HW Unit 4

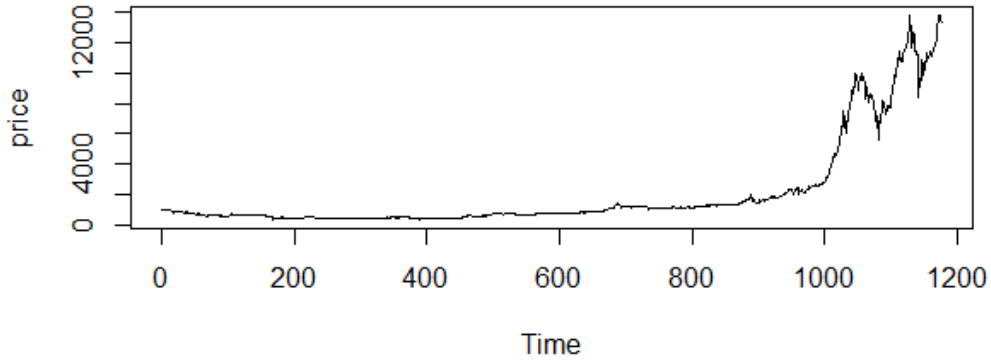
Chenyuang Wang 15620161152281

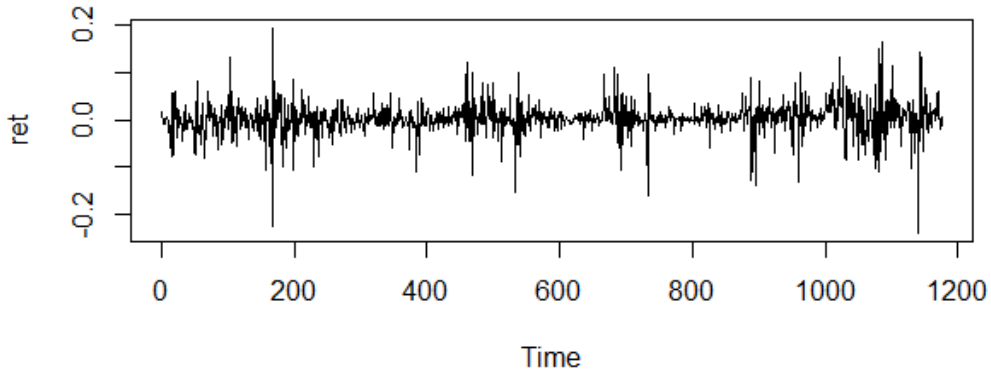
1. improve the R quantlets on GH (from CRIX directory on quantlet.de) and make

The daily value of indices in the CRIX and The log returns of CRIX index

- 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))
- par(mfrow=c(2,1))
- ts.plot(ret)

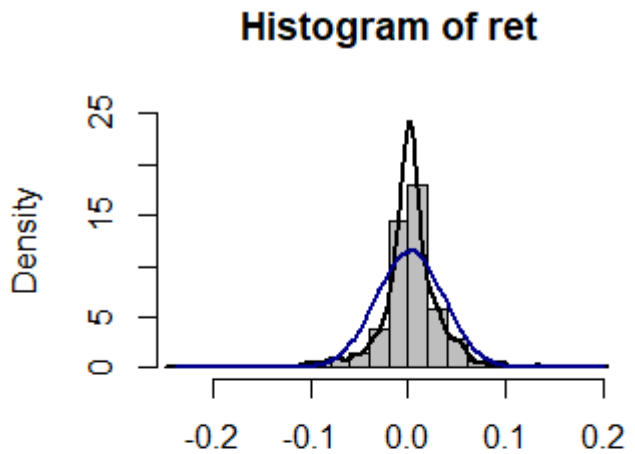


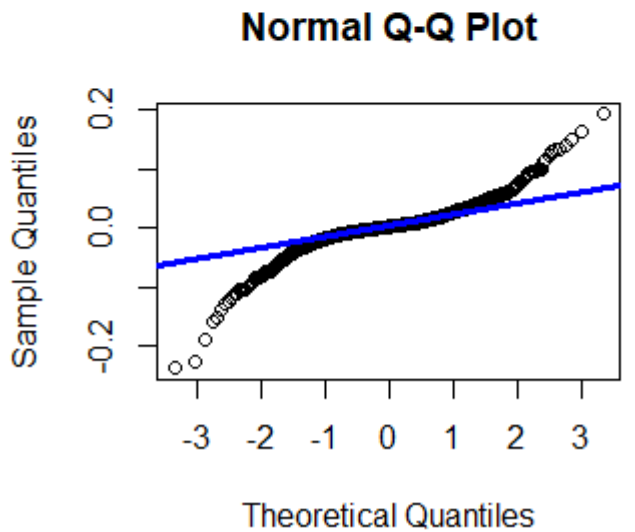


- Histogram and QQ plot of CRIX returns

- # histogram of returns
- par(mfrow=c(2,1))
- hist(ret, col = "grey", breaks = 20, freq = FALSE, ylim = c(0, 25), xlab = NA)
- 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 = "darkblue", lwd = 2)

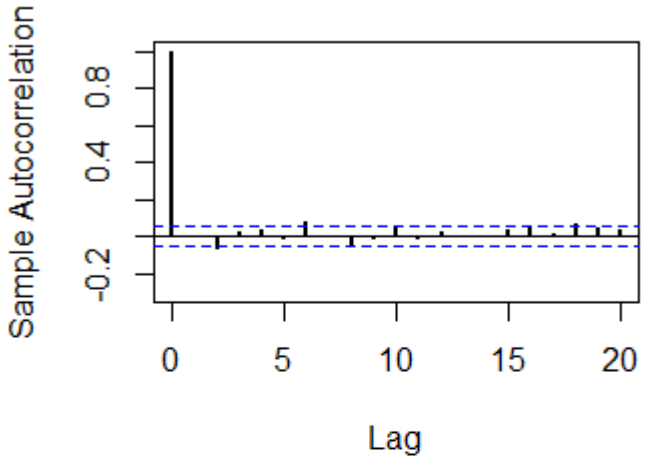
- # qq-plot
- qqnorm(ret)
- qqline(ret, col = "blue", lwd = 3)



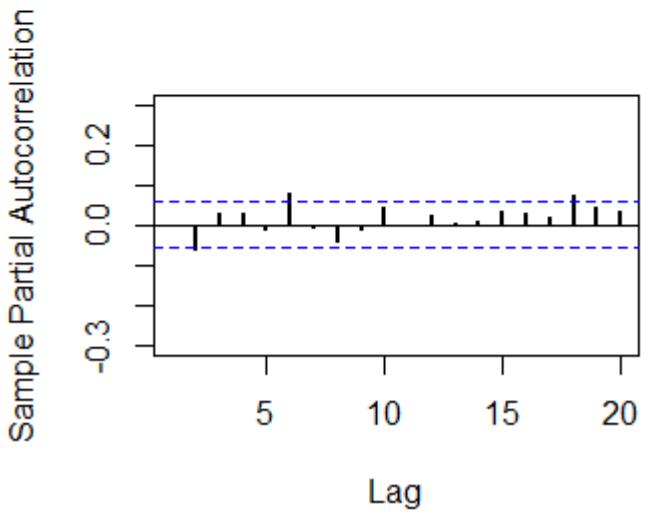


- The sample ACF and PACF of CRIX returns

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

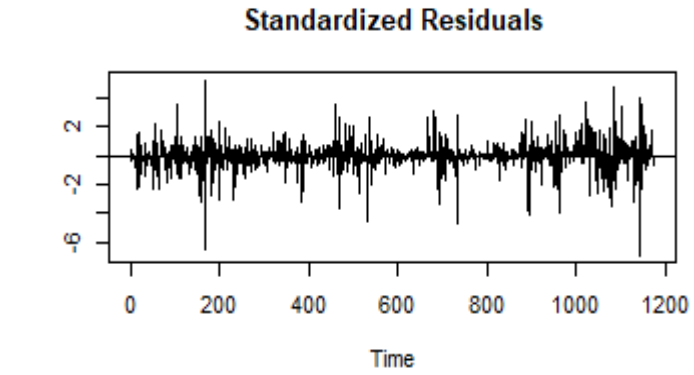


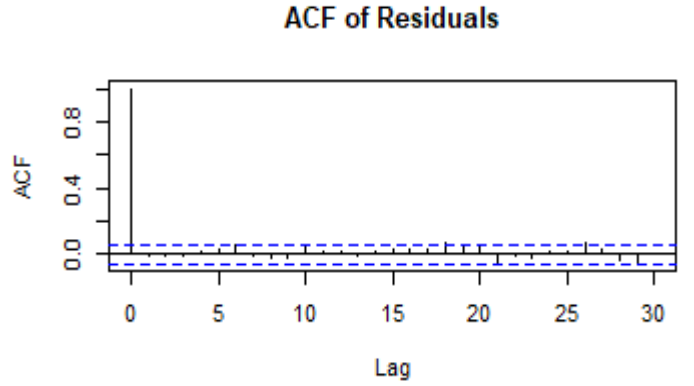
- # plot of pacf
- autopcorr = pacf(ret, lag.max = 20, ylab = "Sample Partial Autocorrelation", main = NA, ylim = c(-0.3, 0.3), lwd = 2)

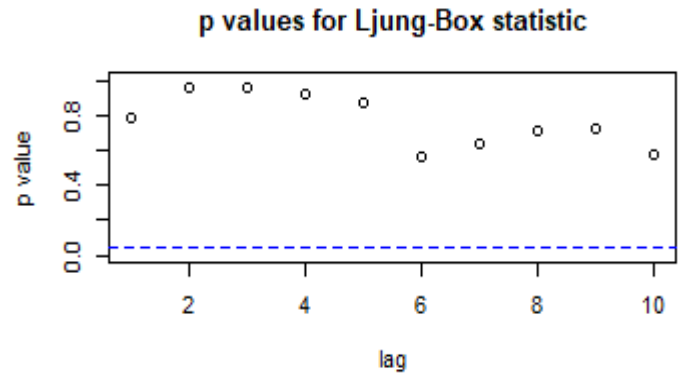


- Diagnostic Checking

- fit202 = arima(ret, order = c(2, 0, 2))
- tsdiag(fit202)

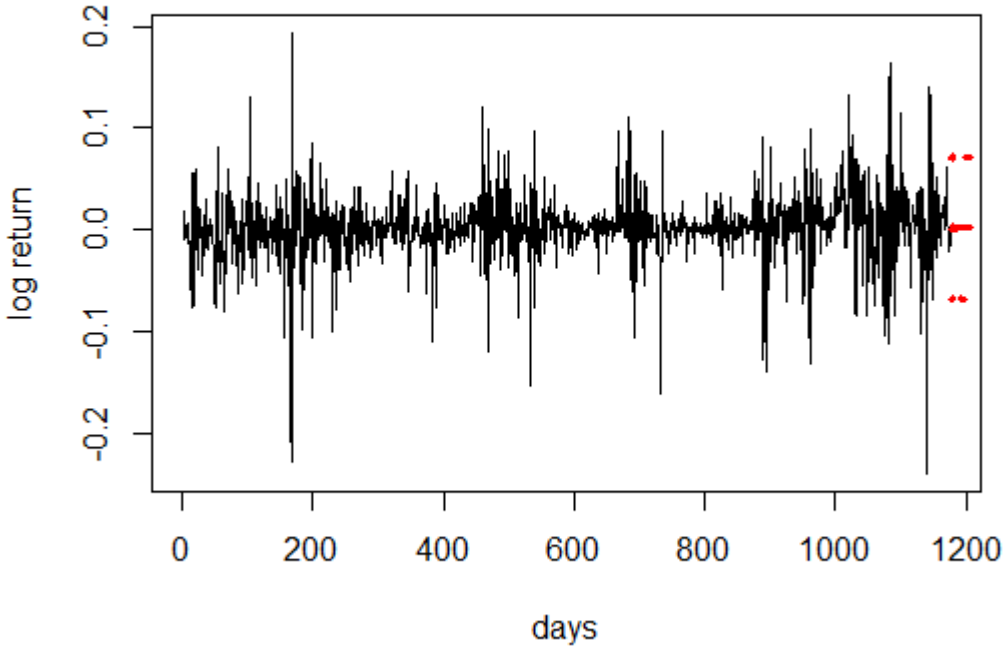






- CRIX returns and predicted values

- # arima202 predict
- fit202 = arima(ret, order = c(2, 0, 2))
- crpre = predict(fit202, n.ahead = 30)
- plot(ret, type = "l", 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)



The confidence bands are red dashed lines.