assignment2_jaruvit.r

Phumj

2021-02-10

```
#install.packages("quantmod")
#install.packages("fBasics")
#install.packages("sn")
#install.packages("PerformanceAnalytics")
#install.packages("car")
#install.packages("tseries")
#install.packages("forecast")
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

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

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
library(fBasics)
```

```
## Loading required package: timeDate
```

```
## Loading required package: timeSeries
```

```
##
## Attaching package: 'timeSeries'
```

```
## The following object is masked from 'package:zoo':
##
##     time<-
```

```
##
## Attaching package: 'fBasics'
```

```
## The following object is masked from 'package:TTR':
##
##     volatility
```

```
library(sn)
```

```
## Loading required package: stats4
```

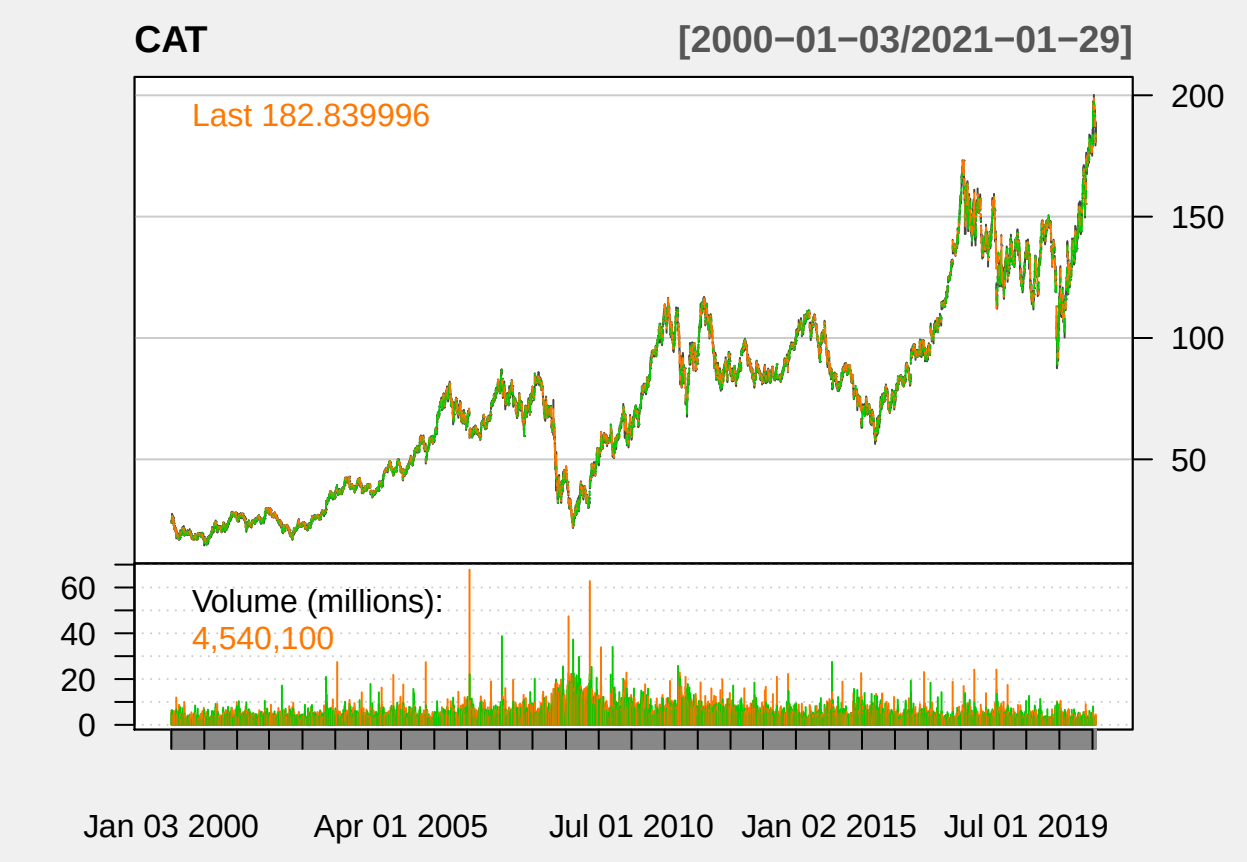
```
##
## Attaching package: 'sn'
## The following object is masked from 'package:fBasics':
##
##     vech
## The following object is masked from 'package:stats':
##
##     sd
library(PerformanceAnalytics)
##
## Attaching package: 'PerformanceAnalytics'
## The following objects are masked from 'package:timeDate':
##
##     kurtosis, skewness
## The following object is masked from 'package:graphics':
##
##     legend
library(car)
## Loading required package: carData
##
## Attaching package: 'car'
## The following object is masked from 'package:fBasics':
##
##     densityPlot
library(tseries)
library(forecast)
getSymbols("CAT",from="2000-01-03",to="2021-01-31")
## '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.
## [1] "CAT"
dim(CAT)
## [1] 5303    6
head(CAT)
##            CAT.Open CAT.High  CAT.Low CAT.Close CAT.Volume CAT.Adjusted
## 2000-01-03 23.84375 24.50000 23.84375  24.31250    5055000     13.75500
## 2000-01-04 24.31250 24.87500 24.00000  24.00000    6181400     13.57821
## 2000-01-05 24.00000 25.09375 24.00000  24.56250    6398600     13.89644
## 2000-01-06 25.28125 26.12500 25.28125  25.81250    5140600     14.60364
```

```
## 2000-01-07 26.37500 27.56250 26.37500  26.65625    6360200      15.08100
## 2000-01-10 26.65625 27.28125 25.75000  25.78125    3682200      14.58597
```

```
tail(CAT)
```

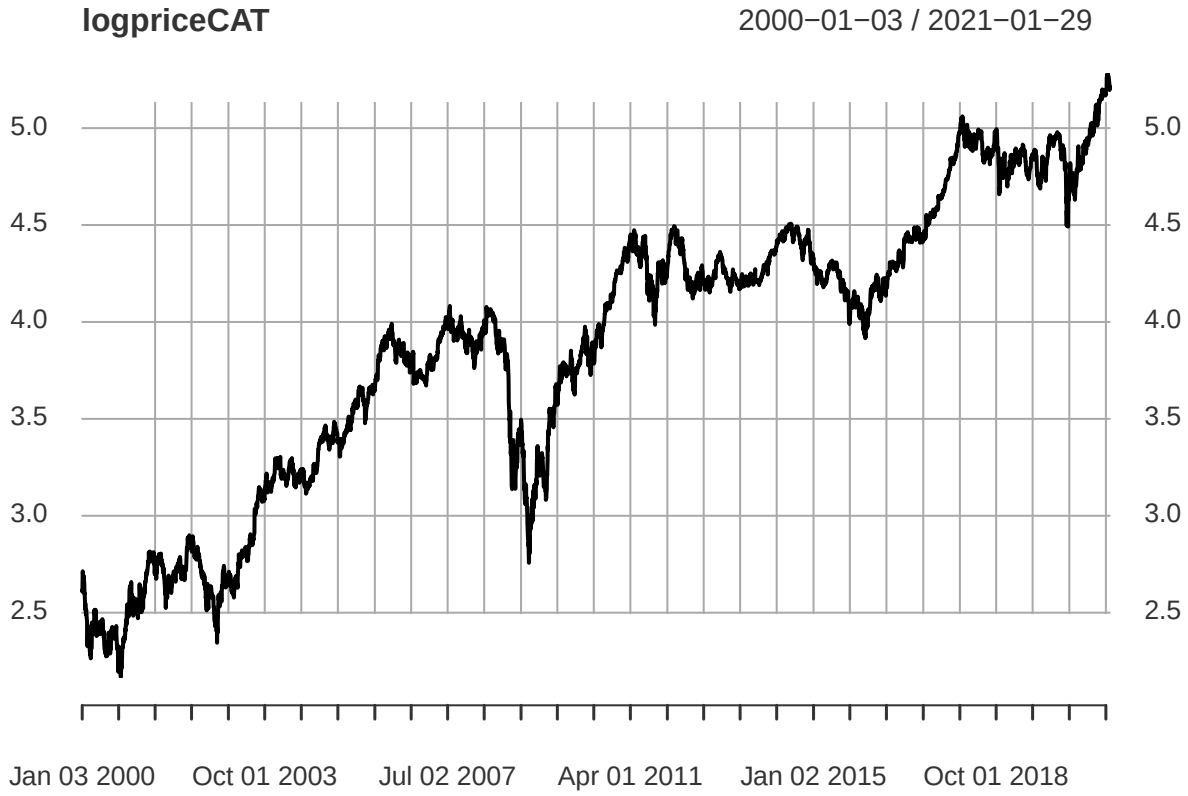
```
##            CAT.Open CAT.High CAT.Low CAT.Close CAT.Volume CAT.Adjusted
## 2021-01-22   190.85   192.82  189.31    191.94    2027000       191.94
## 2021-01-25   190.56   191.37  186.97    187.34    3837100       187.34
## 2021-01-26   187.60   189.41  186.83    187.21    2506000       187.21
## 2021-01-27   184.20   185.55  179.34    180.63    4095300       180.63
## 2021-01-28   182.26   187.61  181.31    184.34    3445400       184.34
## 2021-01-29   183.50   188.82  180.73    182.84    4540100       182.84
```

```
da=CAT
chartSeries(CAT,theme="white")
```




```
priceCAT=da[,6]
plot(priceCAT,type="l")
```


```
logpriceCAT=log(priceCAT)
plot(logpriceCAT,type="l")
```




```
logreturnCAT=diff(log(priceCAT))
simplereturnCAT <-exp(logreturnCAT)-1

getSymbols("AOT.BK",from="2000-01-03",to="2021-01-31")
```

```
## [1] "AOT.BK"
```

```
dim(AOT.BK)
```

```
## [1] 4159    6
```

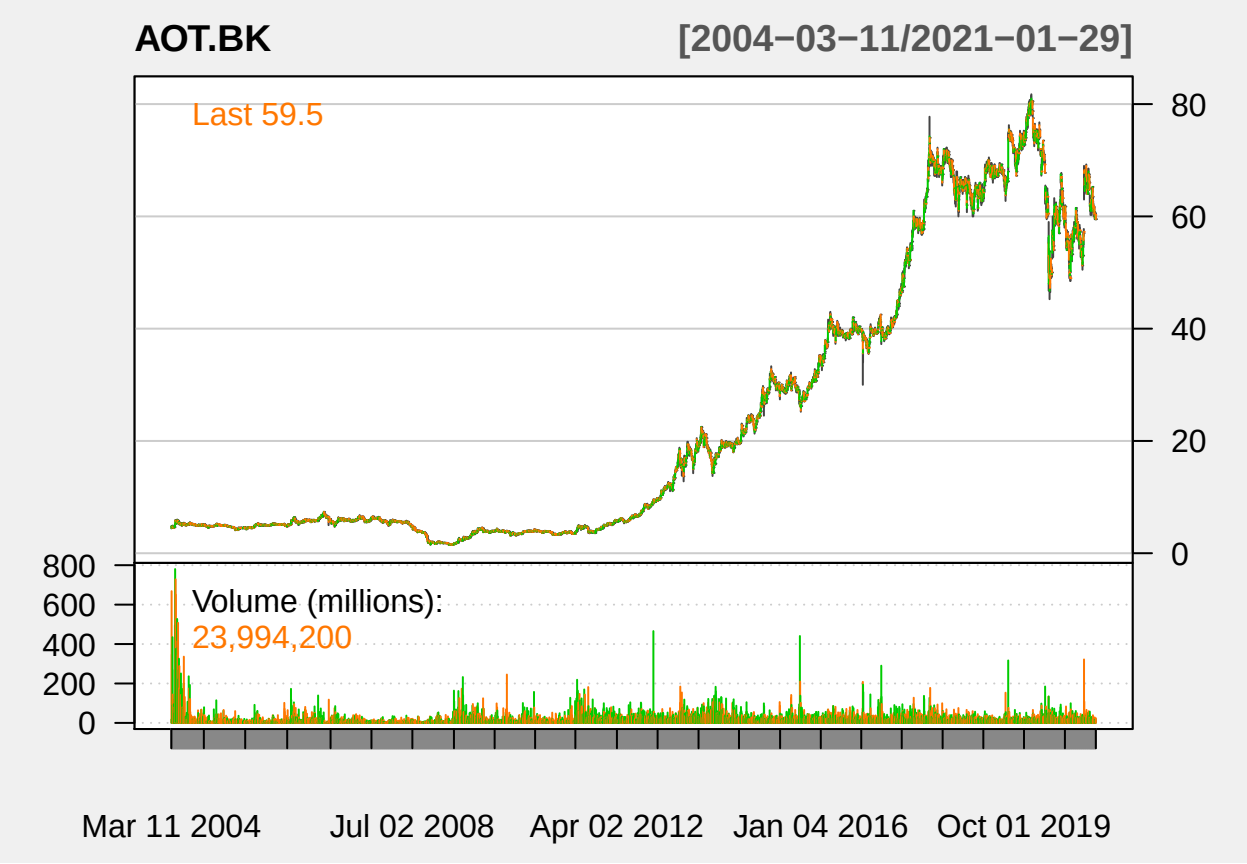
```
head(AOT.BK)
```

```
##            AOT.BK.Open AOT.BK.High AOT.BK.Low AOT.BK.Close AOT.BK.Volume
## 2004-03-11       4.500       4.800      4.425         4.800      17414690
## 2004-03-12       4.700       4.775      4.600         4.600     668350000
## 2004-03-15       4.625       4.650      4.550         4.550     346345000
## 2004-03-16       4.525       4.575      4.500         4.525     136384000
## 2004-03-17       4.550       4.600      4.550         4.600      88608000
## 2004-03-18       4.650       4.925      4.650         4.775     434665000
##            AOT.BK.Adjusted
## 2004-03-11        2.668538
## 2004-03-12        2.557348
## 2004-03-15        2.529552
## 2004-03-16        2.515653
## 2004-03-17        2.557348
## 2004-03-18        2.654639
```

```
tail(AOT.BK)
```

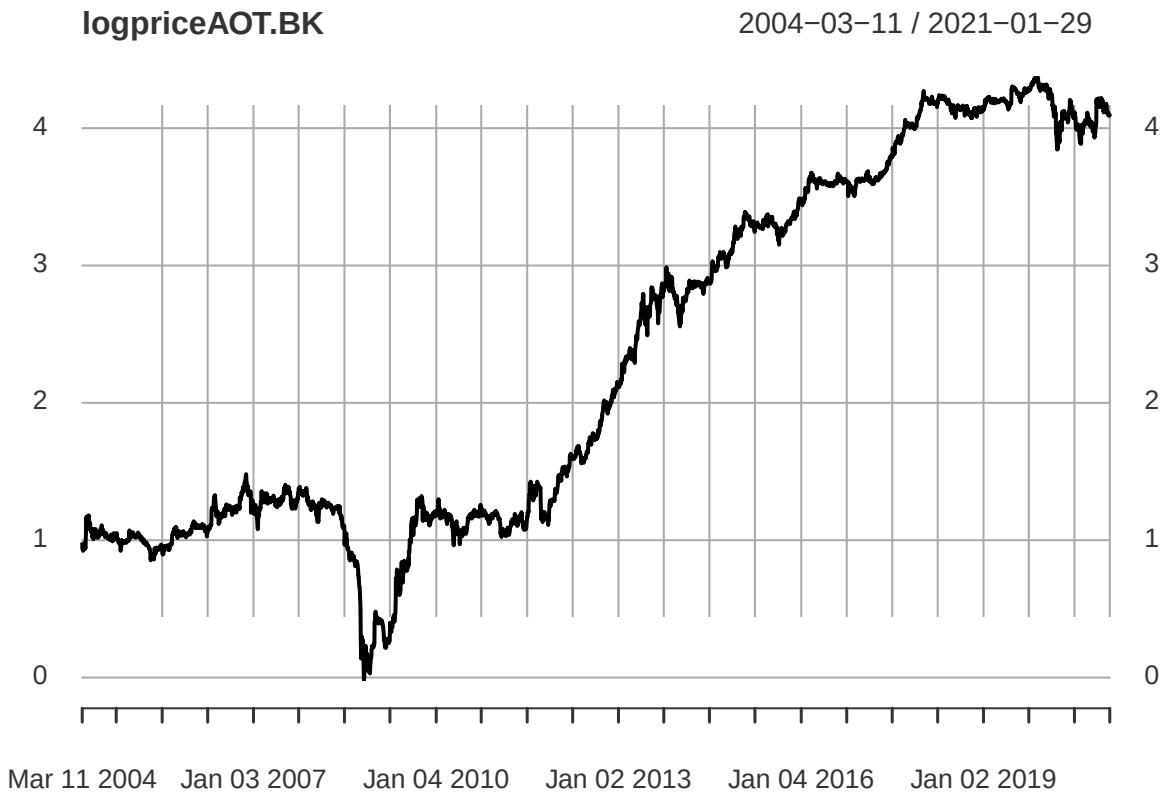
```
##            AOT.BK.Open AOT.BK.High AOT.BK.Low AOT.BK.Close AOT.BK.Volume
## 2021-01-22       60.50       60.75       59.5         59.75      27812300
## 2021-01-25       59.75       60.50       59.5         59.75      10446500
## 2021-01-26       59.75       60.75       59.5         60.25      15439500
## 2021-01-27       60.25       60.75       60.0         60.25      12355000
## 2021-01-28       59.50       60.50       59.5         60.00      19675400
## 2021-01-29       60.25       60.50       59.5         59.50      23994200
##            AOT.BK.Adjusted
## 2021-01-22           59.75
## 2021-01-25           59.75
## 2021-01-26           60.25
## 2021-01-27           60.25
## 2021-01-28           60.00
## 2021-01-29           59.50
```

```
da1=AOT.BK
chartSeries(AOT.BK,theme="white")
```

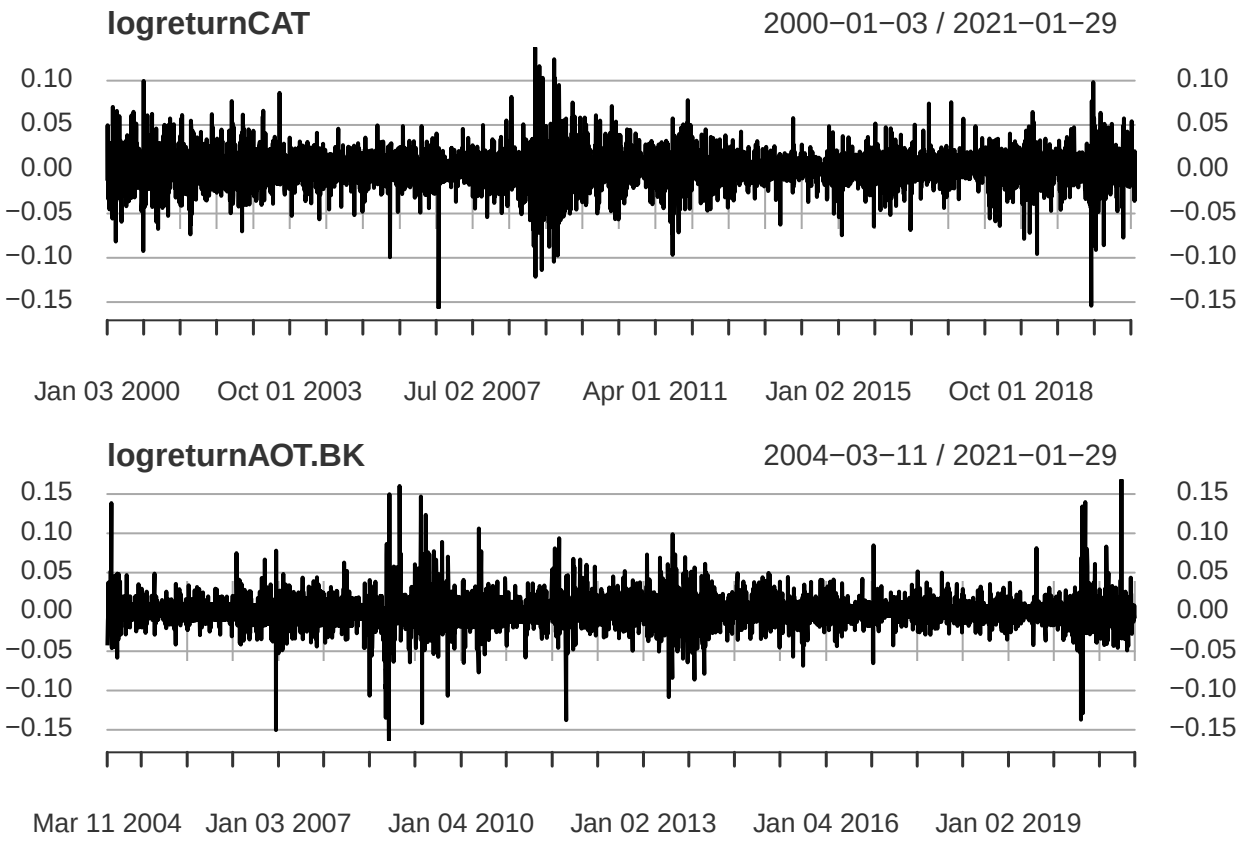



```
priceAOT.BK=da1[,6]
plot(priceAOT.BK,type="l")
```

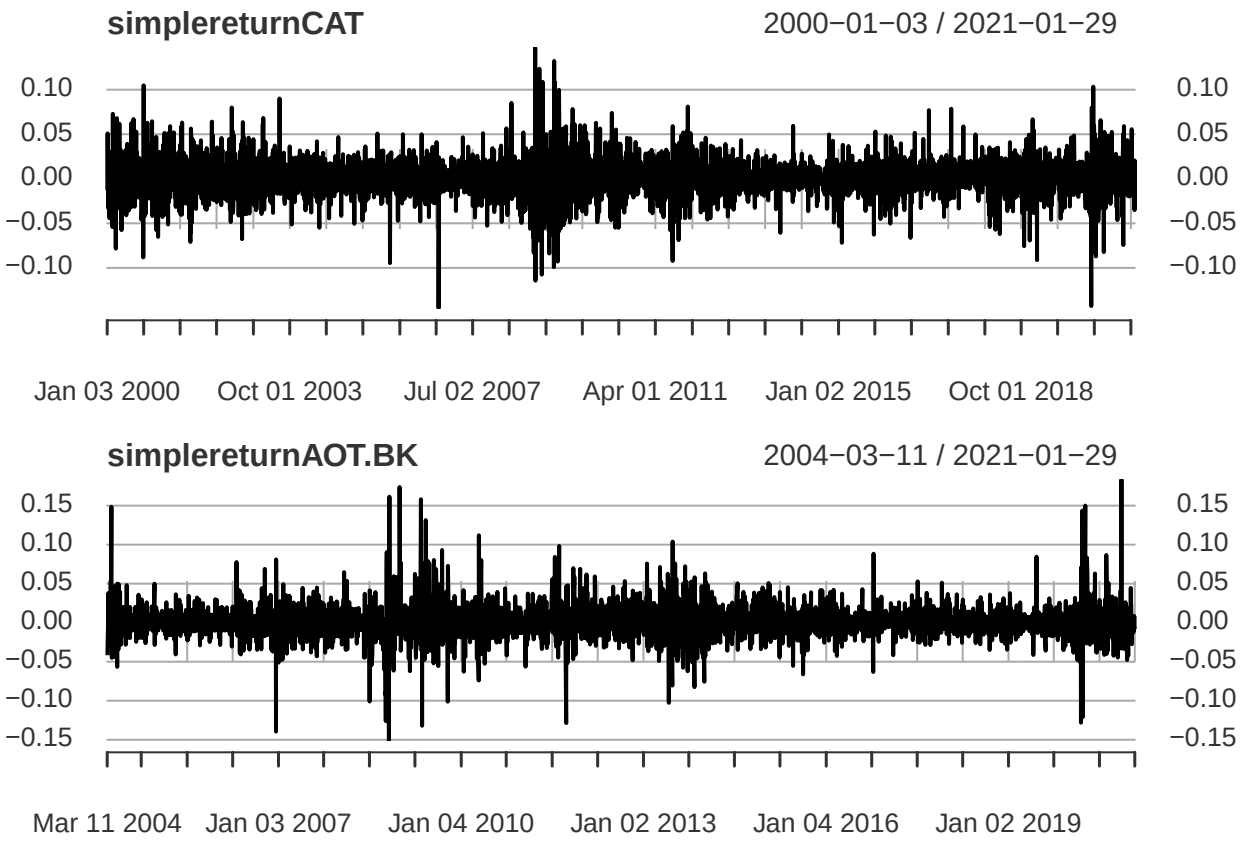

```
logpriceAOT.BK=log(priceAOT.BK)
plot(logpriceAOT.BK,type="l")
```




```
logreturnAOT.BK=diff(log(priceAOT.BK))
simplereturnAOT.BK <-exp(logreturnAOT.BK)-1

#1 plot log returns and simple returns
#answer A
par(mfrow=c(2,1))
plot(logreturnCAT,type="l")
plot(logreturnAOT.BK,type="l")
```




```
plot(simplereturnCAT)
plot(simplereturnAOT.BK)
```




```
newlogreturnCAT <-logreturnCAT[2:nrow(logreturnCAT),]
newsimplereturnCAT <- simplereturnCAT[2:nrow(logreturnCAT),]

newlogreturnAOT.BK <-logreturnAOT.BK[2:nrow(logreturnAOT.BK),]
newsimplereturnAOT.BK <- simplereturnAOT.BK[2:nrow(logreturnAOT.BK),]

#2 mean SD skewness excess_kurtosis min and max using simplereturns
#answer B
table.Stats(simplereturnCAT)
```

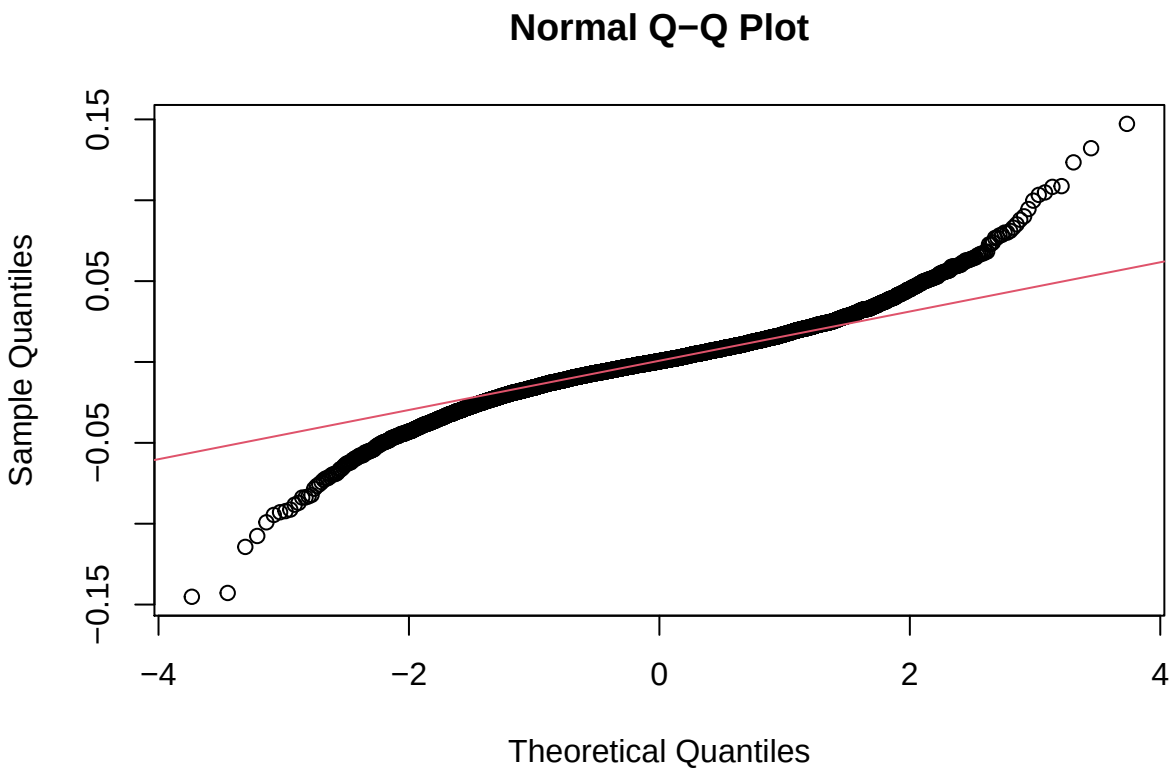
```
##                 CAT.Adjusted
## Observations       5302.0000
## NAs                   1.0000
## Minimum              -0.1452
## Quartile 1           -0.0095
## Median                0.0005
## Arithmetic Mean       0.0007
## Geometric Mean        0.0005
## Quartile 3            0.0110
## Maximum               0.1472
## SE Mean               0.0003
## LCL Mean (0.95)       0.0001
## UCL Mean (0.95)       0.0013
## Variance              0.0004
## Stdev                 0.0205
## Skewness              0.0197
```

```
## Kurtosis              4.5480
```

```
table.Stats(simplereturnAOT.BK)
```

```
##                  AOT.BK.Adjusted
## Observations           4158.0000
## NAs                       1.0000
## Minimum                  -0.1505
## Quartile 1               -0.0093
## Median                    0.0000
## Arithmetic Mean           0.0010
## Geometric Mean            0.0007
## Quartile 3                0.0103
## Maximum                   0.1834
## SE Mean                   0.0003
## LCL Mean (0.95)           0.0003
## UCL Mean (0.95)           0.0016
## Variance                  0.0005
## Stdev                     0.0213
## Skewness                  0.5443
## Kurtosis                 10.0827
```

```
#3
#answer C
par(mfrow=c(1,1))
qqnorm(newsimplereturnCAT)
qqline(newsimplereturnCAT, col= 2)
```



```
jarque.bera.test(newsimplereturnCAT)
```

```
##
##  Jarque Bera Test
##
## data:  newsimplereturnCAT
## X-squared = 4569.9, df = 2, p-value < 2.2e-16
```

```
#As calculated p-value is less than an alpha. Therefore, the daily simple return of CAT is not normally

#4 mean SD skewness excess_kurtosis min and max using logreturns
#answer D
table.Stats(logreturnCAT)
```

```
##                 CAT.Adjusted
## Observations       5302.0000
## NAs                   1.0000
## Minimum              -0.1569
## Quartile 1           -0.0095
## Median                0.0005
## Arithmetic Mean       0.0005
## Geometric Mean        0.0003
## Quartile 3            0.0110
## Maximum               0.1373
## SE Mean               0.0003
## LCL Mean (0.95)      -0.0001
## UCL Mean (0.95)       0.0010
## Variance              0.0004
## Stdev                 0.0205
## Skewness             -0.1836
## Kurtosis              4.6982
```

```
table.Stats(logreturnAOT.BK)
```

```
##                 AOT.BK.Adjusted
## Observations          4158.0000
## NAs                      1.0000
## Minimum                 -0.1632
## Quartile 1              -0.0093
## Median                   0.0000
## Arithmetic Mean          0.0007
## Geometric Mean           0.0005
## Quartile 3               0.0102
## Maximum                  0.1684
## SE Mean                  0.0003
## LCL Mean (0.95)          0.0001
## UCL Mean (0.95)          0.0014
## Variance                 0.0004
## Stdev                    0.0212
## Skewness                 0.1746
## Kurtosis                 9.6096
```

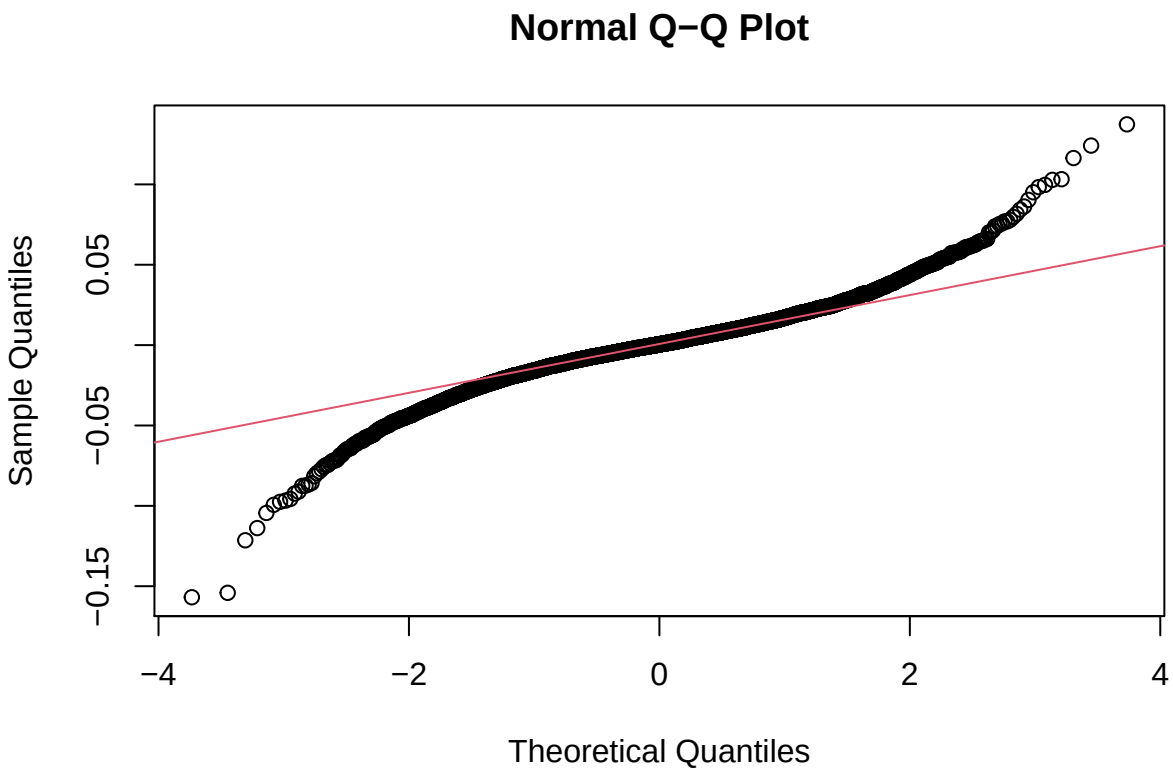
```
#5
#answer E
#test CAT newlogreturn mean=0
t.test(newlogreturnCAT)
```

```
## Warning in tstat + c(-cint, cint): Recycling array of length 1 in array-vector arithmetic is deprecat
##   Use c() or as.vector() instead.

## Warning in cint * stderr: Recycling array of length 1 in vector-array arithmetic is deprecated.
##   Use c() or as.vector() instead.

##
##  One Sample t-test
##
## data:  newlogreturnCAT
## t = 1.7296, df = 5301, p-value = 0.08377
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  -6.513168e-05  1.041069e-03
## sample estimates:
##    mean of x
## 0.0004879685
```

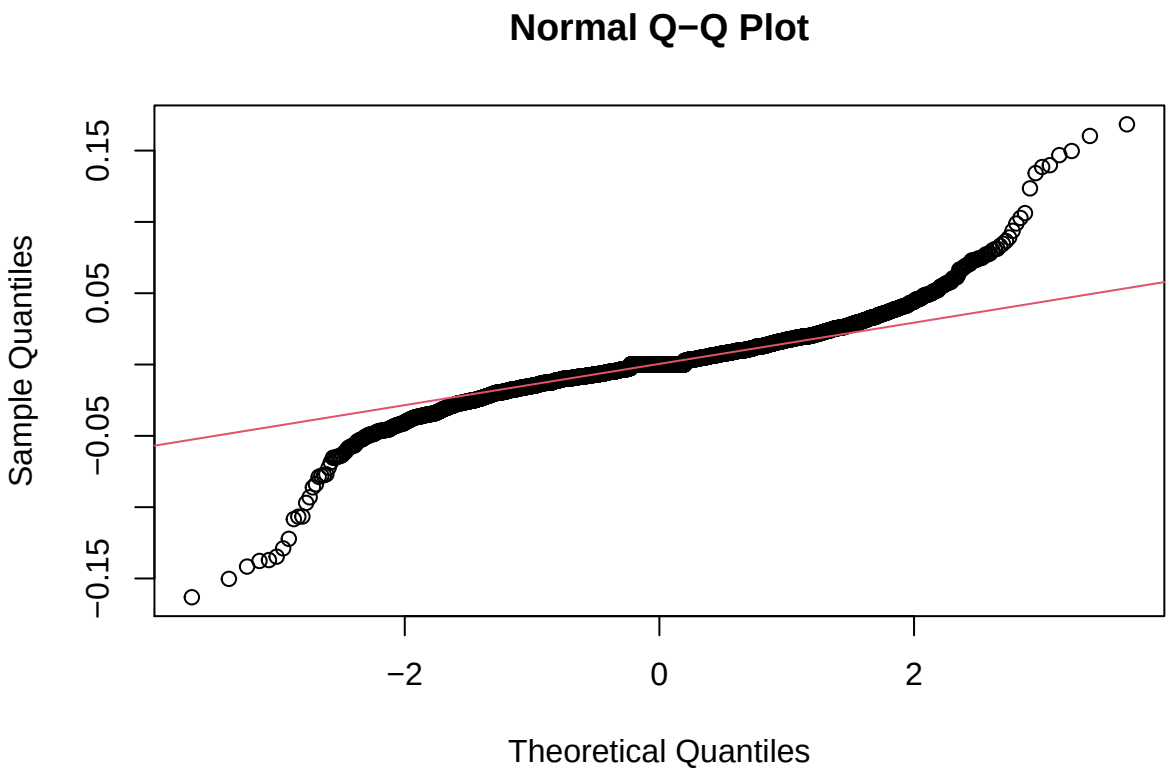
```
#test AOT.BK newlogreturn mean=0
t.test(newlogreturnAOT.BK)
```

```
## Warning in tstat + c(-cint, cint): Recycling array of length 1 in array-vector arithmetic is deprecat
##   Use c() or as.vector() instead.

## Warning in tstat + c(-cint, cint): Recycling array of length 1 in vector-array arithmetic is deprecat
##   Use c() or as.vector() instead.

##
##  One Sample t-test
##
## data:  newlogreturnAOT.BK
## t = 2.2696, df = 4157, p-value = 0.02328
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  0.0001016629 0.0013915769
## sample estimates:
##    mean of x
## 0.0007466199
```

```
#since t from CAT=1.7296 which < 1.96 we acannot reject the null hypothesis with CI 95%
#while AOT.BK = 2.2696 which > 1.96  we reject the null hypothesis with CI 95%

#6
#answer F
par(mfrow=c(1,1))
qqnorm(newlogreturnCAT)
qqline(newlogreturnCAT, col= 2)
```




```
qqnorm(newlogreturnAOT.BK)
qqline(newlogreturnAOT.BK, col= 2)
```




```
#7
#answer G
table.Stats(newlogreturnCAT)
```

```
##                 CAT.Adjusted
## Observations       5302.0000
## NAs                   0.0000
## Minimum              -0.1569
## Quartile 1           -0.0095
## Median                0.0005
## Arithmetic Mean       0.0005
## Geometric Mean        0.0003
## Quartile 3            0.0110
## Maximum               0.1373
## SE Mean               0.0003
## LCL Mean (0.95)      -0.0001
## UCL Mean (0.95)       0.0010
## Variance              0.0004
## Stdev                 0.0205
## Skewness             -0.1836
## Kurtosis              4.6982
```

```
t.test(logreturnCAT, conf.level=0.95)
```

```
## Warning in tstat + c(-cint, cint): Recycling array of length 1 in array-vector arithmetic is deprecat
##   Use c() or as.vector() instead.
```

```
## Warning in tstat + c(-cint, cint): Recycling array of length 1 in vector-array arithmetic is deprecat
##   Use c() or as.vector() instead.
```

```
##
##  One Sample t-test
##
## data:  logreturnCAT
## t = 1.7296, df = 5301, p-value = 0.08377
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  -6.513168e-05  1.041069e-03
## sample estimates:
##    mean of x
## 0.0004879685
```

```
#8 test skewness
#answer H
TCAT=length(newlogreturnCAT)
s3CAT=skewness(newlogreturnCAT)
tst1 = s3CAT/sqrt(6/TCAT)
tst1
```

```
## [1] -5.458812
```

```
pv1 = 2*pnorm(tst1)
pv1
```

```
## [1] 4.793299e-08
```

```
TAOT.BK=length(newlogreturnAOT.BK)
s3AOT.BK=skewness(newlogreturnAOT.BK)
tst2 = s3AOT.BK/sqrt(6/TAOT.BK)
tst2
```

```
## [1] 4.596526
```

```
pv2 = 2*pnorm(tst2)
pv2
```

```
## [1] 1.999996
```

```
#9 test excess kurtosis
#answer I
k4CAT = kurtosis(newlogreturnCAT)
tst3 = k4CAT/sqrt(24/TCAT)
pv3 = 2*(1-pnorm(tst3))
pv3
```

```
## [1] 0
```

```
k4AOT.BK = kurtosis(newlogreturnAOT.BK)
tst4 = k4AOT.BK/sqrt(24/TAOT.BK)
tst4
```

```
## [1] 126.4855
```

```
pv4 = 2*(1-pnorm(tst4))
pv4
```

```
## [1] 0
```

```
tinytex:::install_prebuilt()
```