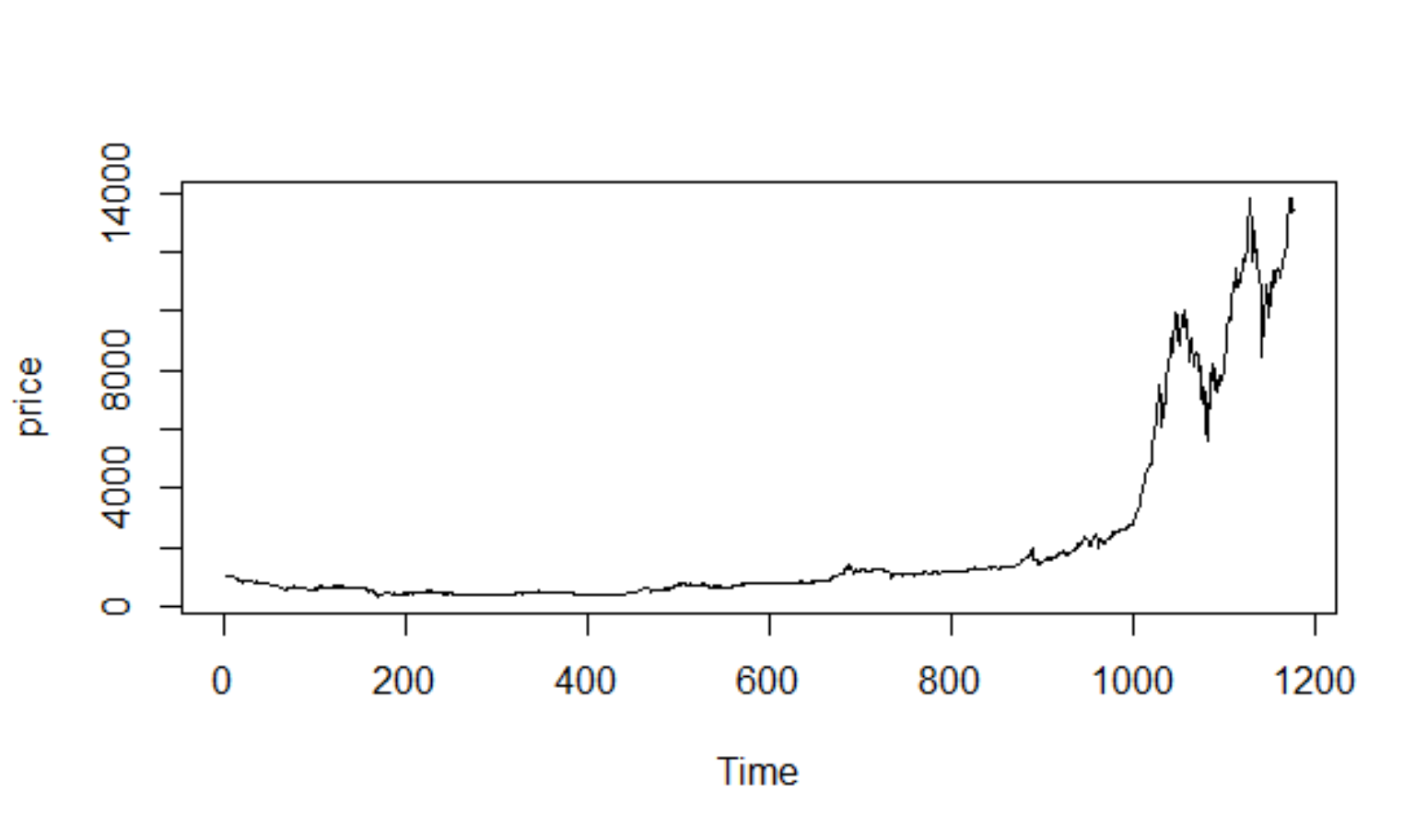
HW4

Xinying Wu

15620161152288

```
#install.packages("rjson", repos="http://cran.us.r-project.org")
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)
n=dim(crix_data_frame)
a=seq(1,n[2],2)
b=seq(2,n[2],2)
date=t(crix_data_frame[1,a])
price=t(crix_data_frame[1,b])

ts.plot(price)
```


price
0
4000
8000
14000
0
200
400
600
800
1000
1200
Time

```
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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)
n=dim(crix_data_frame)
a=seq(1,n[2],2)
b=seq(2,n[2],2)
date=t(crix_data_frame[1,a])
price=t(crix_data_frame[1,b])

ts.plot(price)
ret=diff(log(price))
ts.plot(ret)
> pdf(file="myplot.pdf")
> dev.off()
```
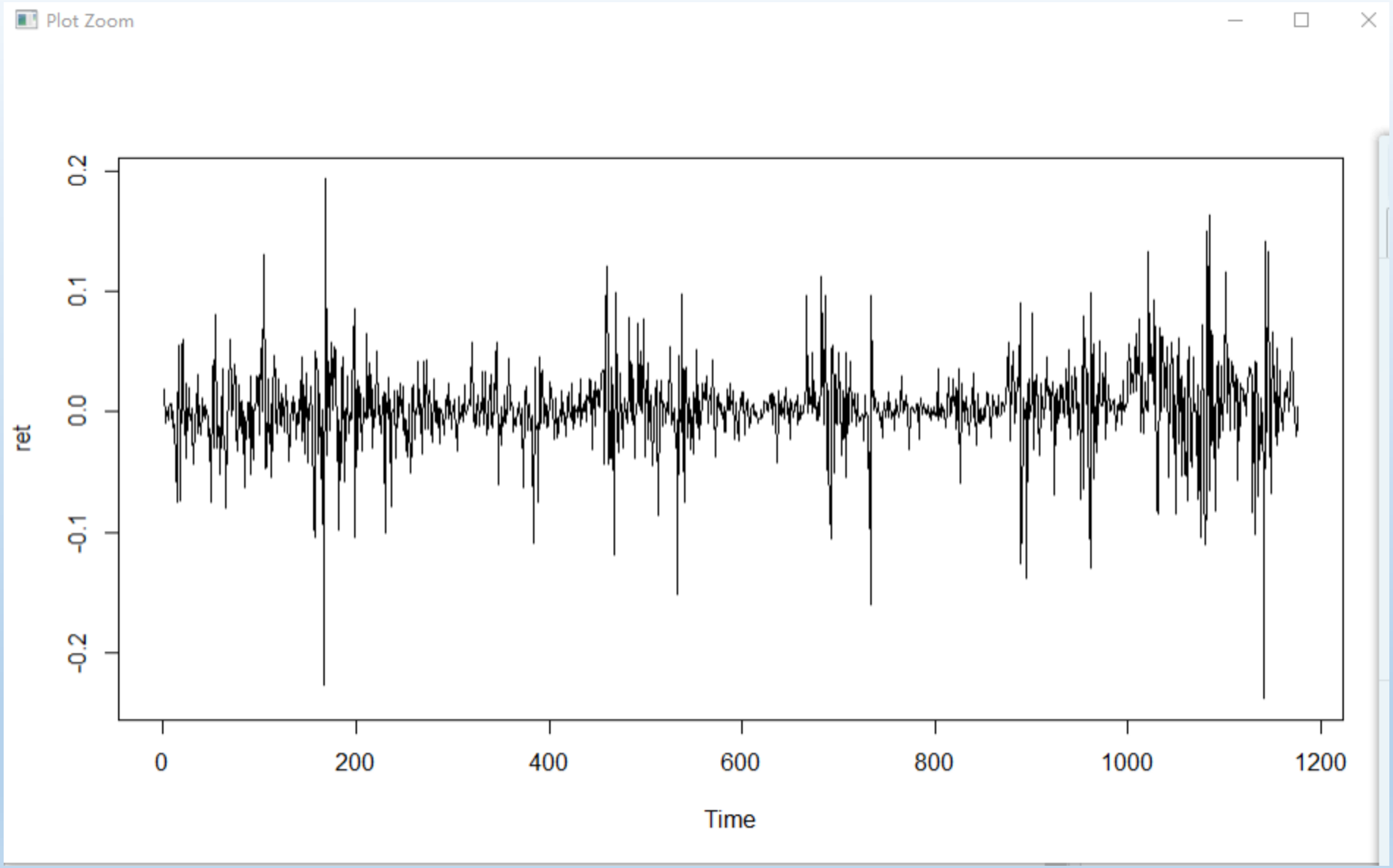


Plot Zoom
ret
0.2
0.1
0.0
-0.1
-0.2
0
200
400
600
800
1000
1200
Time

```
# histogram of returns
hist(ret, col = "cyan", breaks = 20, freq = FALSE, ylim = c(0, 25), xlab = NA)
lines(density(ret), lwd = 1)
mu = mean(ret)
sigma = sd(ret)
x = seq(-4, 4, length = 100)
curve(dnorm(x, mean = mean(ret), sd = sd(ret)), add = TRUE, col = "darkblue", lwd =
1)
```

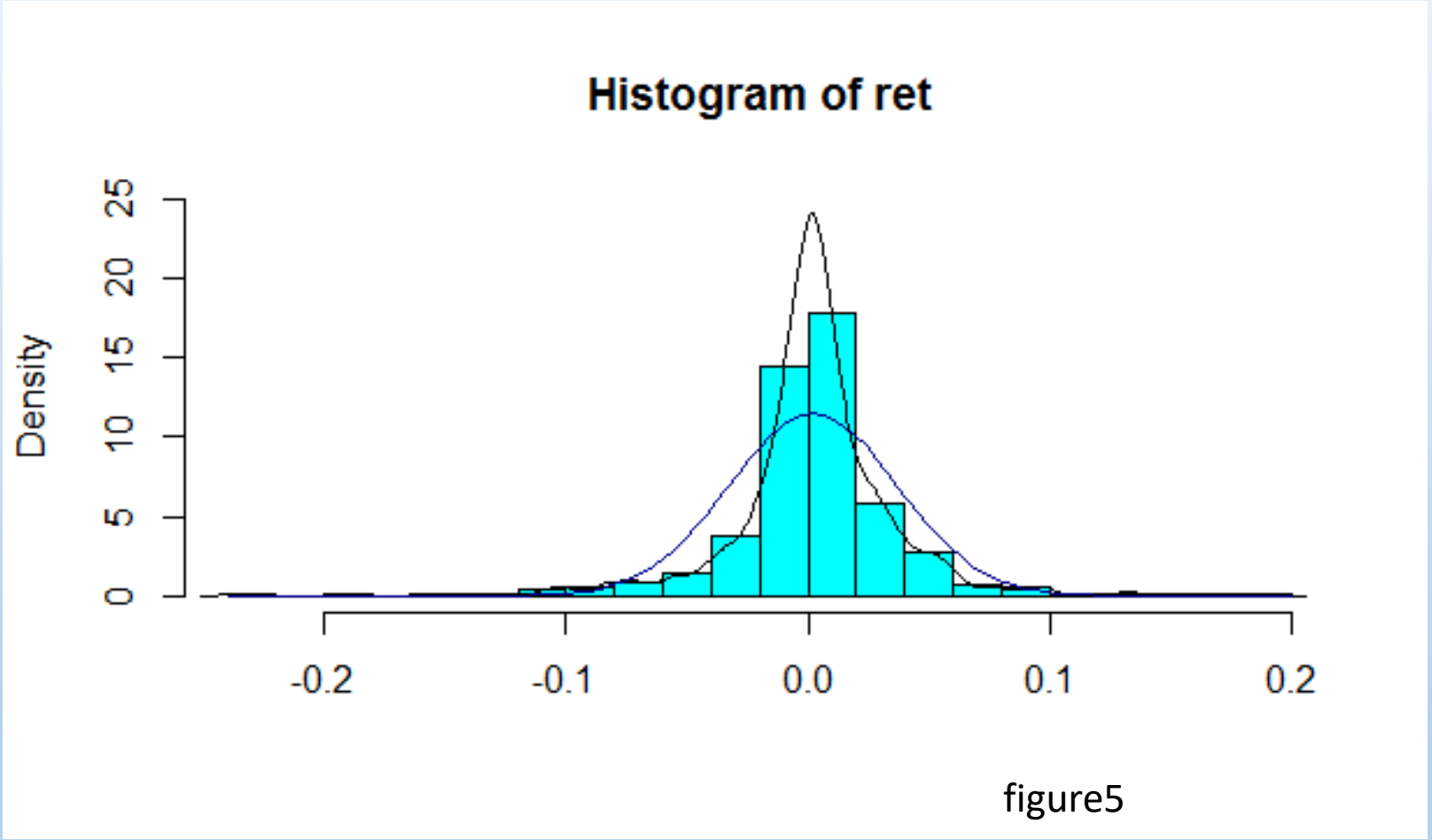
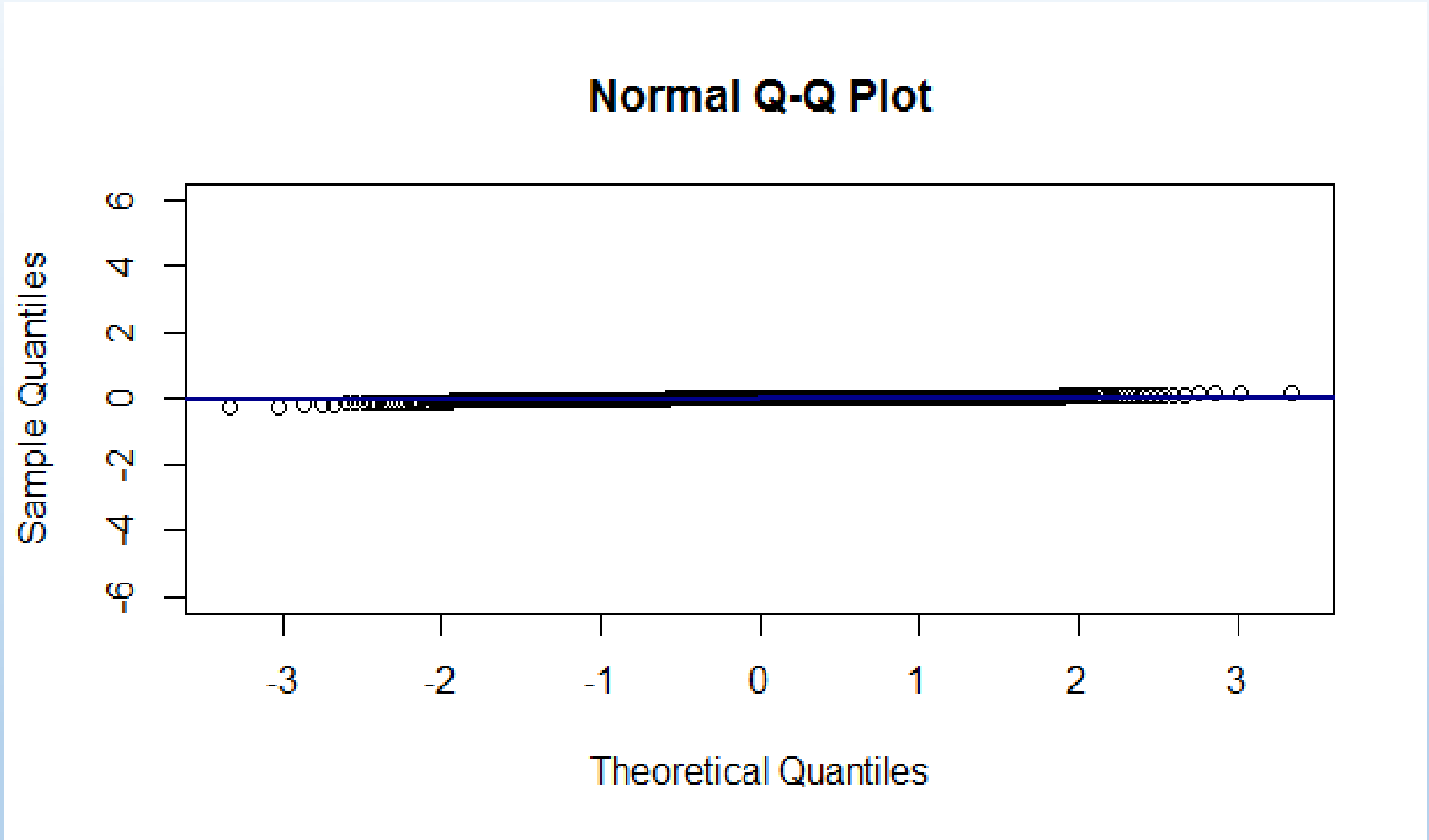


figure5

```
# let's check it by qq-plot
qqnorm(ret,ylim = c(-6, 6))
qqline(ret, col = "darkblue", lwd = 2)
```


Normal Q-Q Plot
Sample Quantiles
6
4
2
0
-2
-4
-6
-3
-2
-1
0
1
2
3
Theoretical Quantiles

```
# plot acf
autocorr = acf(ret, lag.max = 20, ylab = "Sample
Autocorrelation", main = NA,lwd = 1, ylim = c(-0.2,
1))
```

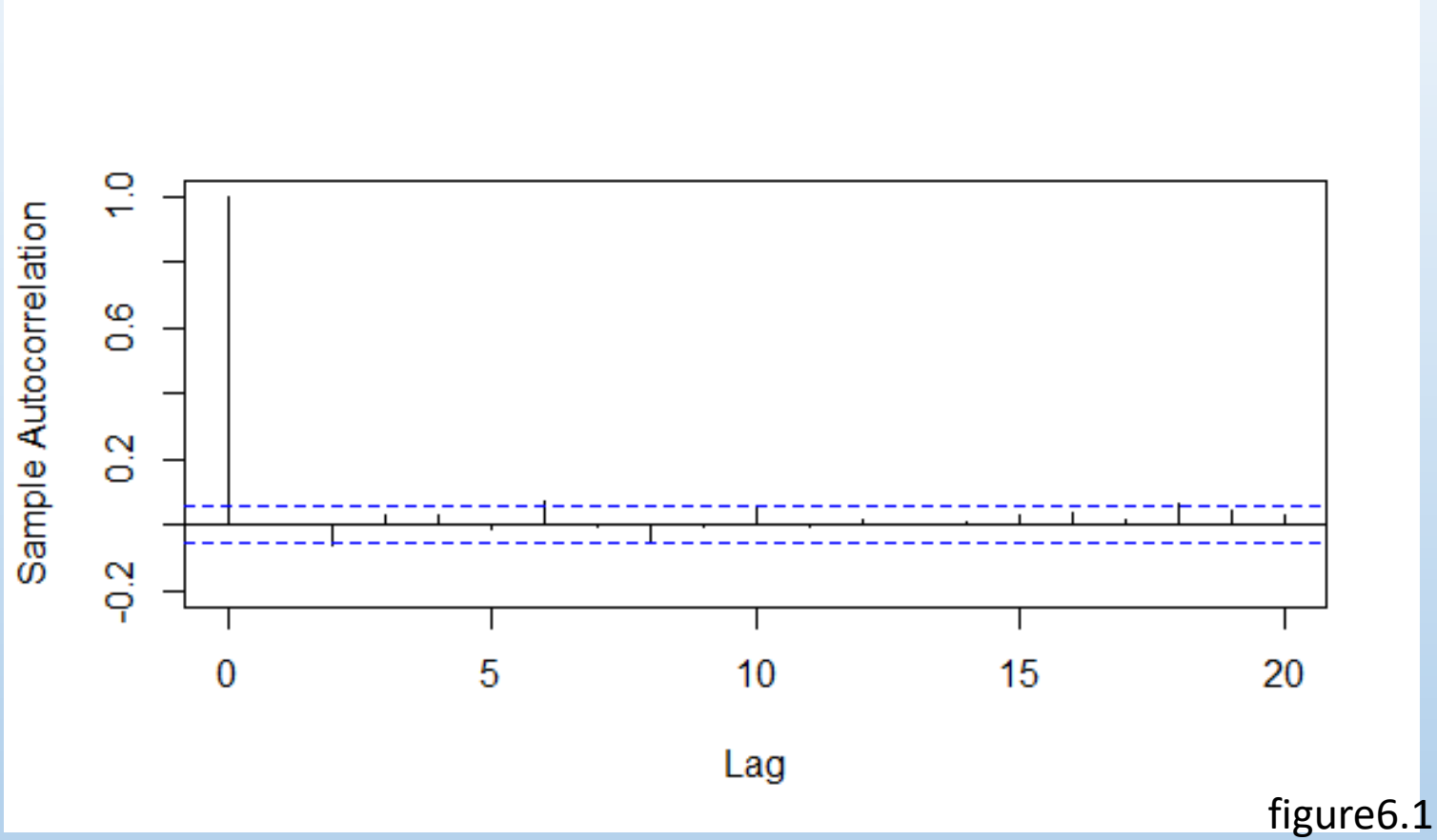


figure6.1

```
# plot of pacf
autopcorr = pacf(ret, lag.max = 20, ylab = "Sample
Partial Autocorrelation", main = NA, ylim = c(-0.3,
0.3), lwd = 2)
```

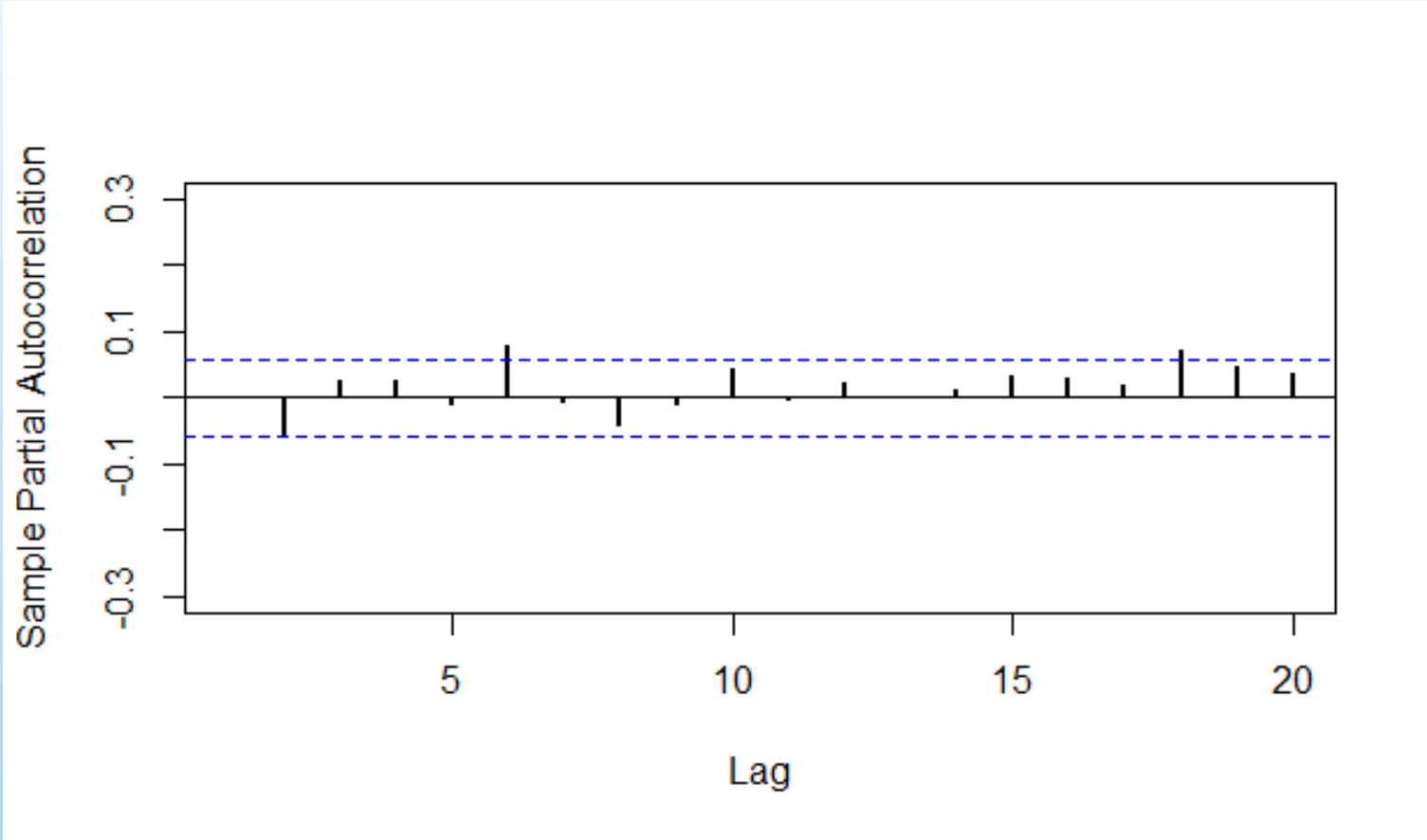
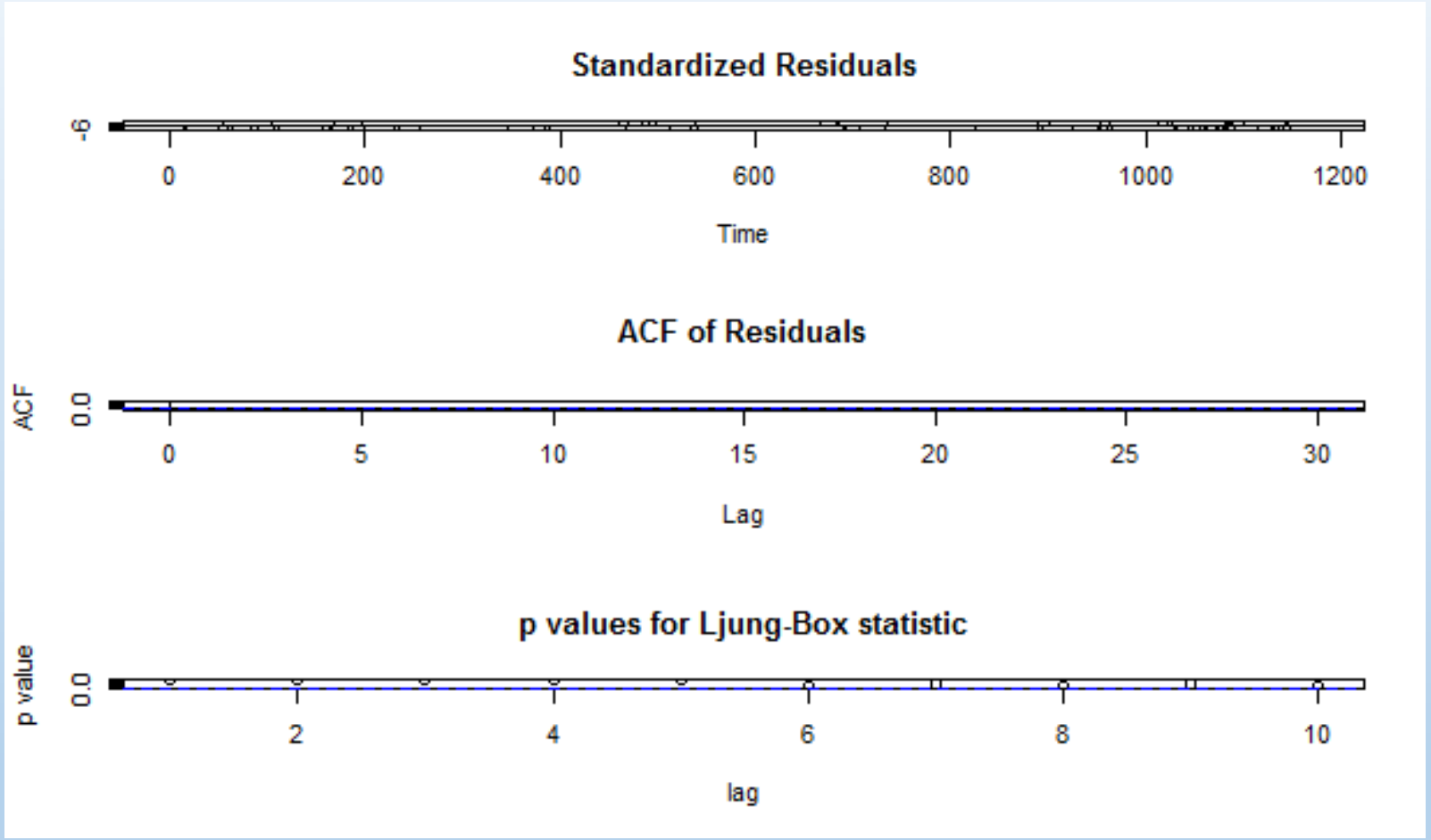


figure6.2

```
# select p and q order of ARIMA model
fit4 = arima(ret, order = c(2, 0, 3))
tsdiag(fit4)
Box.test(fit4$residuals, lag = 1)
```


Standardized Residuals
-6
0
200
400
600
800
1000
1200
Time
ACF of Residuals
ACF
0.0
0
5
10
15
20
25
30
Lag
p values for Ljung-Box statistic
p value
0.0
2
4
6
8
10
lag

```
fitr4 = arima(ret, order = c(2, 1, 3))
tsdiag(fitr4)
Box.test(fitr4$residuals, lag = 1)
> # to conclude, 202 is better than 213
> fit202 = arima(ret, order = c(2, 0, 2))
> tsdiag(fit202)
> tsdiag(fit4)
> tsdiag(fitr4)
```

```
> # arima202 predict
> fit202 = arima(ret, order = c(2, 0, 2))
> crpre = predict(fit202, n.ahead = 30)
> dates = seq(as.Date("02/08/2014", format = "%d/%m/%Y"), by =
"days", length = length(ret))
> plot(ret, type = "l", xlim = c(0, 644), ylab = "log return", xlab =
"days",lwd = 1.5)
> lines(crpre$pred, col = "red", lwd = 3)
> lines(crpre$pred + 2 * crpre$se, col = "red", lty = 3, lwd = 3)
> lines(crpre$pred - 2 * crpre$se, col = "red", lty = 3, lwd = 3)
```

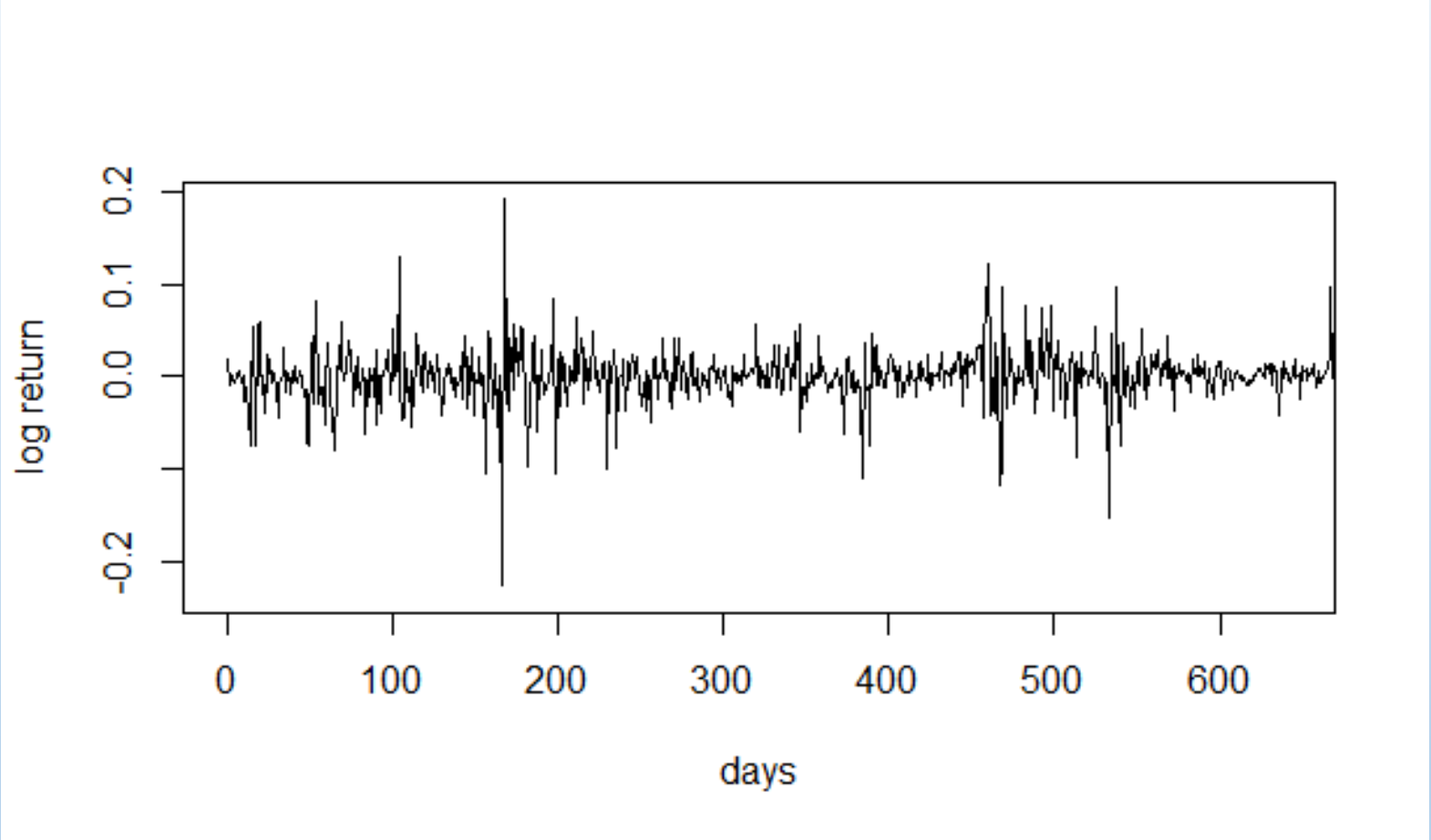


figure7