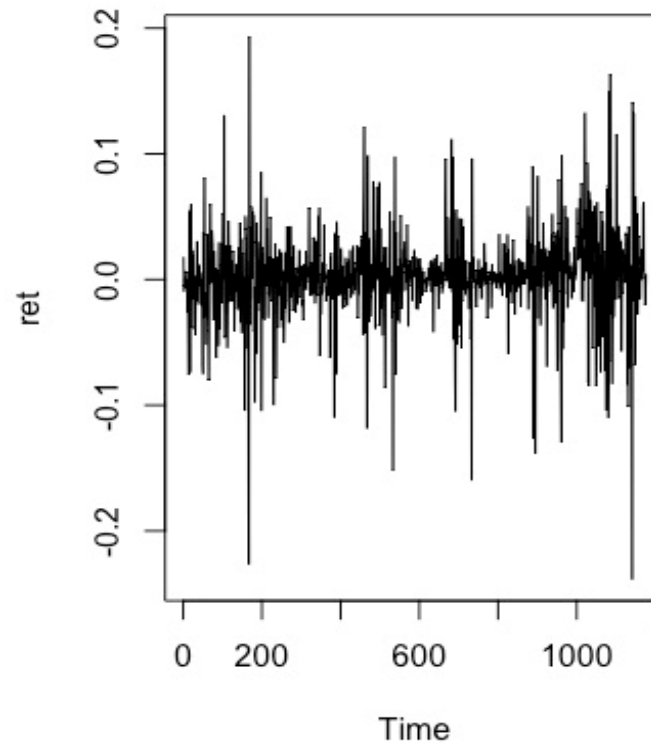


HW4

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```
#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)  
ret<-diff(log(price))  
plot(ret)  
ts.plot(ret)
```



```
# histogram of returns
```

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

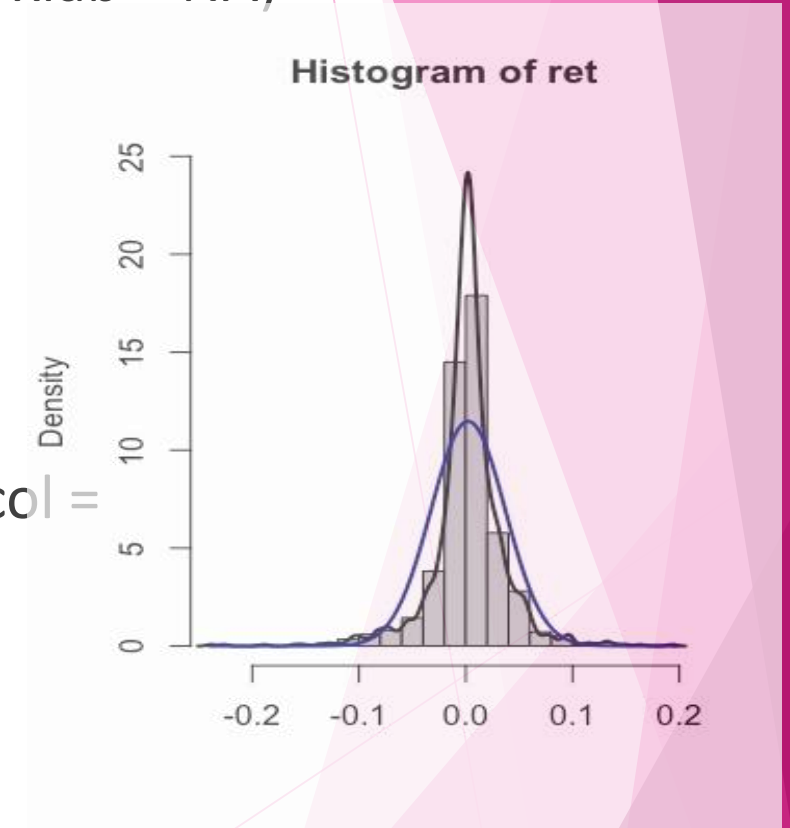
```
lines(density(ret), lwd = 2)
```

```
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)
```

```
# 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)
```

select p and q order of ARIMA model

```
fit4 = arima(ret, order = c(2, 0, 3))
```

```
tsdiag(fit4)
```

```
Box.test(fit4$residuals, lag = 1)
```

```
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)
```