IE421FinalExam

Ahmet Selimhan ŞAHİN

04/02/2022

Necessary Packages

```
library(dplyr) # For data wrangling
library(lubridate) # For time series data
library(ggplot2) # For data visualization
library(tidyr) # For tidy data
library(dygraphs) # For visualizing time series
library(xts) # For creating xts objects
library(forcats) # For handling categorical variables
library(knitr) # For R Markdown
```

Question 1

Loading Datas

Question 1.1

```
load("C:/Users/Selimhan/Desktop/BTC.RData")
load("C:/Users/Selimhan/Desktop/ETH.RData")
load("C:/Users/Selimhan/Desktop/SP500.RData")
```

Question 1.2

```
str(BTC)
```

```
## tibble [1,494 x 2] (S3: tbl_df/tbl/data.frame)
##  $ date     : Factor w/ 1494 levels "2018-01-01 00:00:00",..: 1494 1493 1492 1491 1490 148
9 1488 1487 1486 1485 ...
##  $ BTC_price: num [1:1494] 38823 38695 38467 37882 38167 ...
```

```
str(ETH)
```

```
## tibble [1,494 x 2] (S3: tbl_df/tbl/data.frame)
##  $ date     : Factor w/ 1494 levels "2018-01-01 00:00:00",..: 1494 1493 1492 1491 1490 148
9 1488 1487 1486 1485 ...
##  $ ETH_price: num [1:1494] 2798 2787 2687 2602 2601 ...
```

```
str(SP500)
```

```
## tibble [1,029 x 2] (S3: tbl_df/tbl/data.frame)
##  $ date       : Factor w/ 1067 levels "1.01.2018","1.01.2019",..: 388 769 858 893 998 1033
37 72 107 247 ...
##  $ SP500_index: num [1:1029] 2696 2713 2724 2743 2748 ...
```

```
BTC <- BTC %>%
  mutate(date = ymd_hms(date))



ETH <- ETH %>%
  mutate(date = ymd_hms(date))


SP500 <- SP500 %>%
  mutate(date = dmy(date))
```

```
str(BTC)
```

```
## tibble [1,494 x 2] (S3: tbl_df/tbl/data.frame)
##  $ date     : POSIXct[1:1494], format: "2022-02-02" "2022-02-01" ...
##  $ BTC_price: num [1:1494] 38823 38695 38467 37882 38167 ...
```

```
str(ETH)
```

```
## tibble [1,494 x 2] (S3: tbl_df/tbl/data.frame)
##  $ date     : POSIXct[1:1494], format: "2022-02-02" "2022-02-01" ...
##  $ ETH_price: num [1:1494] 2798 2787 2687 2602 2601 ...
```

```
str(SP500)
```

```
## tibble [1,029 x 2] (S3: tbl_df/tbl/data.frame)
##  $ date       : Date[1:1029], format: "2018-01-02" "2018-01-03" ...
##  $ SP500_index: num [1:1029] 2696 2713 2724 2743 2748 ...
```

Question 2

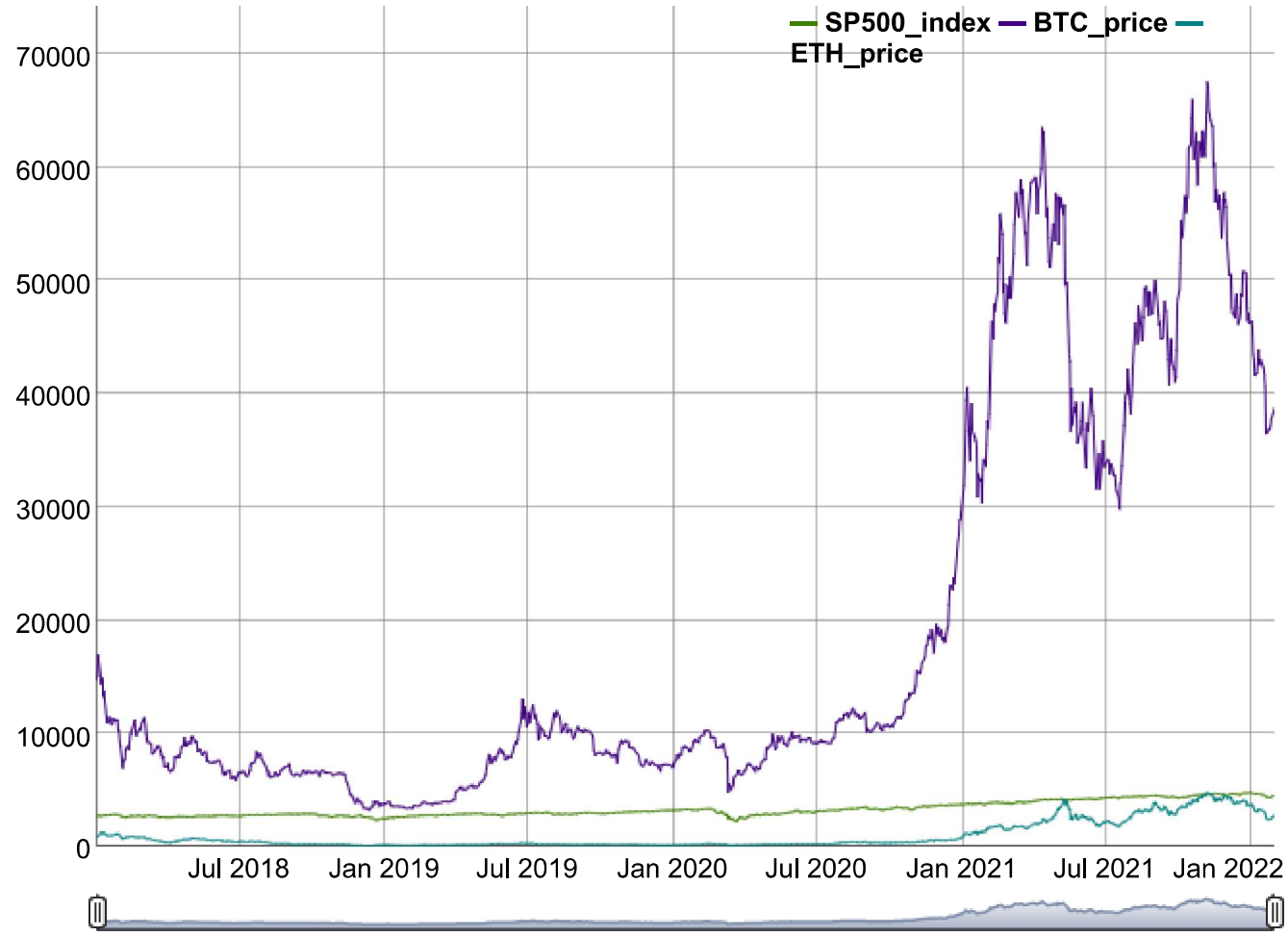
Question 2.1

```
d1 <- SP500 %>%
    left_join(BTC , by = "date")


d2 <- d1 %>%
    left_join(ETH , by = "date")

kable(head(d2))
```

date	SP500_index	BTC_price	ETH_price
2018-01-02	2695.81	14675.11	855.28
2018-01-03	2713.06	14919.51	934.03
2018-01-04	2723.99	15059.54	940.00
2018-01-05	2743.15	16960.39	959.30
2018-01-08	2747.71	14902.54	1133.18
2018-01-09	2751.29	14400.00	1291.00

Question 2.2

```
inter = xts(d2[ , -1] , order.by = d2$date)


dygraph(inter) %>%
  dyRangeSelector(height = 20)
```



Question 3

Question 3.1

```
month.cor <- d2 %>%
  group_by(month = cut(date , "month")) %>%
  summarize(
    ETH_vs_BTC = cor(ETH_price , BTC_price)
  )
```

```
month.cor = month.cor %>%
  mutate(month = ymd(month))

str(month.cor)
```

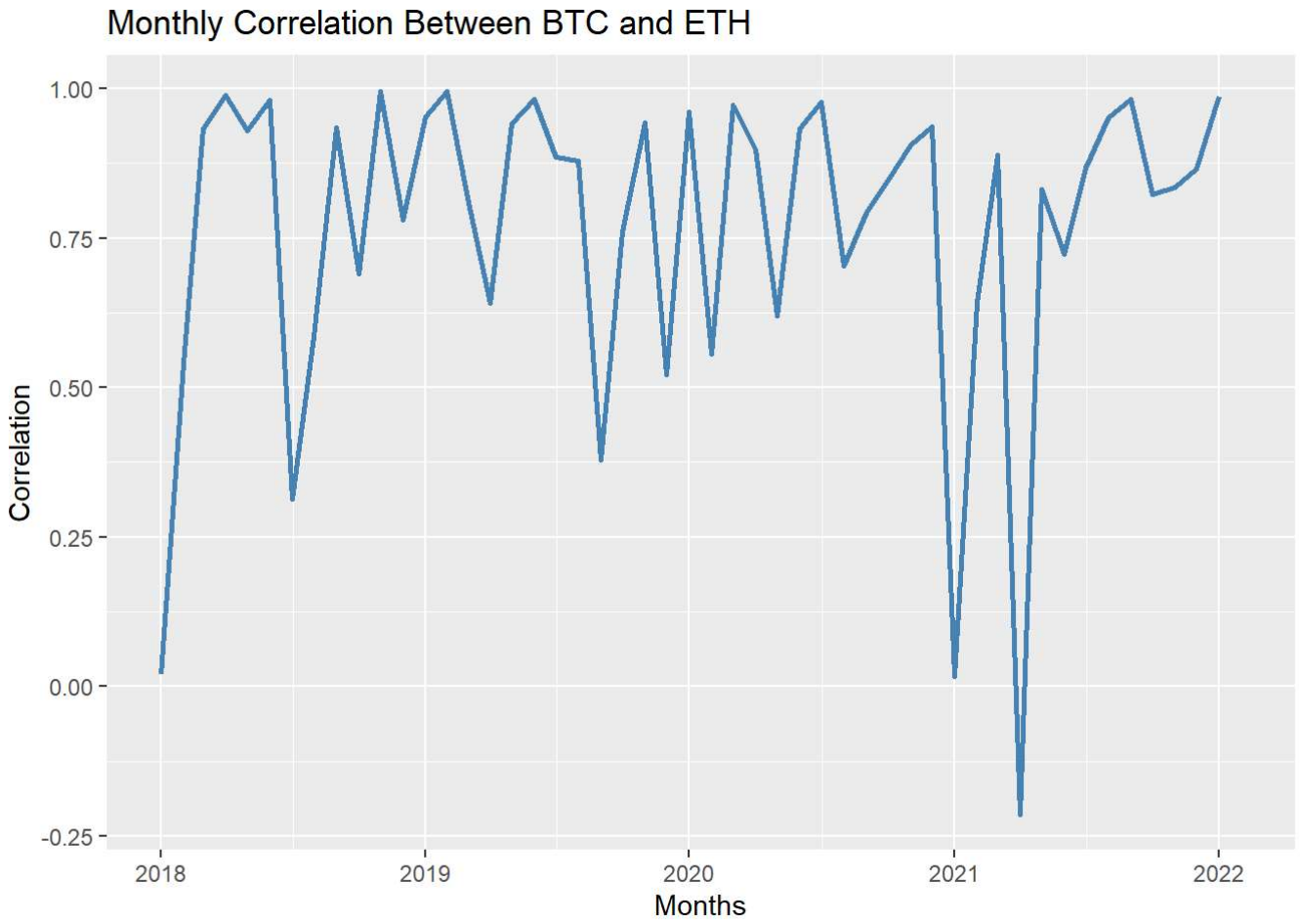
```
## tibble [50 x 2] (S3: tbl_df/tbl/data.frame)
##  $ month     : Date[1:50], format: "2018-01-01" "2018-02-01" ...
##  $ ETH_vs_BTC: num [1:50] 0.0194 0.5394 0.9328 0.988 0.9294 ...
```

```
kable(head(month.cor))
```

month	ETH_vs_BTC
2018-01-01	0.0193672
2018-02-01	0.5394411
2018-03-01	0.9327627
2018-04-01	0.9880261
2018-05-01	0.9293843
2018-06-01	0.9800046

Question 3.2

```
ggplot(month.cor , aes(x = month , y = ETH_vs_BTC)) +
  geom_line(color = "steelblue" , size = 1) +
  labs(x = "Months" , y = "Correlation" , title = "Monthly Correlation Between BTC and ETH")
```


Monthly Correlation Between BTC and ETH
1.00
0.75
0.50
0.25
0.00
-0.25
Correlation
2018
2019
2020
2021
2022
Months