Unit 4 Homework

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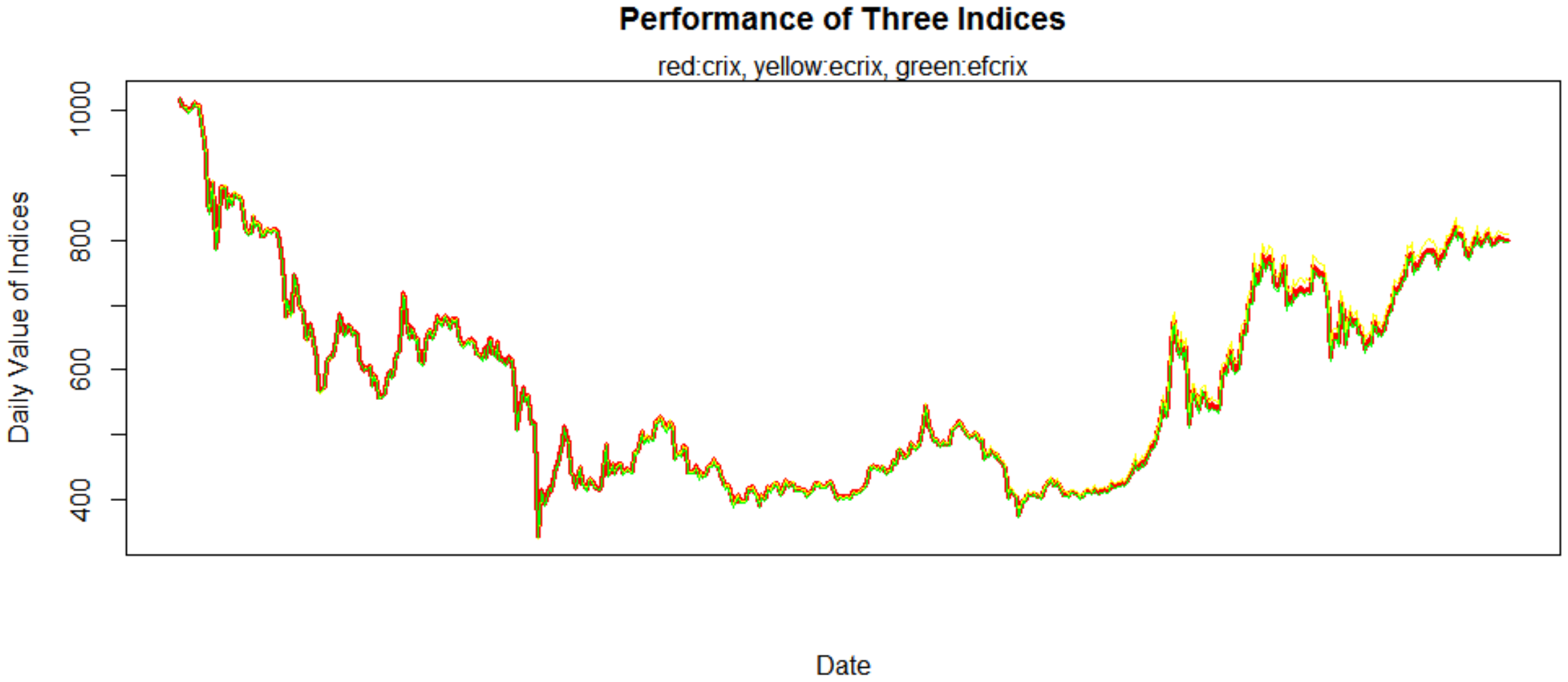
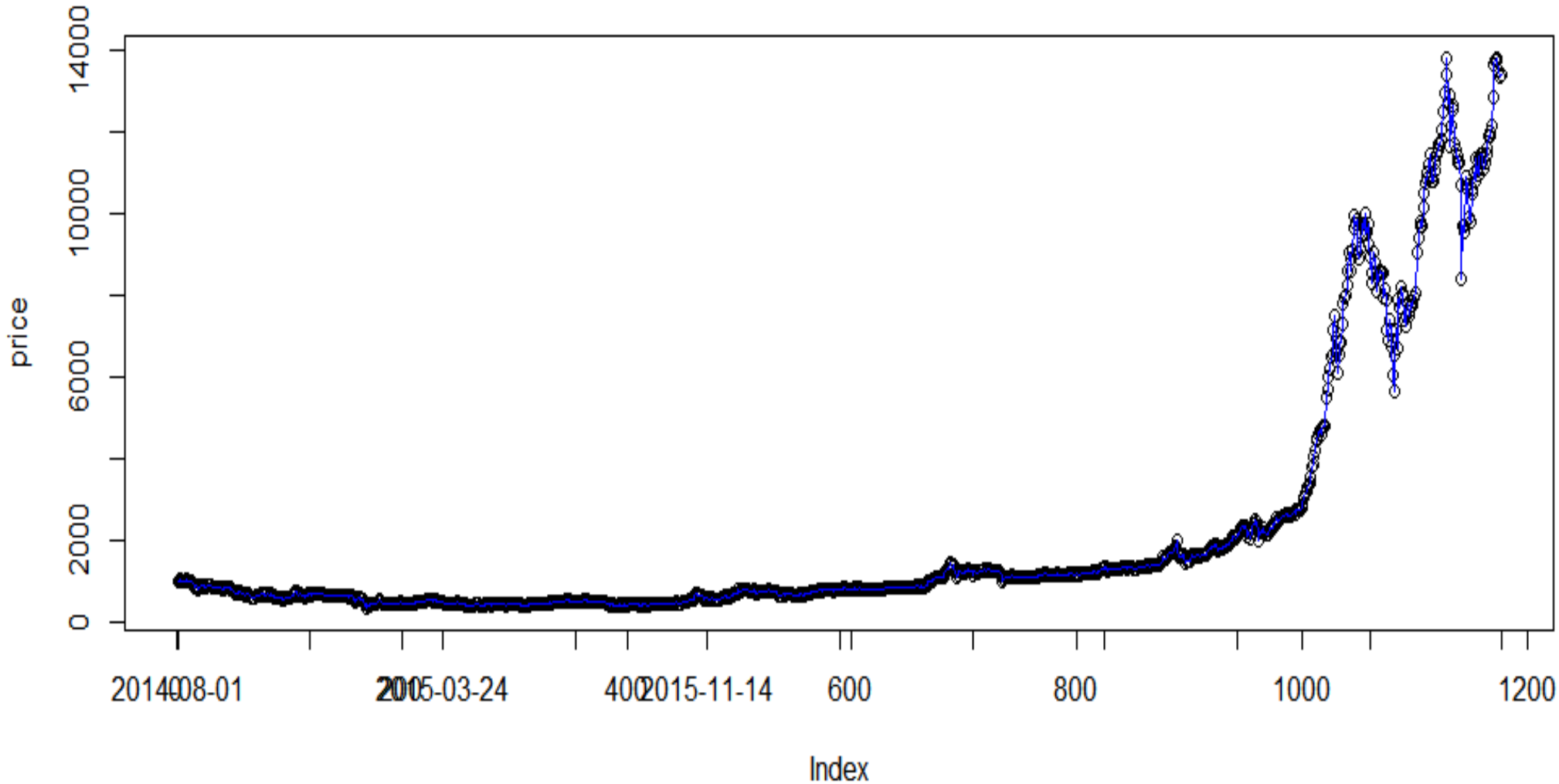
- #figure 3:crix&ecrix%efcrix
- setwd("C:/Users/Administrator/Desktop/workstation")
- load("crix.RData")
- load("ecrix.RData")
- load("efcrix.RData")
- plot(crix, type = "l", col = "red", xaxt = "n", lwd = 3, main = "Performance of Three Indices", xlab = "Date", ylab = "Daily Value of Indices")
- lines(ecrix, col = "yellow")
- lines(efcrix, col = "green")
- mtext("red:crix, yellow:ecrix, green:efcrix")

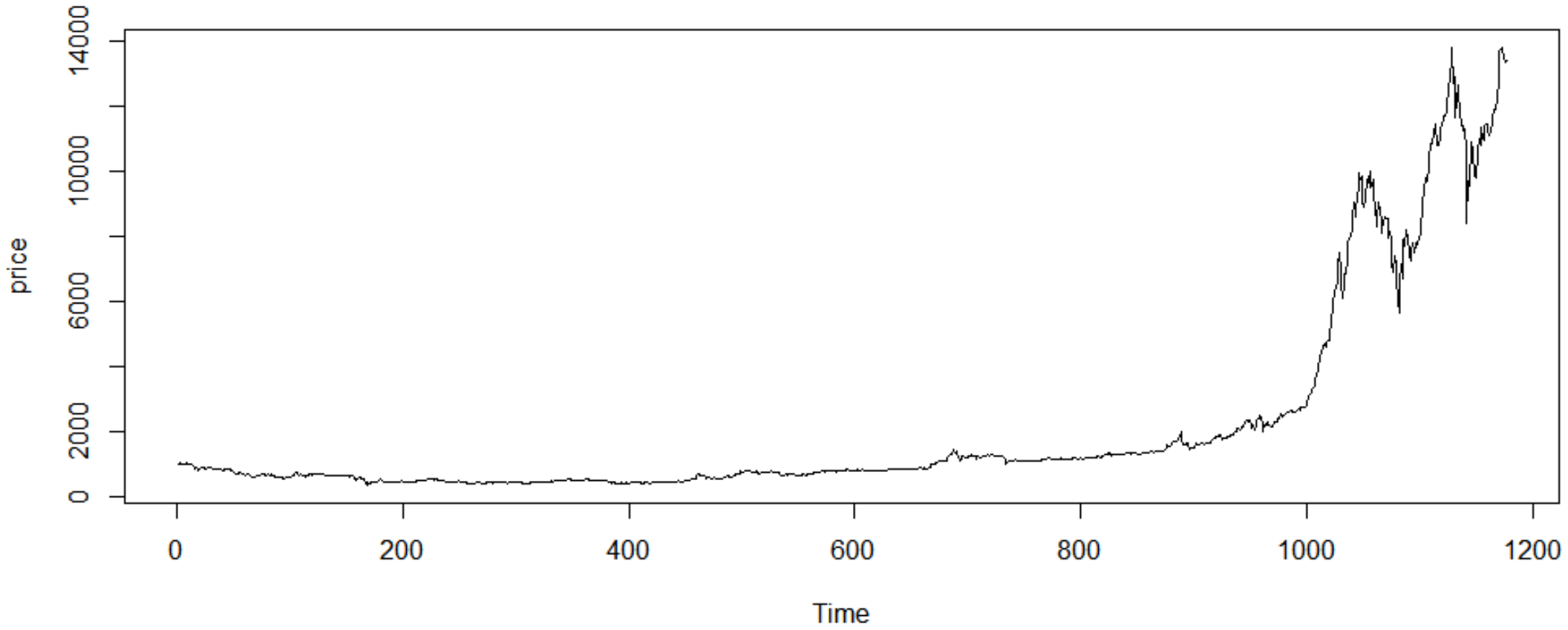
Q1. Figure 3


Performance of Three Indices
red:crix, yellow:ecrix, green:efcrix
Daily Value of Indices
400
600
800
1000
Date

- library(rjson)
- json_file = "http://crix.hu-berlin.de/data/crix.json"
- json_data = fromJSON(file=json_file)
- crix_data_frame=as.data.frame(json_data)
- x=crix_data_frame
- dim(x)
- n=dim(x) # [1]   1 2354 #
- a=seq(1,n[2],2)
- b=seq(2,n[2],2)
- data=t(x[1,a])
- price=t(x[1,b])
- plot(price)
- lines(price, col = “blue")

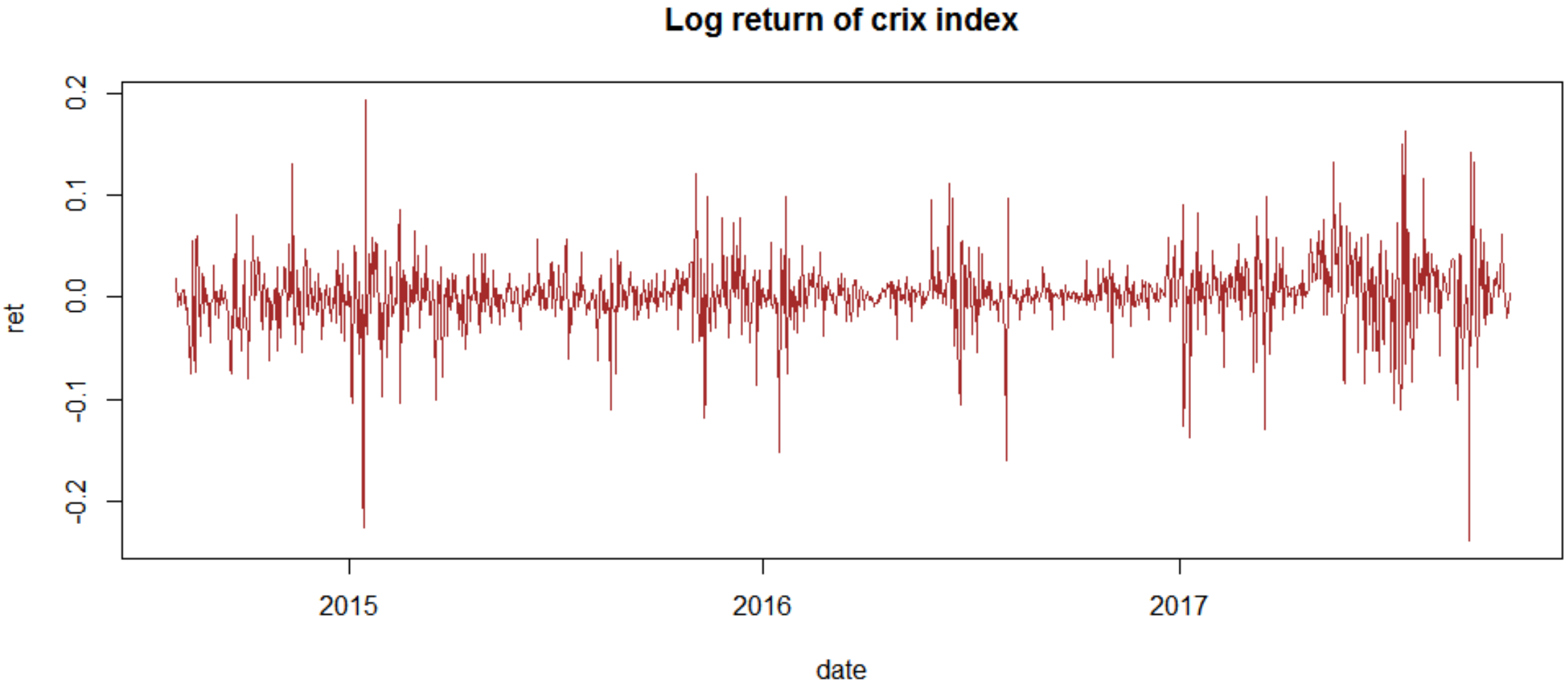

price
0
2000
6000
10000
14000
2014-08-01
2015-03-24
2015-11-14
200
400
600
800
1000
1200
Index

- ts.plot(price)



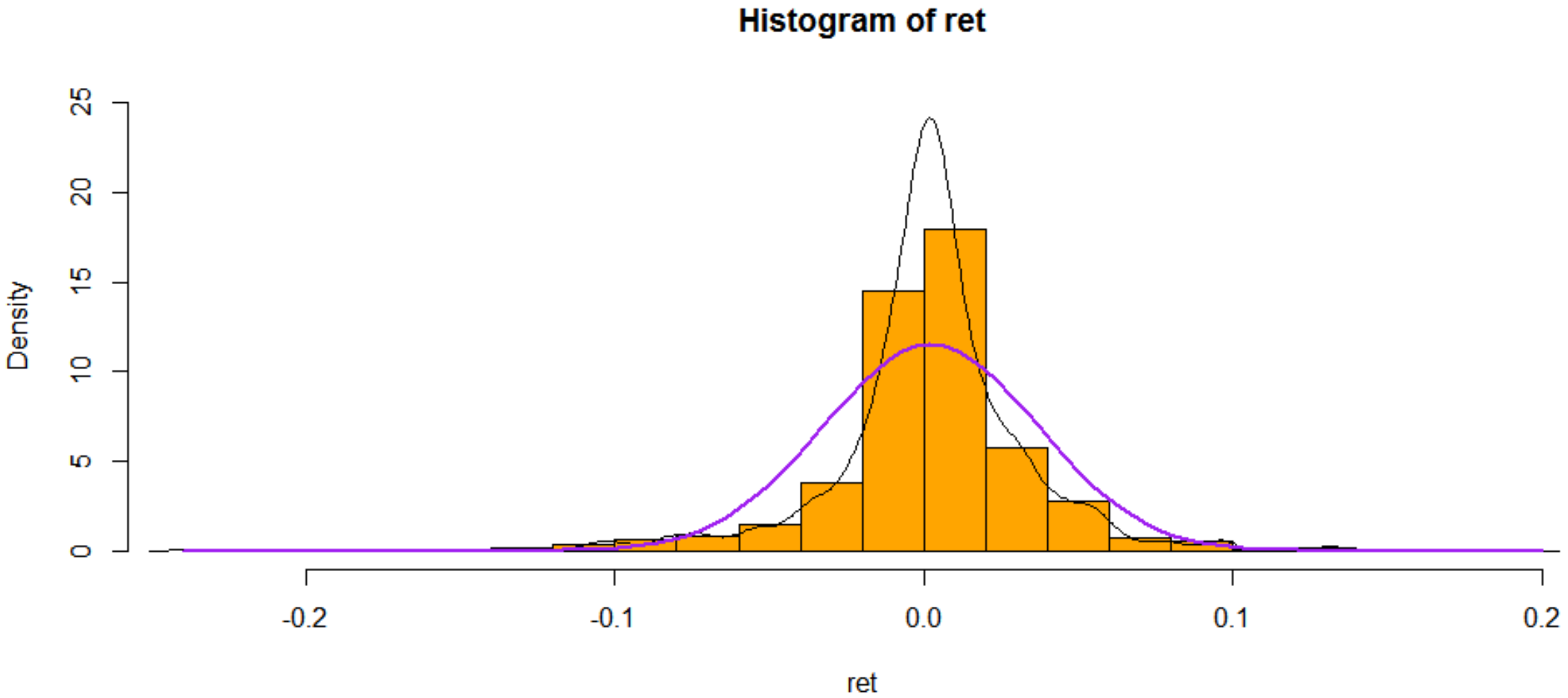
- #figure4
- library(rjson)
- json_file = "http://crix.hu-berlin.de/data/crix.json"
- json_data = fromJSON(file=json_file)
- x = as.data.frame(json_data)
- date1=c(json_data[[1]]$date)
- for (i in 1:2348){date1[i]=c(json_data[[i]]$date)}
- price1=c(json_data[[1]]$price)
- for (i in 1:2348){price1[i]=c(json_data[[i]]$price)}
- date=date1
- price=price1
- crix=data.frame(date,price)
- date2=date[-1]
- ret=diff(log(price))
- plot(ret~as.Date(date2),type="l",col="brown",xlab="date",ylab="ret", main="Log return of crix index")

Q1. Figure 4



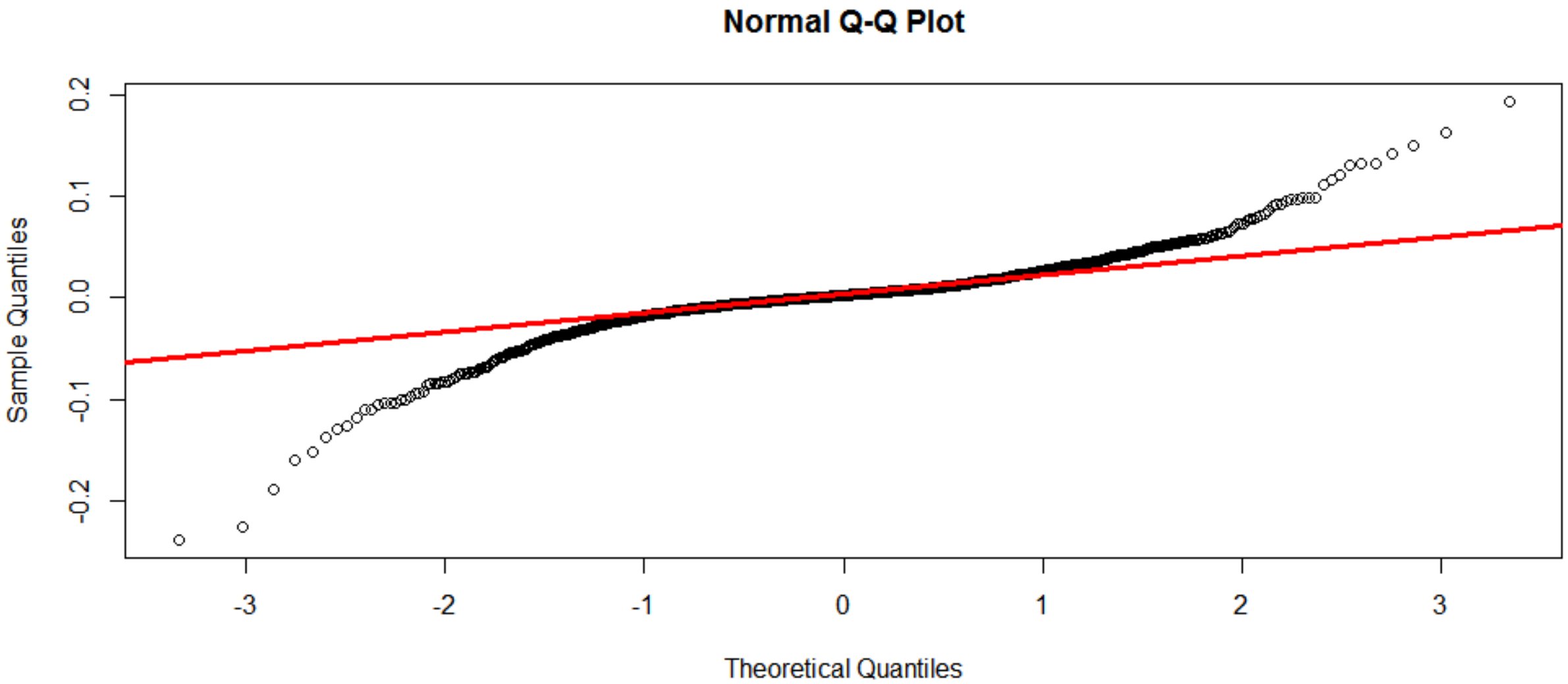
- #figure5
- mean(ret) # [1] 0.002206347 #
- var(ret) # [1] 0.001206677 #
- sd(ret) # [1] 0.03473726 #
- hist(ret, col = "orange", breaks = 20, freq = FALSE, ylim = c(0, 25), xlab = "ret")
- lines(density(ret), lwd = 2)
- mu = mean(ret)
- sigma = sd(ret)
- x = seq(-4, 4, length = 100)
- curve(dnorm(x, mean = mean(ret), sd = sd(ret)), add = TRUE, col = "purple", lwd = 2)

Q1. Figure 5



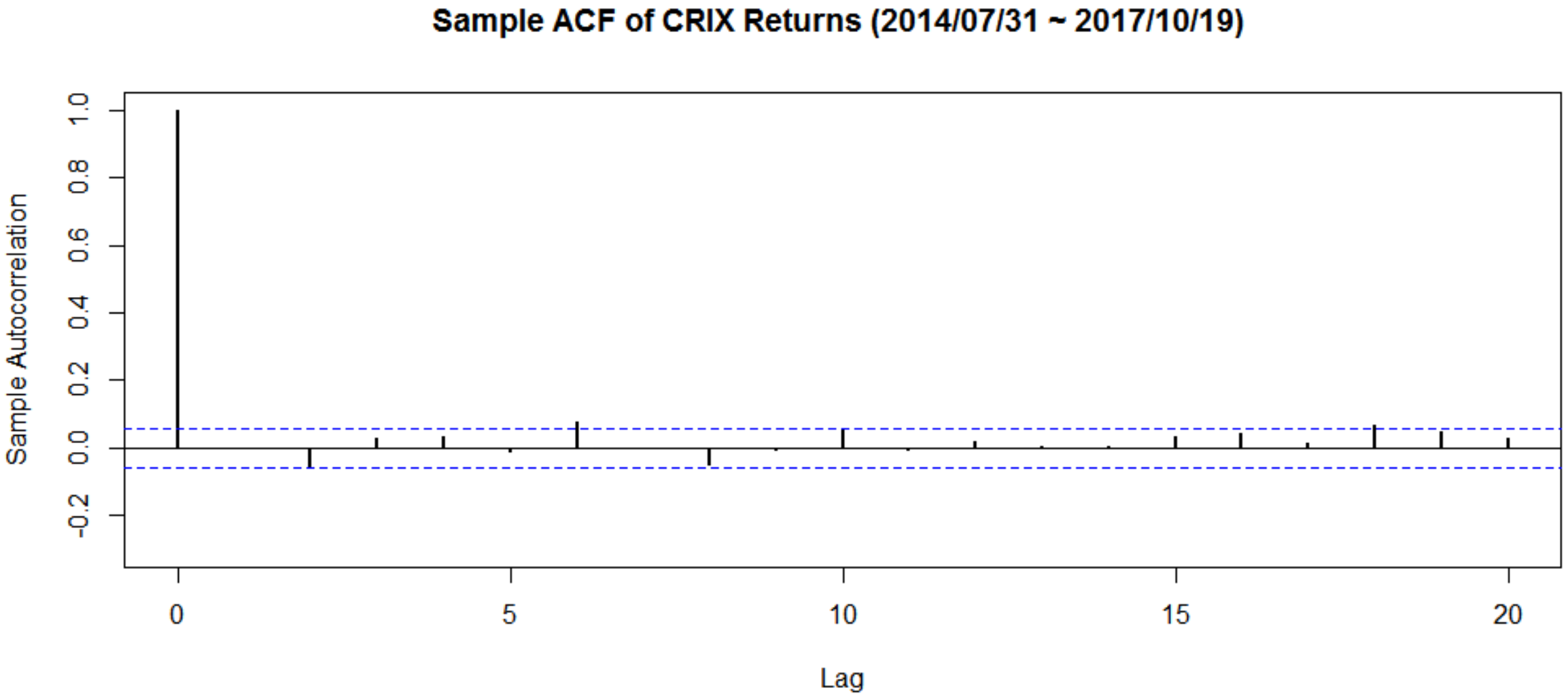
- qqnorm(ret)
- qqline(ret, col = "red", lwd = 3)

Q1. Figure 5

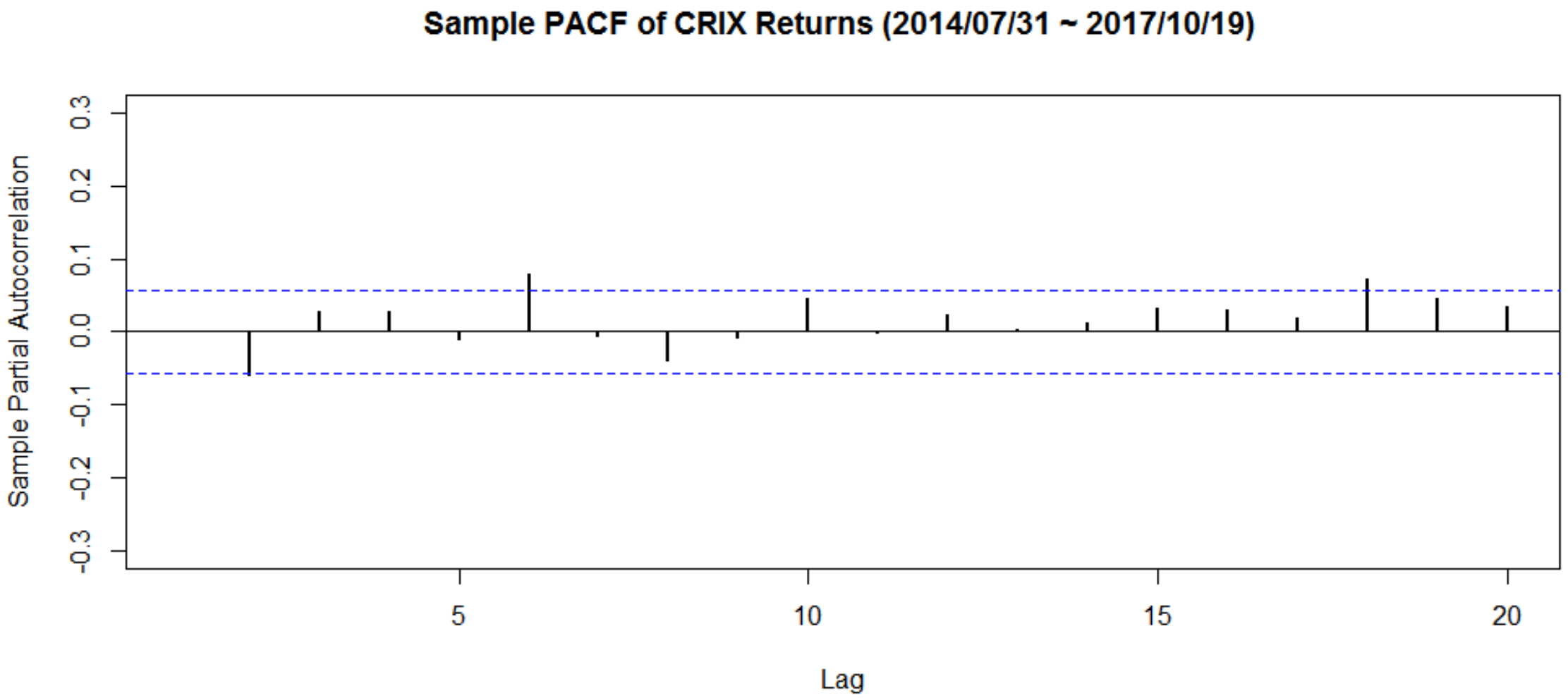

Normal Q-Q Plot
Sample Quantiles
Theoretical Quantiles
0.2
0.1
0.0
-0.1
-0.2
-3
-2
-1
0
1
2
3

- #figure6
- libraries = c("zoo", "tseries")
- autocorr = acf(ret, lag.max = 20, ylab = "Sample Autocorrelation", main = "Sample ACF of CRIX Returns (2014/07/31 ~ 2017/10/19) ", lwd = 2, ylim = c(-0.3, 1))
- autopcorr = pacf(ret, lag.max = 20, ylab = "Sample Partial Autocorrelation", main = "Sample PACF of CRIX Returns (2014/07/31 ~ 2017/10/19) ", ylim = c(-0.3, 0.3), lwd = 2)

Q1. Figure 6.1

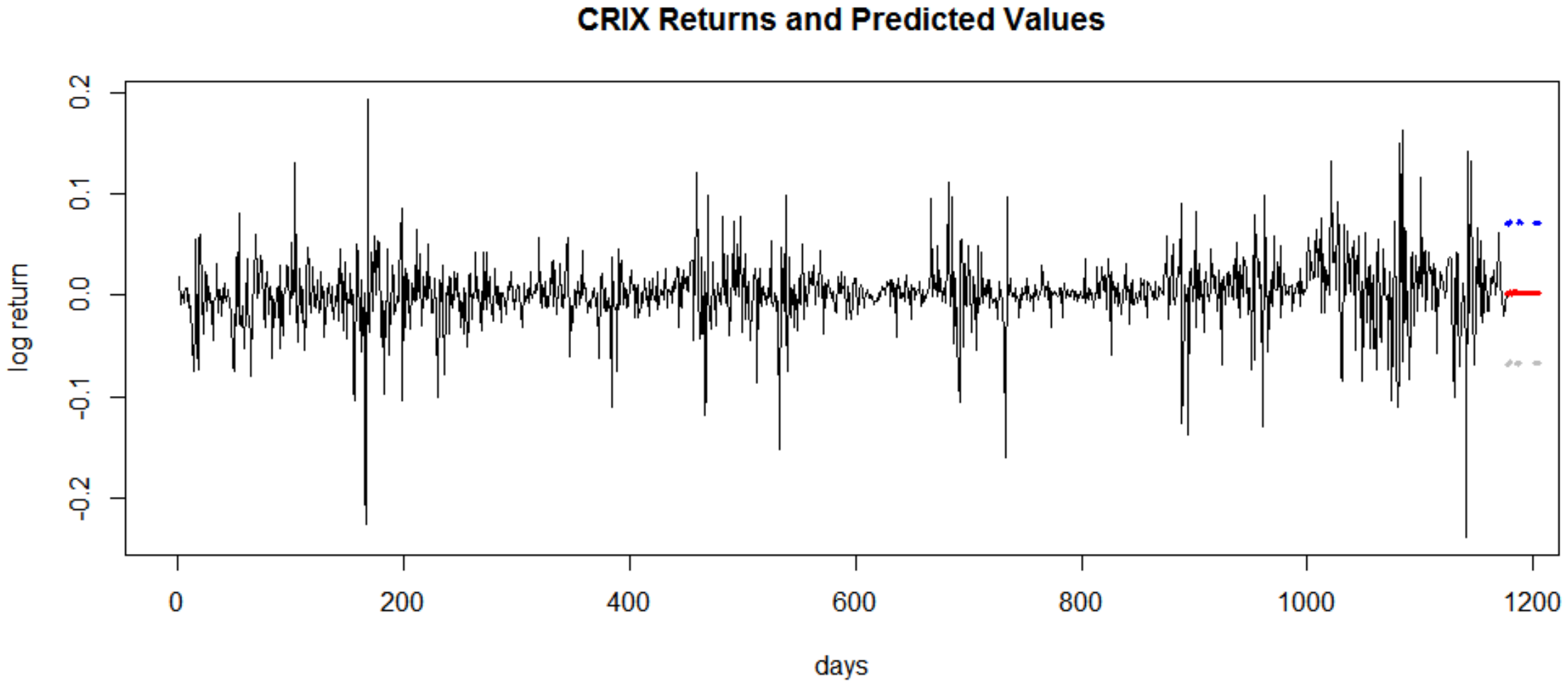

Sample ACF of CRIX Returns (2014/07/31 ~ 2017/10/19)
Sample Autocorrelation
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
0
5
10
15
20
Lag

Q1. Figure 6.2


Sample PACF of CRIX Returns (2014/07/31 ~ 2017/10/19)
Sample Partial Autocorrelation
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
5
10
15
20
Lag

```
#figure7
# arima model
library(caschrono)
library(TTR)
library(forecast)
library(TSA)
par(mfrow = c(1, 1))
auto.arima(ret)
fit202 = arima(ret, order = c(2, 0, 2))
tsdiag(fit202)
fit202 = arima(ret, order = c(2, 0, 2))
crpre = predict(fit202, n.ahead = 30)
dates = seq(as.Date("31/07/2014", format = "%d/%m/%Y"), by = "days", length = length(ret))
plot(ret, type = "l", ylab = "log return", xlab = "days", lwd = 1.5, main = "CRIX Returns and Predicted Values")
lines(crpre$pred, col = "red", lwd = 3)
lines(crpre$pred + 2 * crpre$se, col = "blue", lty = 3, lwd = 3)
lines(crpre$pred - 2 * crpre$se, col = "grey", lty = 3, lwd = 3)
```

Q2. Figure 7


CRIX Returns and Predicted Values
log return
0.2
0.1
0.0
-0.1
-0.2
0
200
400
600
800
1000
1200
days

Thank you!