



Homework 4

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HW 4.1

```
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)  
a=seq(1,n[2],2)  
b=seq(2,n[2],2)  
date=t(x[1,a])  
price=t(x[1,b])  
crix=data.frame(date,price)  
load("ecrix.RData")  
load("efcrix.RData")
```

Figure3: Daily value of indices in the CRIX family

```
plot(ecrix, type = "l", col = "blue", xaxt = "n", main =  
" Daily value of indices in the CRIX family", xlab =  
"Date", ylab = "Daily Value of Indices")
```

```
lines(efcrix, col = "black")
```

```
lines(price, col = "red")
```

```
lab=seq(1,n[2],365)
```

```
axis(1, at = lab, label = names(ecrix)[lab])
```

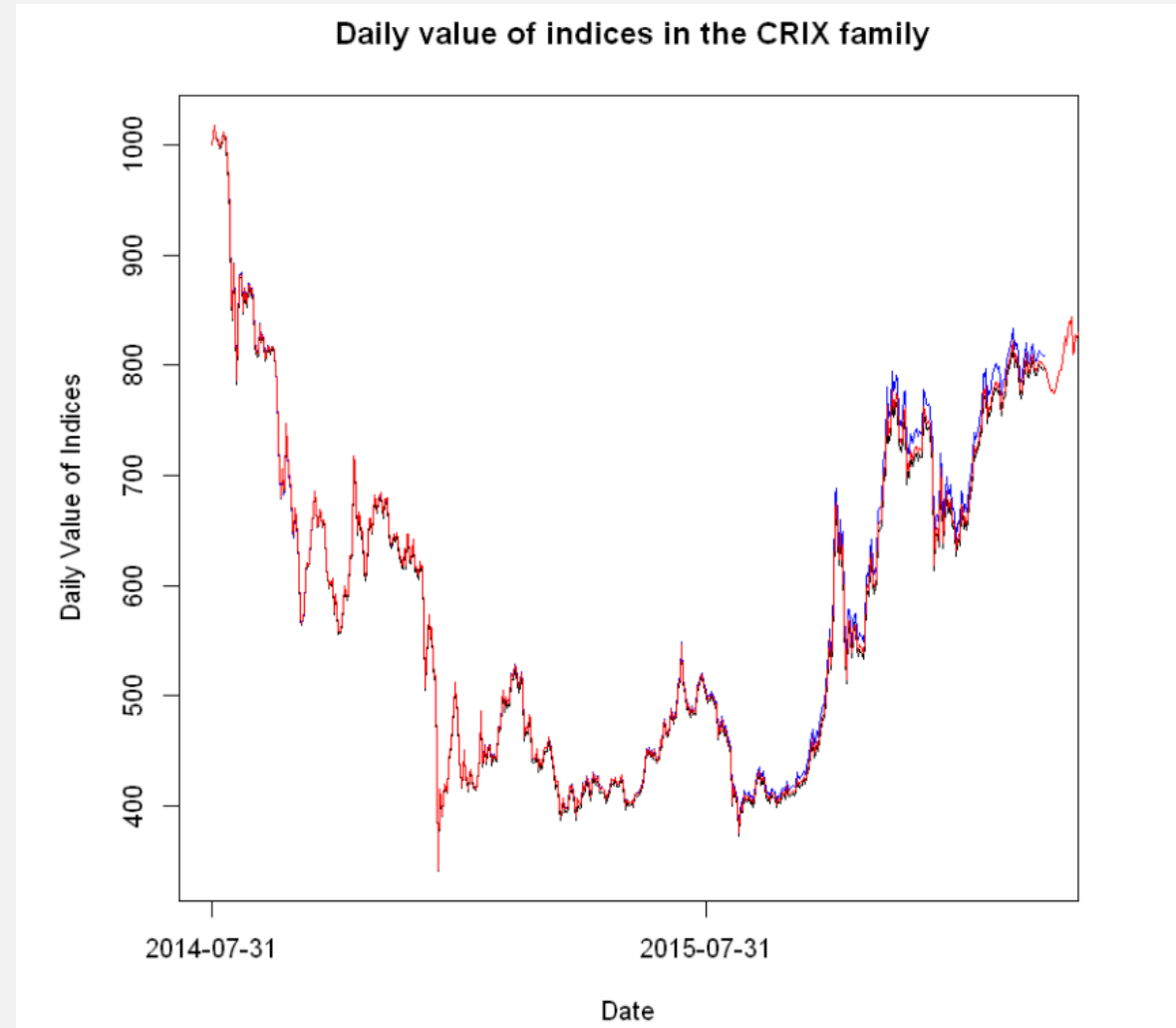


Figure 4: The log returns of CRIX index

```
ret=diff(log(price))
```

```
plot(ret~as.Date(date[-1]), type="l", col="black", xlab="Date", ylab="Log return", main="Log returns of crix index")
```

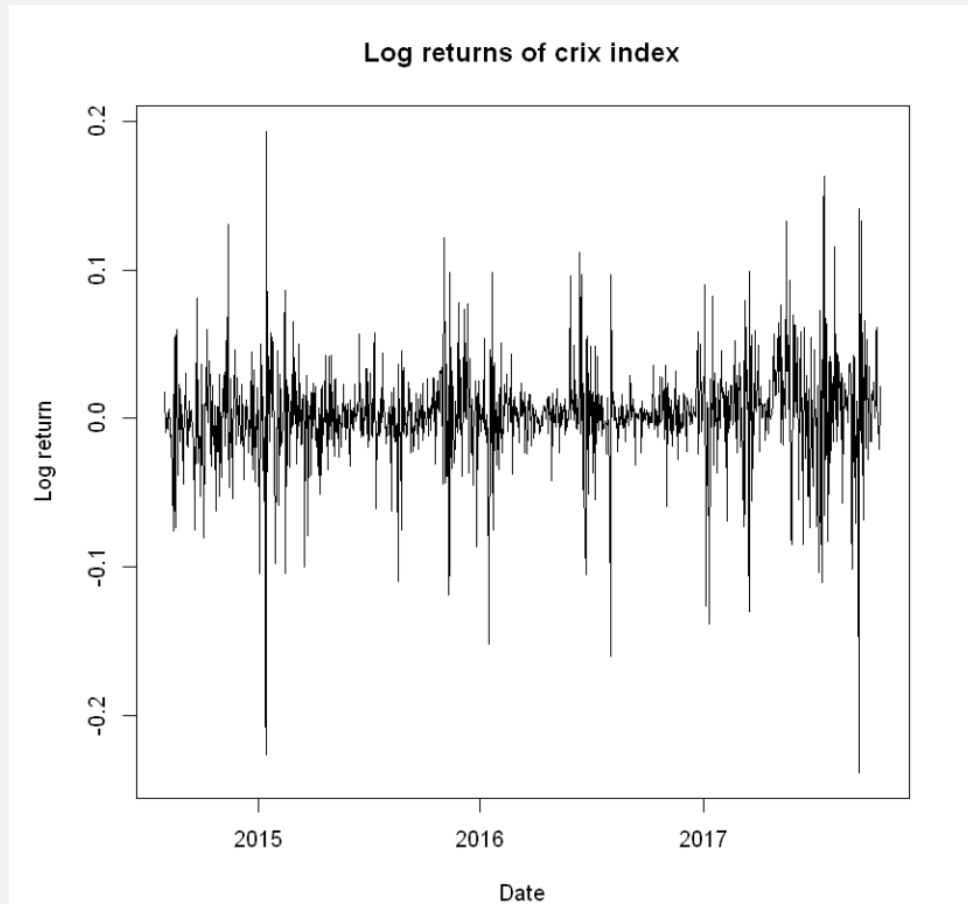


Figure 5: Histogram and QQ plot of CRIX returns

```
hist(ret, col = "grey", breaks = 20, freq = FALSE, ylim = c(0, 25),  
xlab = "Return")
```

```
lines(density(ret), lwd = 2)
```

```
x = seq(-4, 4, length = 100)
```

```
curve(dnorm(x, mean = mean(ret), sd = sd(ret)), add=TRUE,  
col = "darkblue", lwd = 2)
```

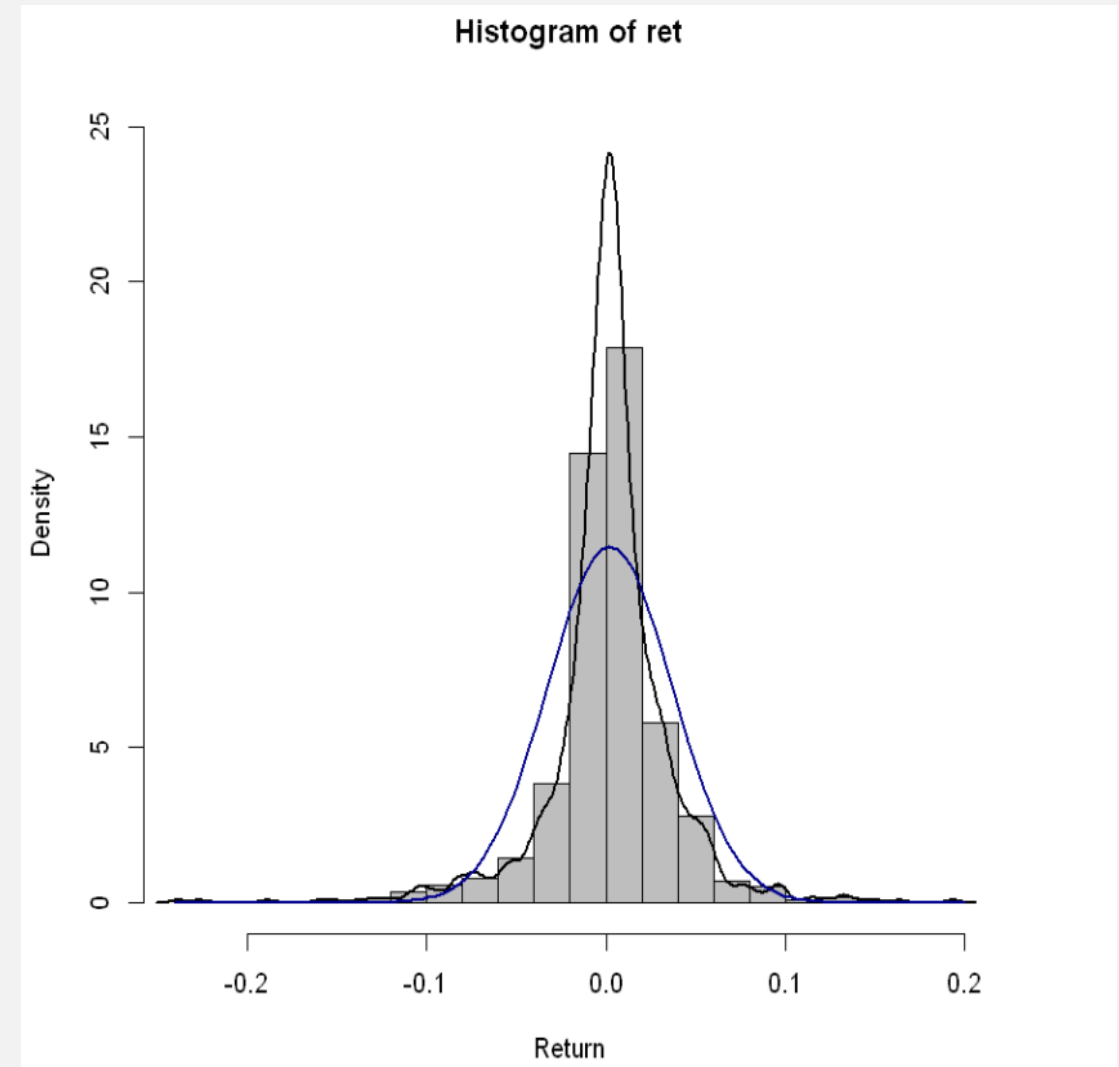


Figure 5: Histogram and QQ plot of CRIX returns

`qqnorm(ret)`

`qqline(ret, col = "blue", lwd = 4)`

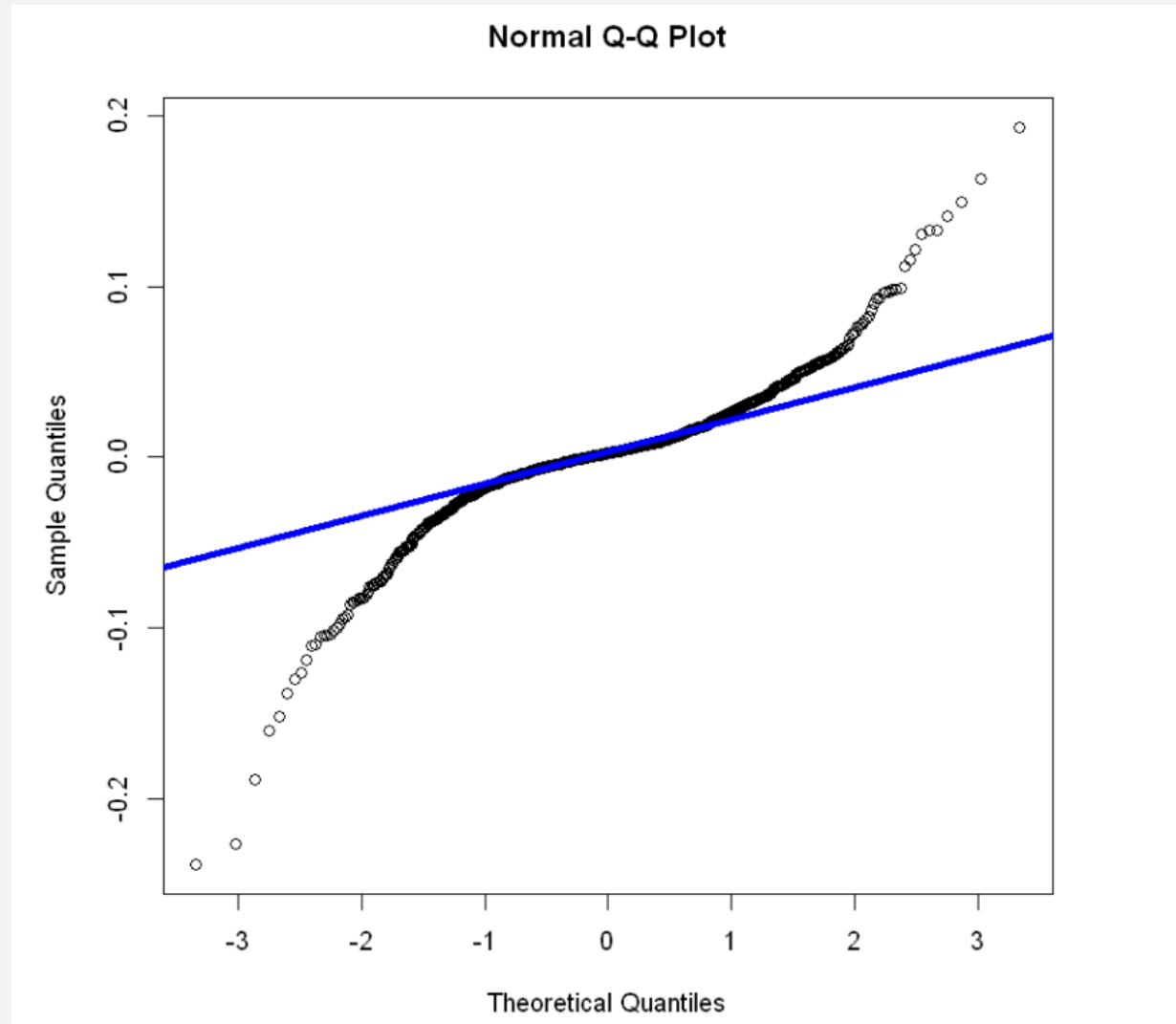


Figure 6: The sample ACF and PACF of CRIX returns

```
par(mfrow = c(2, 1))
```

```
libraries = c("zoo", "tseries")
```

```
autocorr = acf(ret, lag.max = 20, ylab  
= "Sample Autocorrelation", main =  
"ACF", lwd = 2, ylim = c(-0.3, 1))
```

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

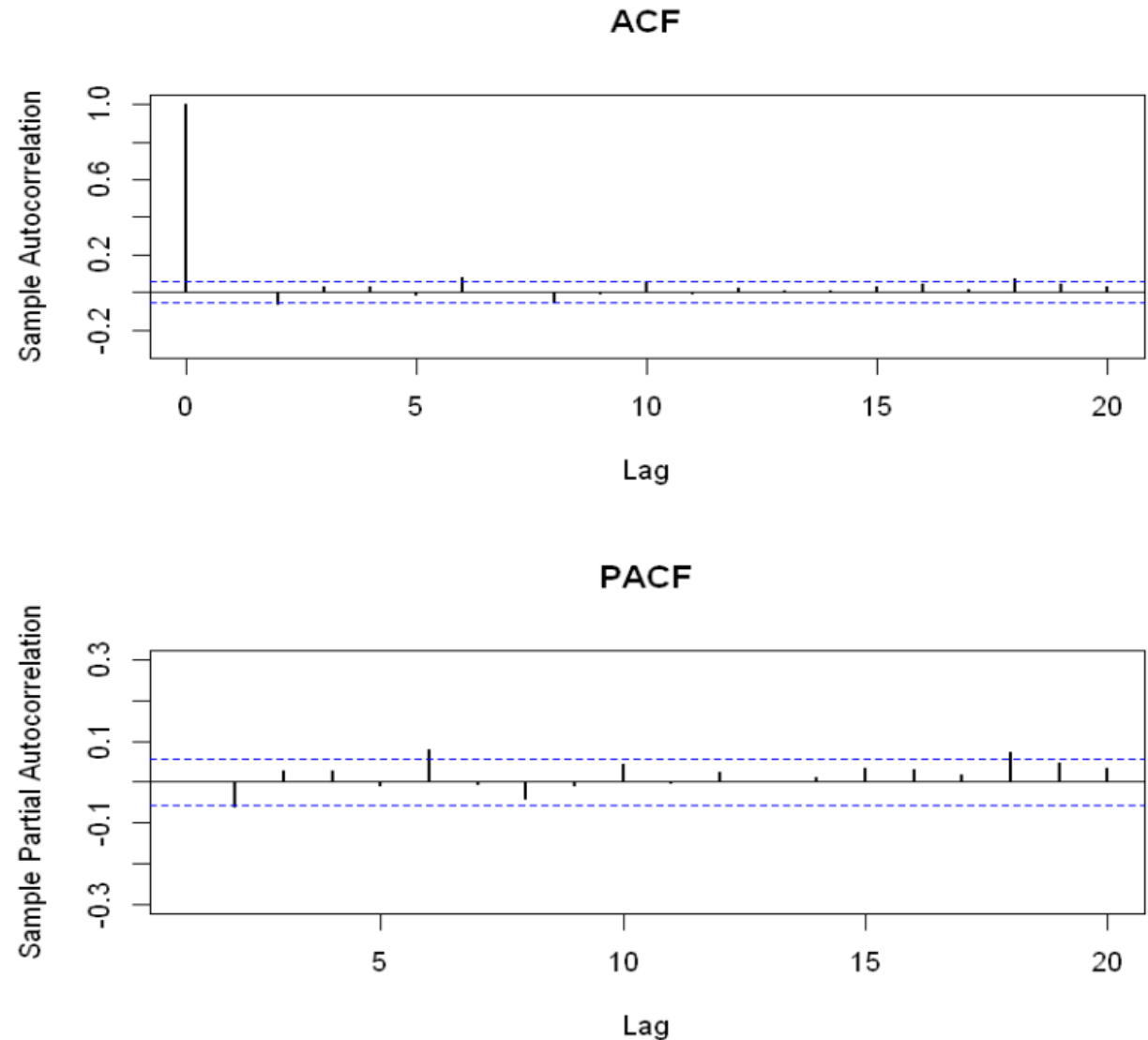


Figure 7:Diagnostic Checking

```
library(TTR)
```

```
library(TSA)
```

```
library(caschnono)
```

```
Library(forecast)
```

```
fit = arima(ret, order = c(2, 0, 2))
```

```
tsdiag(fit)
```

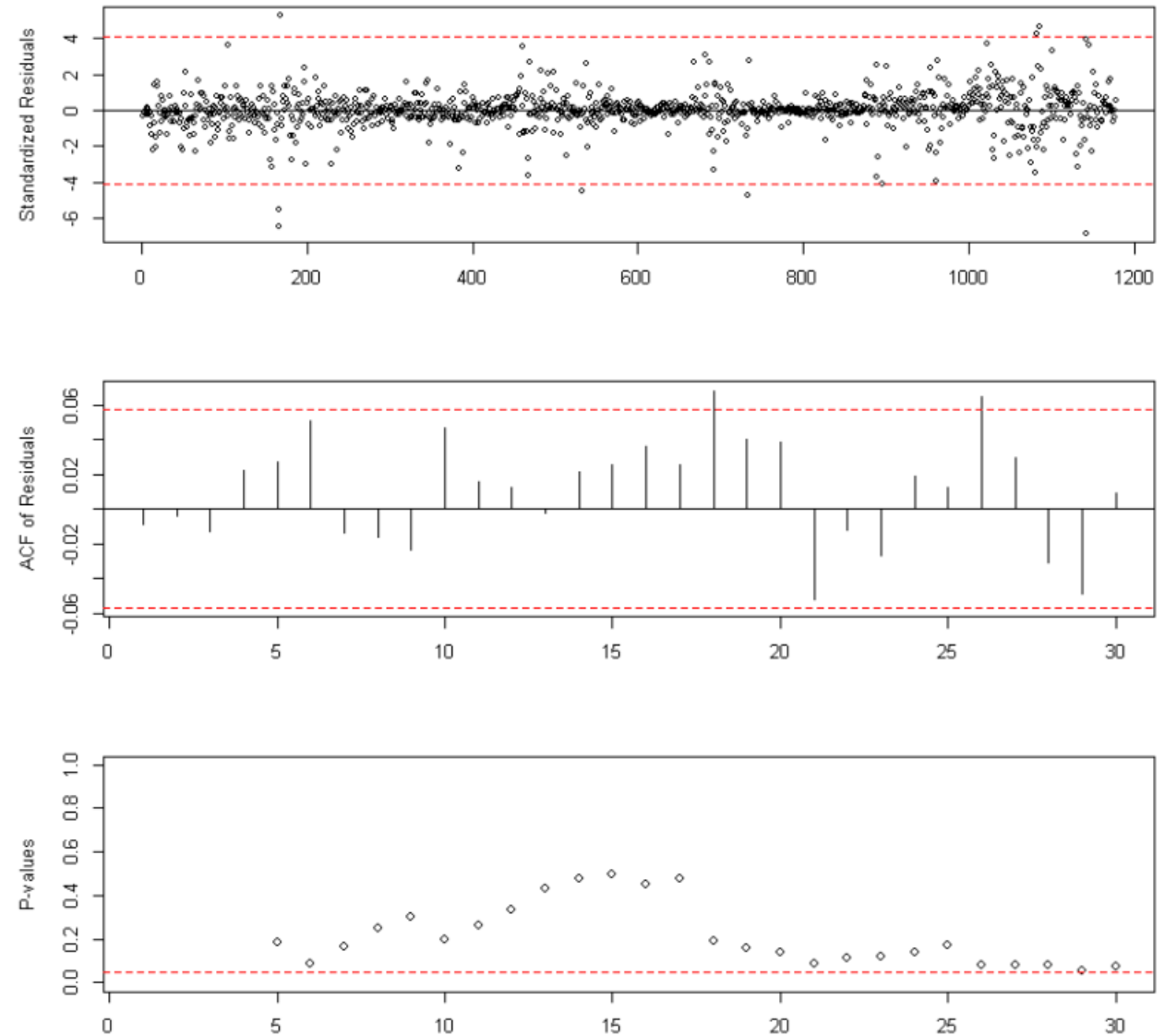


Figure 7:Diagnostic Checking

```
crix_pre = predict(fit, n.ahead = 30)
plot(ret, type = "l", ylab = "Log return", xlab = "Date",
     lwd = 1, main = "CRIX returns and predicted values")
lines(crix_pre$pred, col = "red", lwd = 1)
lines(crix_pre$pred + 2 * crix_pre$se, col = "red", lty = 3, lwd = 1)
lines(crix_pre$pred - 2 * crix_pre$se, col = "red", lty = 3, lwd = 1)
```

