ST5218_Finance_Tut_1

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Question_1:

From Yahoo finance, download the adjusted price of Stock of Boeing (symbol in New York stock exchange Market: BA) from Jan. 1, 2001 to Dec. 30, 2010.

(a) Draw the daily prices

```
library(tseries)
library(forecast)
```

```
## Warning: package 'forecast' was built under R version 3.5.2
```

```
library(zoo)
```

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

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

```
price_BA = get.hist.quote(instrument = "T",
                  start = "2001-01-01", end = "2010-12-30",
                  quote = c("AdjClose"),provider = "yahoo",
                  compress = "d")
```

```
## '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.
```

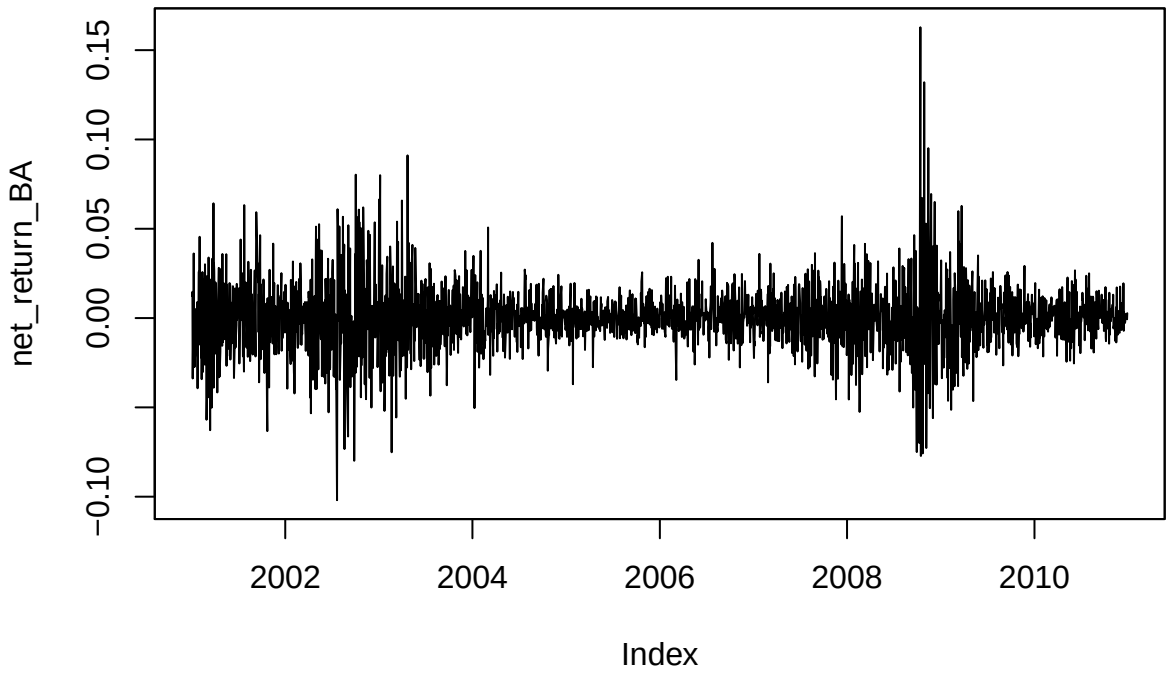
```
##
## WARNING: There have been significant changes to Yahoo Finance data.
## Please see the Warning section of '?getSymbols.yahoo' for details.
##
## This message is shown once per session and may be disabled by setting
## options("getSymbols.yahoo.warning"=FALSE).
```

```
## time series starts 2001-01-02
## time series ends   2010-12-29
```

```
plot(price_BA)
```

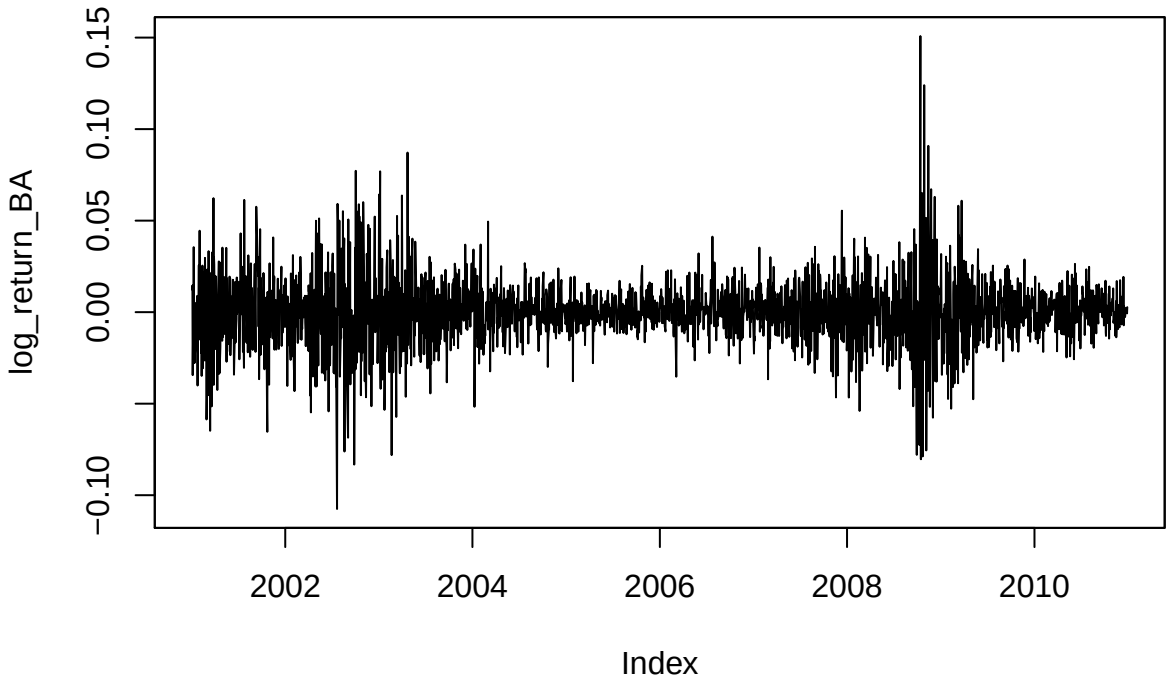
(b) Draw the daily net returns

```
log_return_BA = diff(log(price_BA))
net_return_BA = exp(log_return_BA)-1
plot(net_return_BA)
```



(c) Draw the daily log returns

```
plot(log_return_BA)
```



Question_2:

Suppose closed price of a stock is $ 123.

(a) If the net return in the next 5 days are respectively 0.01, -0.01, 0.02, -0.02, and 0, what is the price of the stock at the end of the 5th day?

p_5th $= 123 \times (1 + 0.01) \times (1 - 0.01) \times (1 + 0.02) \times (1 - 0.02) \times 1 =$ $ 122.9385.

(b) If the log return in the next 5 days are respectively 0.01, -0.01, 0.02, -0.02, and 0, what is the price of the stock at the end of the 5th day?

p_5th $= 123 \times e^{0.01} \times e^{-0.01} \times e^{0.02} \times e^{-0.02} \times 1 =$ $ 123.

(c) If the net return in the next 5 days are respectively 0.01, -0.01, 0.02, -0.02, and 0, find their respective log returns?

Since $r_t = log(1 + R_t)$,

Thus, $r_{t1} = log(1 + 0.01), \quad r_{t2} = log(1 - 0.01), \quad r_{t3} = log(1 + 0.02), \quad r_{t4} = log(1 - 0.02), \quad r_{t5} = 0$

Quetion_3:

Quetion_4:

$33.49, 33.4, 33.5, 33.17$

$33.6 * (1 - \frac{0.49}{33.6}), 33.55 * (1 - \frac{0.49}{33.6}), 34.66 * (1 - \frac{0.49}{33.6}), 35.15 * (1 - \frac{0.49}{33.6})$

$35.33*(1-\frac{0.46}{35.33})*(1-\frac{0.49}{33.6}), 35.49*(1-\frac{0.46}{35.33})*(1-\frac{0.49}{33.6}), 35.65*(1-\frac{0.46}{35.33})*(1-\frac{0.49}{33.6}), 35.56*(1-\frac{0.46}{35.33})*(1-\frac{0.49}{33.6})$

$36.02 * (1 - \frac{0.46}{36.02}) * (1 - \frac{0.46}{35.33}) * (1 - \frac{0.49}{33.6}), 35.84 * (1 - \frac{0.46}{36.02}) * (1 - \frac{0.46}{35.33}) * (1 - \frac{0.49}{33.6})$

Quetion_5:

a)

$log(\frac{P_1}{P_0}) = r_1 \sim N(0.001, 0.0015^2))$

$P(P_1 < 990) = P(r_1 < log(\frac{990}{1000})) = 0.23 \qquad R : pnorm(log(0.99), 0.001, 0.015)$

b)

$log(\frac{P_5}{P_0}) = r_5(5) = 5 \times r_1 \sim N(0.005, 5 \times 0.015^2)$

$P(P_5 < 990) = P(r_5(5) < log(0.99)) = 0.33 \qquad R : pnorm(log(0.99), 0.005, sqrt(5) * 0.015)$

Quetion_6:

a)

$r_t(4) \sim N(4 \times 0.06, 4 \times 0.47)$

b)

$P(r_t(4) < 2) = 0.90 \qquad R : pnorm(2, 4 * 0.06, sqrt(4 * 0.47))$

c)

0.47

d)

$N(0.72, 2 * 0.47)$

Quetion_7:

a)

$log(\frac{X_2}{X_0}) = r_2(2) = r_1 + r_2 \sim N(2\mu, 2\sigma^2))$

$P(X_2 > 1.3X_0) = P(\frac{X_2}{X_0} > 1.3) = P(r_2(2) > log(1.3))$

b)

$\frac{1}{x\sigma\sqrt{2\pi}} exp\{-\frac{log(x)-\mu-log(X_0)}{2\sigma^2}\}$

c)

$X_0 exp\{Q_{0.9}\} = X_0 exp\{z_{0.9}\sqrt{k}\sigma + k\mu\}$

e)

Sharp-ratio for r_k : $\frac{\mu}{\sigma}$

Sharp-ratio for $log(X_k) - log(X_0)$: $\frac{\sqrt{k}\mu}{\sigma}$

Quetion_8:

$P' = 1500 \times (1 + \frac{0.043}{0.5})^{0.5 \times 6} \approx 1921.24$

Quetion_9:

Quetion_10:

```
library(tseries)
library(timeSeries)
```

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

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

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

```
DJIA = get.hist.quote(instrument = "DJI",
                      start="2016-01-01",end="2016-12-31",
                      quote = c("AdjClose"),
                      provider = "yahoo",
                      compression = "d")
```

```
## time series starts 2016-01-04
## time series ends   2016-12-30
```

```
log_ruturn = diff(log(DJIA))
mu = mean(log_ruturn)
std = sd(log_ruturn)
SR = mu/std
n = 250
c(SR - 1.96 * sqrt((1 + SR^2/2)/n), SR + 1.96 * sqrt((1 + SR^2/2)/n))
```

```
## [1] -0.05256773  0.19567195
```