

Homework 1

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This document has been created as part of the first homework assignment at CMF.

Initially, the working directory is set and the required *quantmod* package is loaded.

```
##### Initialisation #####
setwd("~/")
Sys.setlocale("LC_ALL","English")
library(quantmod)
```

The historical prices of S&P 500 index, Apple and IBM from 2002 up to present are loaded from Yahoo Finance using *getSymbols* function from *quantmod* package. The raw data frames are then merged into a single xts using only adjusted prices.

```
##### Loading data #####
tickers = c("SPY", "AAPL", "IBM") # specify the tickers to load

e <- new.env() # environment where data will be stored

# suppress warning about future change in the function behaviour
options("getSymbols.warning4.0"=FALSE)

# load data from Yahoo Finance
getSymbols(tickers, src = "yahoo", from="2002-01-01", env=e)

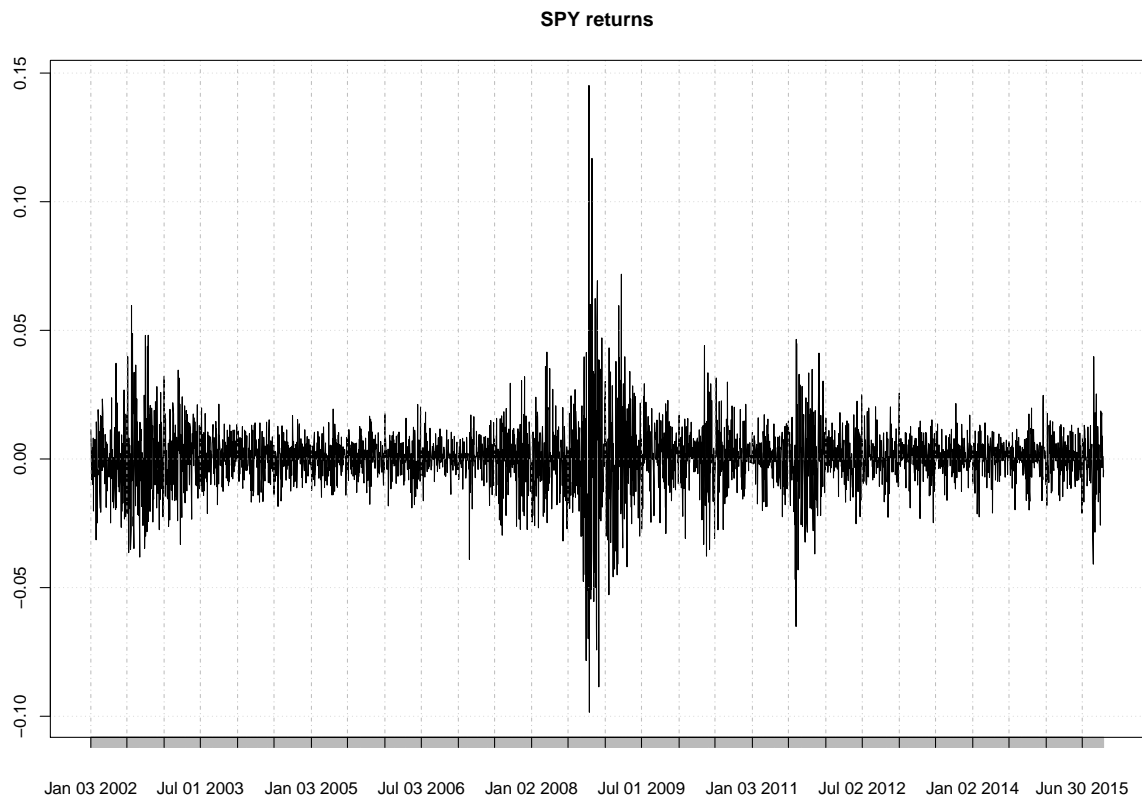
# merge data into a single xts taking only adjusted prices
df = do.call(merge, eapply(e, Ad)[tickers])
names(df) = tickers
```

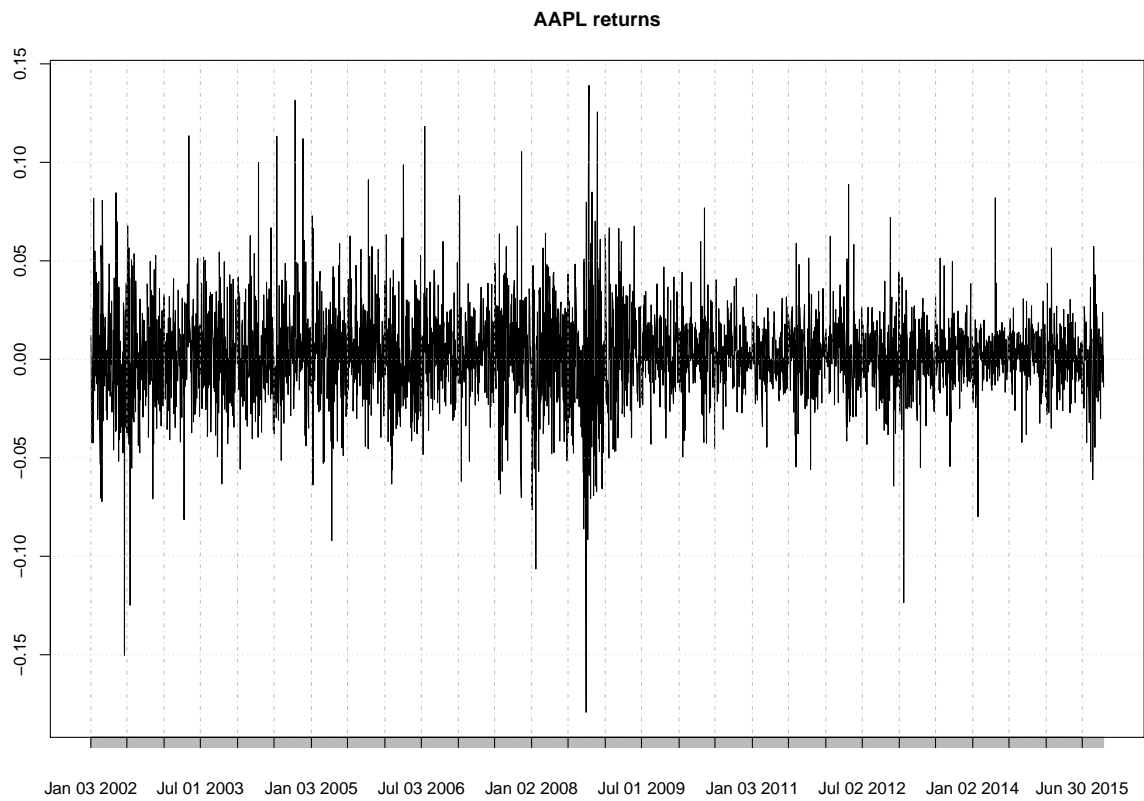
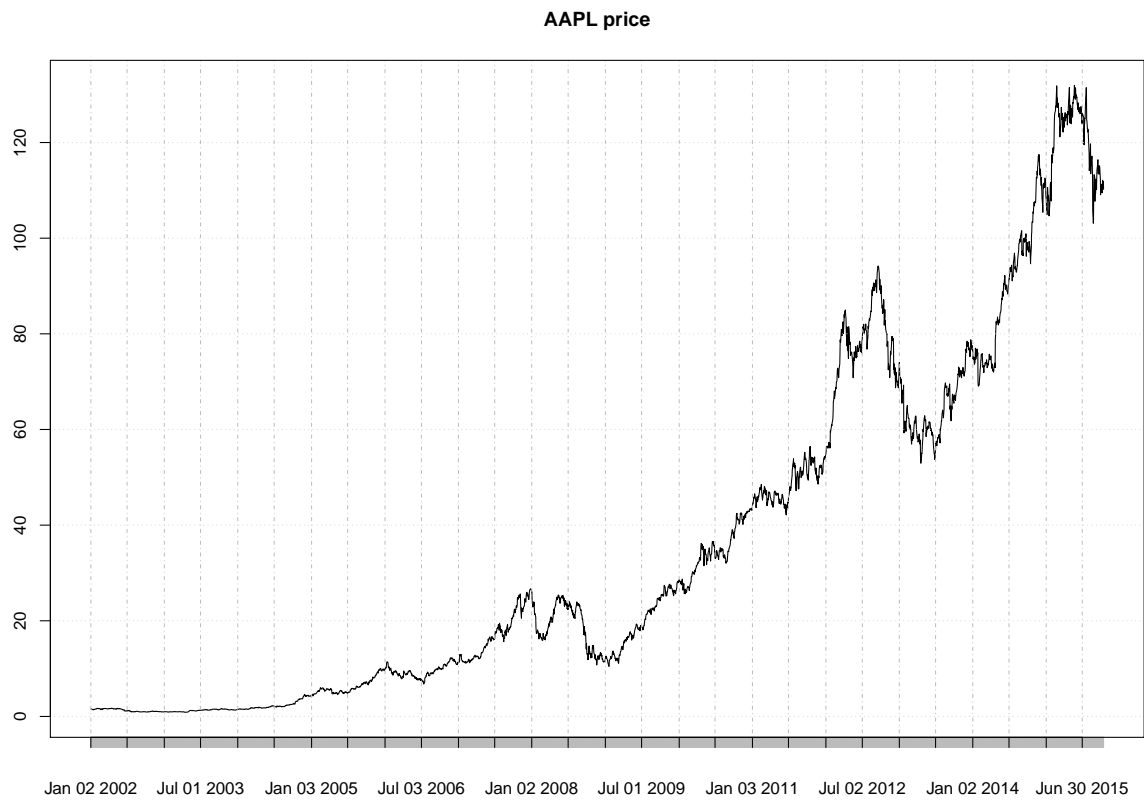
Daily returns are calculated and saved as *xts*.

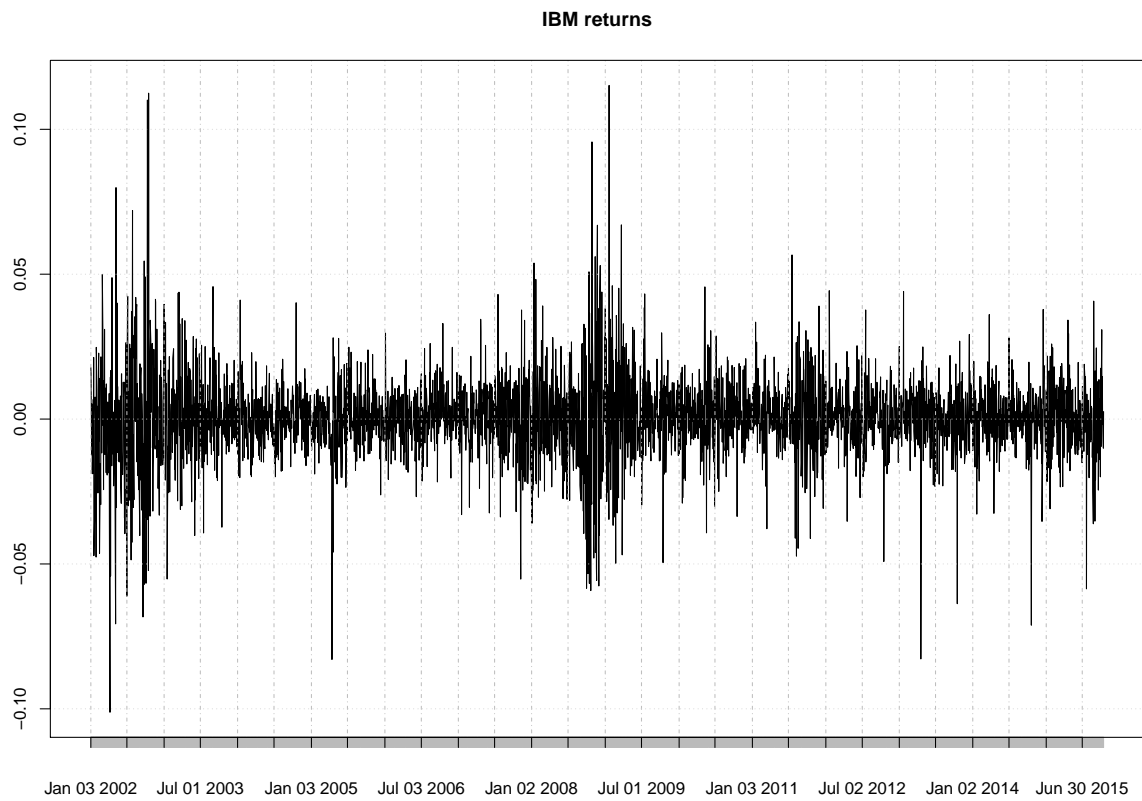
```
##### Calculate returns #####
rets = apply(df, 2, function(x) diff(x)/x[-length(x)])
rets = xts(rets, order.by = index(df)[-1])
```

Both prices and returns are then plotted.

```
##### Plot prices and returns #####
for (i in 1:ncol(df))
{
  par(mfrow=c(2,1))
  plot(df[,i], main = paste(tickers[i], "price"))
  plot(rets[,i], main = paste(tickers[i], "returns"))
  par(mfrow=c(1,1))
}
```







The user-defined function *stats* calculates mean and standard deviation of the returns series which is passed as an argument to the function.

```
##### Calculate mean return and return s.d. #####
stats = function(r)
{
  x = c(mean(r), sd(r))
  names(x) = c("Mean", "SD")
  return(x)
}

options(digits=4)
apply(rets, 2, stats)
```

```
##           SPY      AAPL      IBM
## Mean 0.0003123 0.001494 0.0002328
## SD   0.0125029 0.023066 0.0148505
```