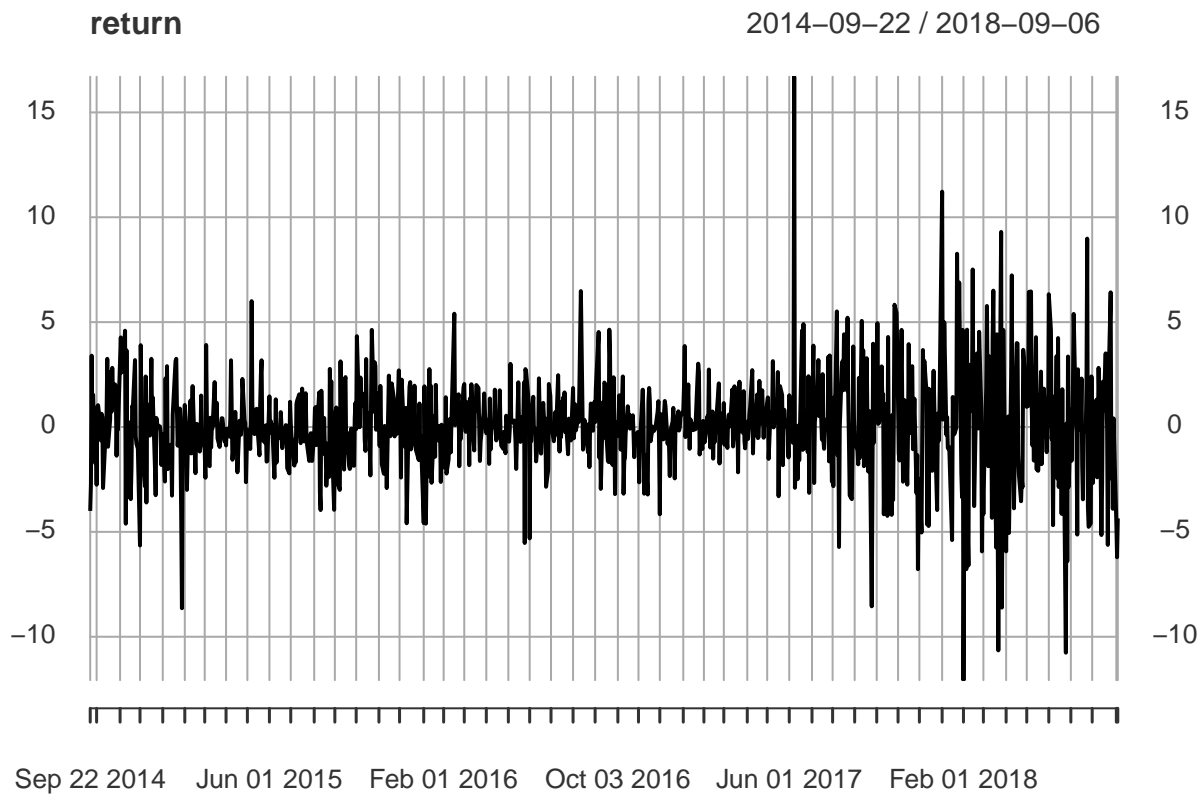
Next, we will prove 3 facts of return ## 1. distribution of returns is not normal
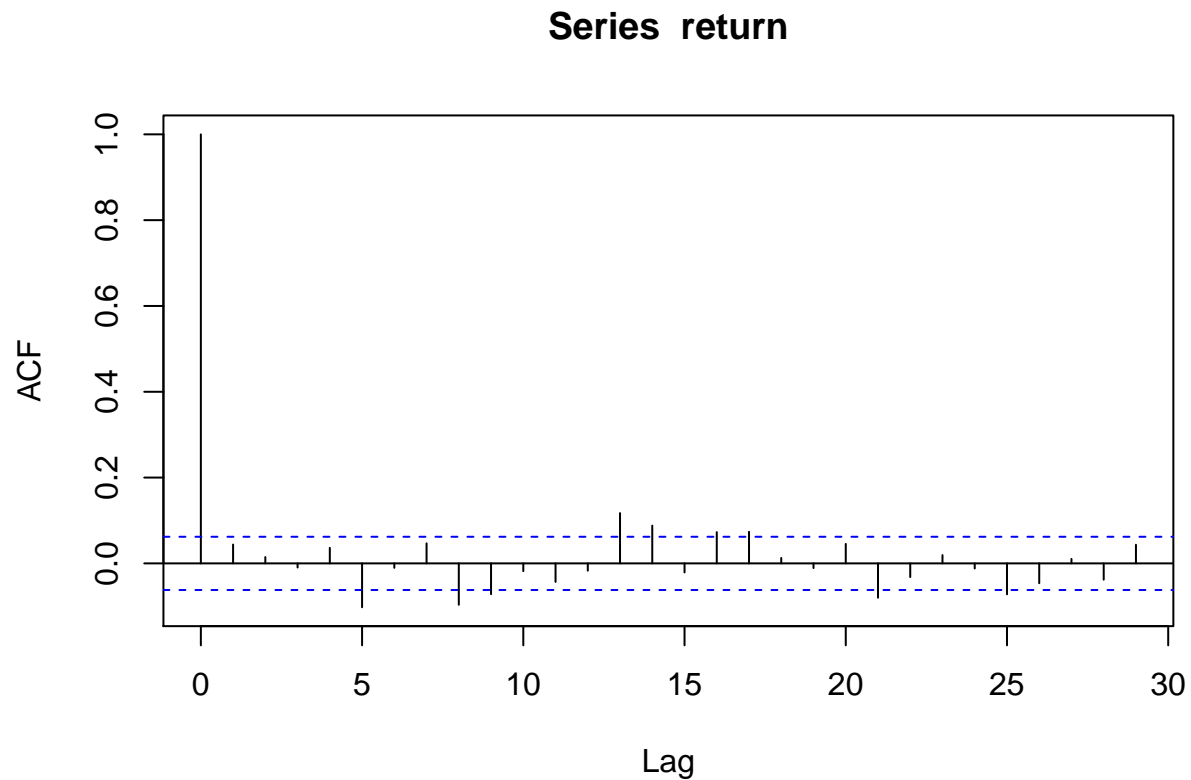
```r
hist(return, breaks = "Scott", probability = T)
curve(dnorm(x,mean=mean(return),sd=sd(return)),col='red',add=T,main="")
```

Histogram of return
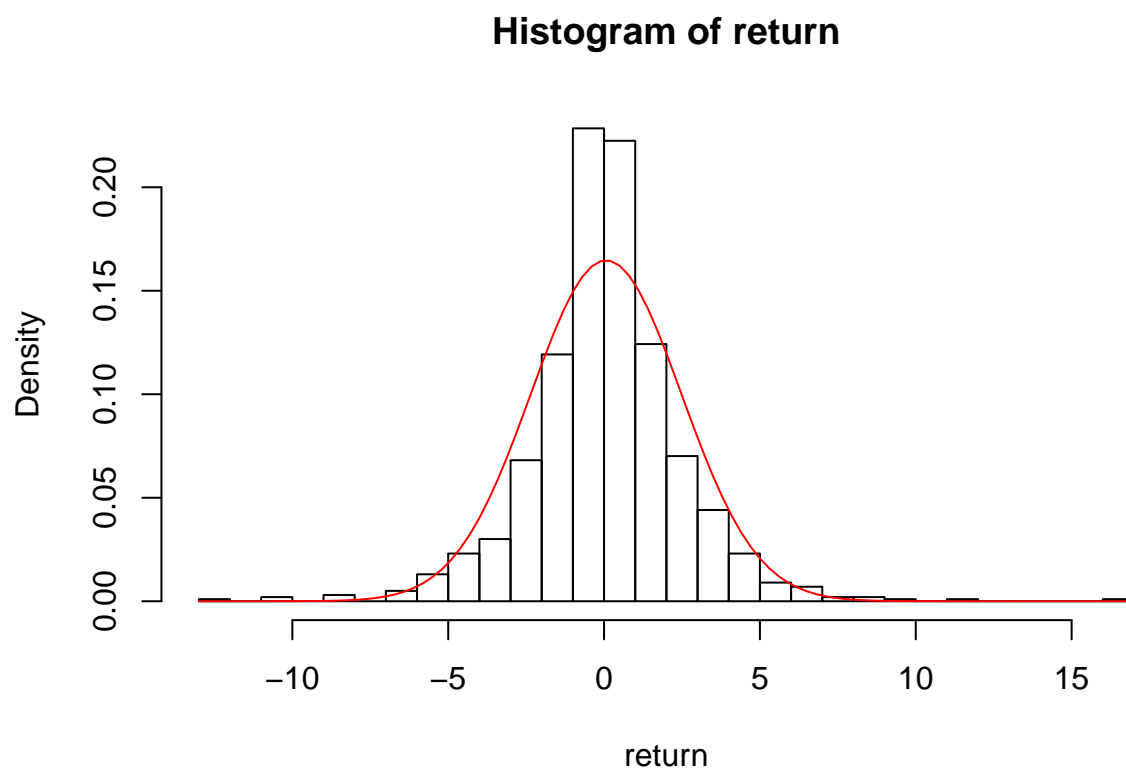
For Alibaba Group's stock, the distribution seem like "Normal" but a little skew to the left.

2.There is almost no correlations between returns for different days.

```
acf(return)
```
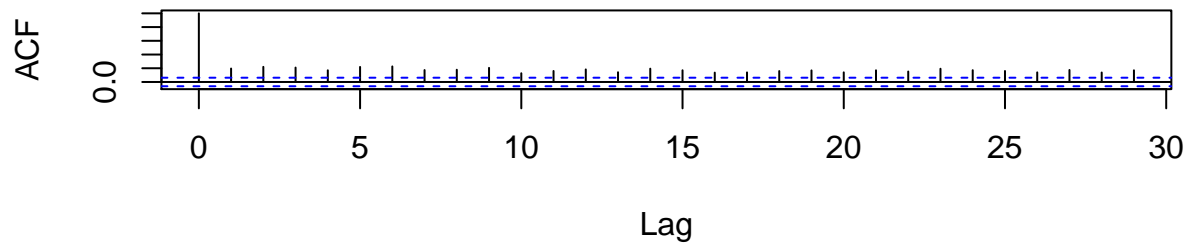
Series return

From the graph above, the second rule is quite true since autocorrelations are quite small.
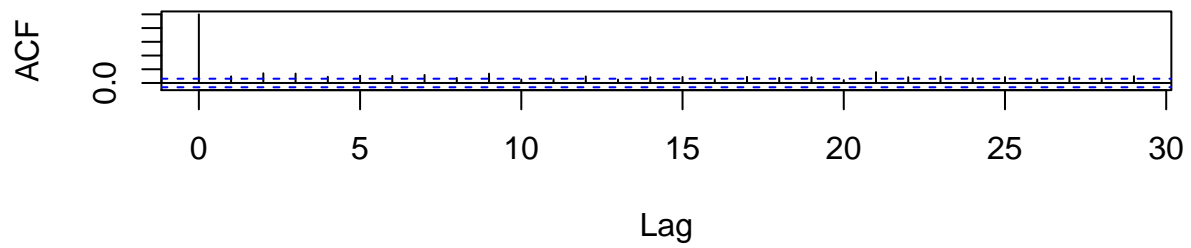
3. There is positive dependence(autocorrelations) between absolute returns on nearby days, and likewise for squared returns.

```r
par(mfrow = c(2,1))
acf(abs(return))
acf(return^2)
```

Series abs(return)

Series return^2

It is confirmed that there is positive dependency between absolute return in nearby days.