Data Jugglers

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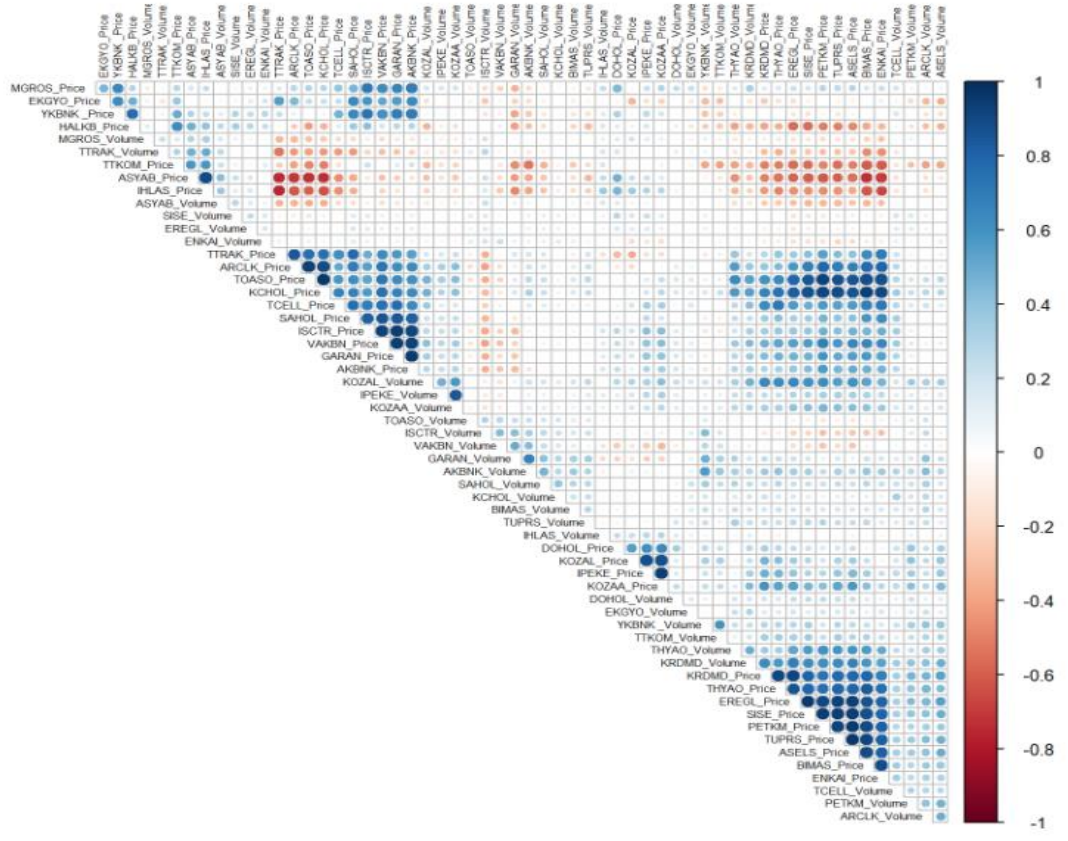
Data Preparation & Beta Analysis

- The data set consist of last price and volume data of equities daily listed in BIST30 Index from January 2011 to November 2018
  - 2061 x 60 tables
- **Normalization**: Before starting beta analysis, we should normalize the data as we take date 01.01.2011 equals to 100 for all stocks' price.
- We will divide the data into two groups, financial sector companies (7), real sector companies(23). Then we will compare two groups according to the annual yields, and illustrate them by graphics for each year.

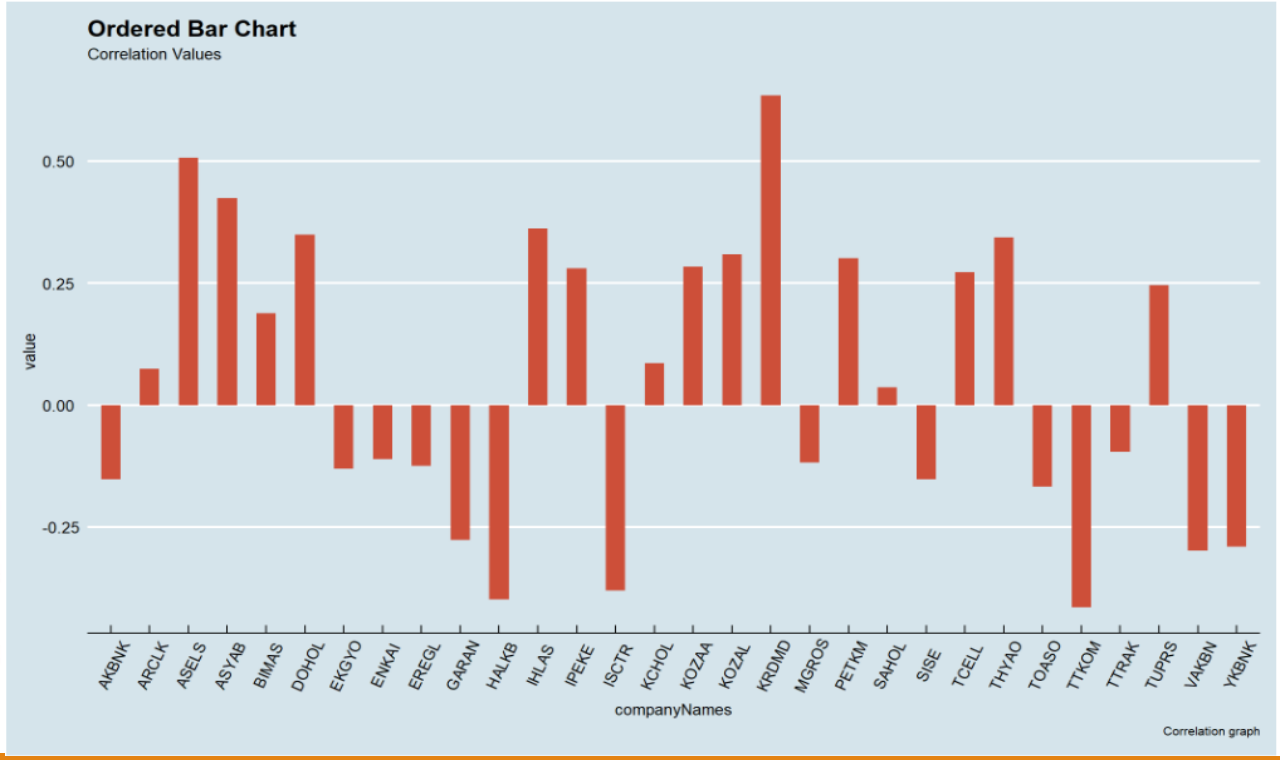
```
tmp<-tempfile(fileext=".xlsx")
download.file("https://github.com/MEF-BDA503/gpj18-data-jugglers/blob/master/XU030_v2.xlsx?raw=true",destfile=
tmp,mode='wb')
bist30=read_xlsx(tmp)

bist30 <- cbind(bist30, apply(bist30[seq(2,60,2)], 2, function (a) a / a[[1]] * 100))

colnames(bist30)[62:91] <- paste(colnames(bist30[seq(2,60,2)]), "norm", sep = "_")

head(bist30[62:90],10)
```

Correlation and Regression Analysis of Volume and Price

```
corrplot(corrValuesTable, type = "upper", tl.pos = "td",
         method = "circle", tl.cex = 0.5, tl.col = 'black',
         order = "hclust", diag = FALSE)
```

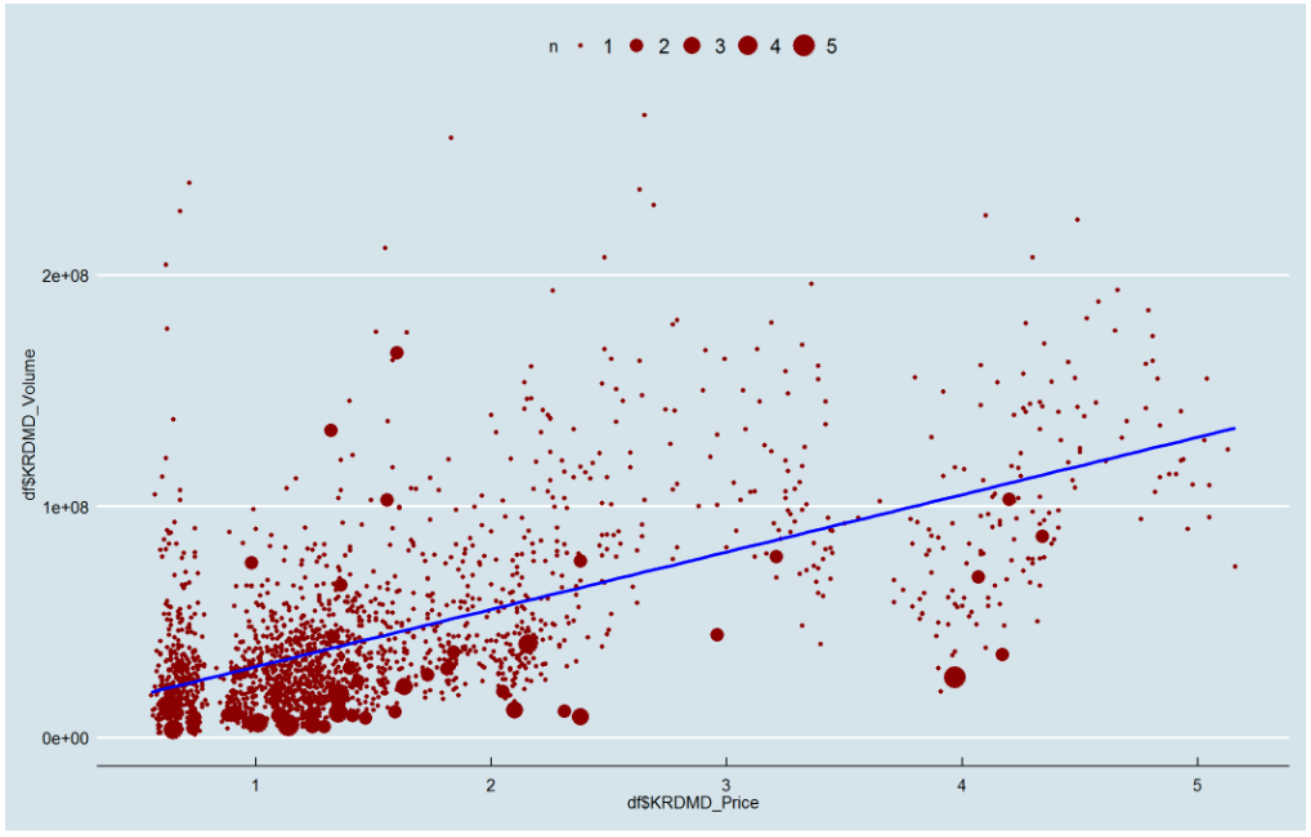



```
corrTable %>% arrange(desc(value)) %>%
ggplot( aes(x=companyNames, y=value)) +
  geom_bar(stat="identity", width=.5, fill="tomato3") +
  labs(title="Ordered Bar Chart",
       subtitle="Correlation Values",
       caption="Correlation graph") +
  theme(axis.text.x = element_text(angle=65, vjust=0.6))
```

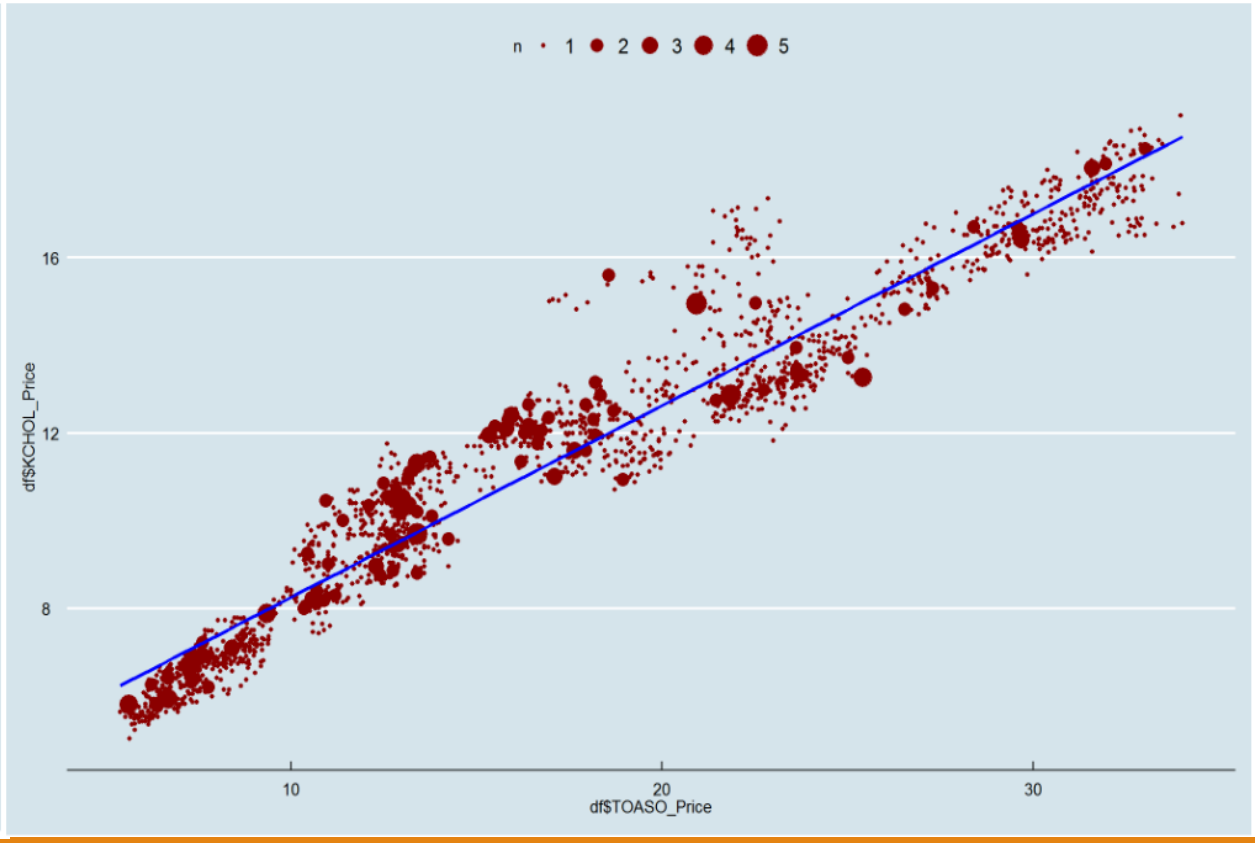


Linear Models

```
ggplot(df, aes(df$KRDMD_Price, df$KRDMD_Volume)) +
  geom_count(color="darkred") +
  geom_smooth(method="lm", se=F,color="blue")
```

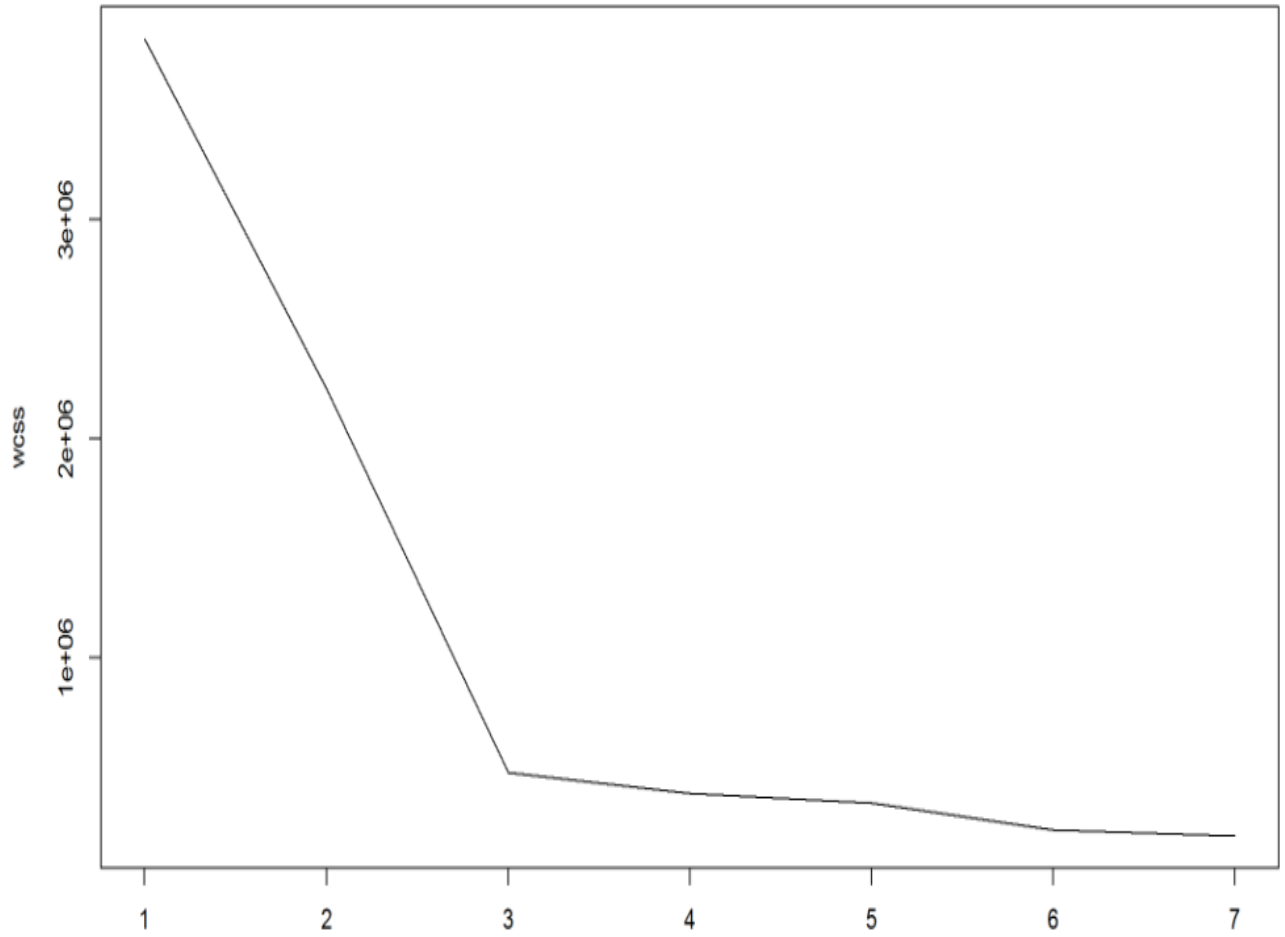



```
ggplot(df, aes(df$TOASO_Price, df$KCHOL_Price)) +
  geom_count(color="darkred") +
  geom_smooth(method="lm", se=F,color="blue")
```



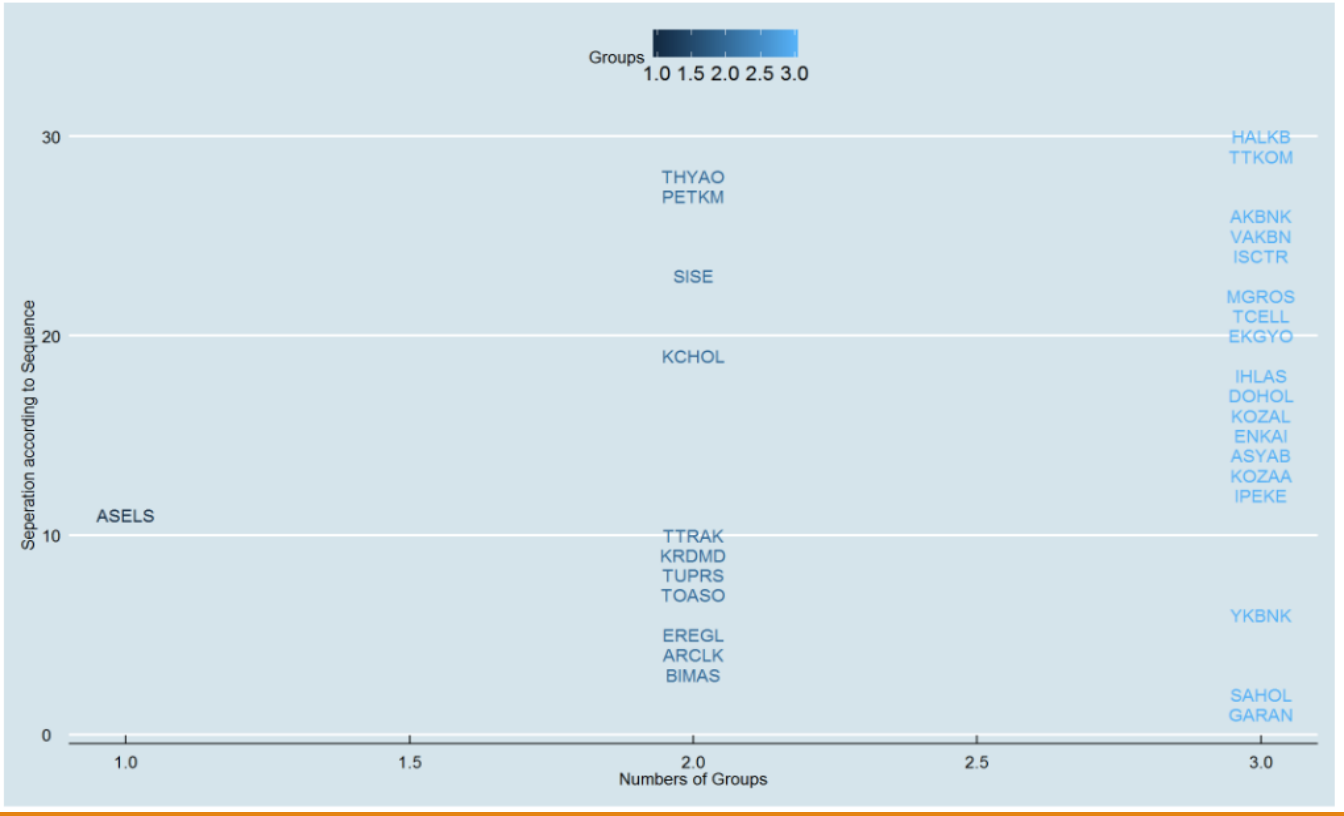
K-Means Analysis

```r
#we calculate the annual average of stocks.
annual_average<- aggregate(bist30[,62:91], list(format(bist30$Dates, "%Y")), mean)
View(annual_average)

#get transpose of annual_average dataset.
transpose <- as.matrix(annual_average[,-1])
rownames(transpose) <- annual_average[,1]
annual_average <- t(transpose)
View(annual_average)

#lets define wcss(Within cluster sum of squares) vector.
wcss <- vector()

#lets find the distance to the center for each predefined center numbers.
for (i in 1:7) wcss[i] <- sum(kmeans(annual_average, i)$withinss)
View(wcss)

#lets determine the breakdown point of the wcss graph.
plot(1:7, wcss, type="l")
```



K-Means Analysis - Cluster Table

```
ggplot(clusterFrame, aes(x =Groups , y = seq(1,30,1), colour = Groups,fill = Groups)) + geom_text(label = clusterFrame$Companies) +
  xlab(label = "Numbers of Groups") +
  ylab(label = "Seperation according to Sequence")
```

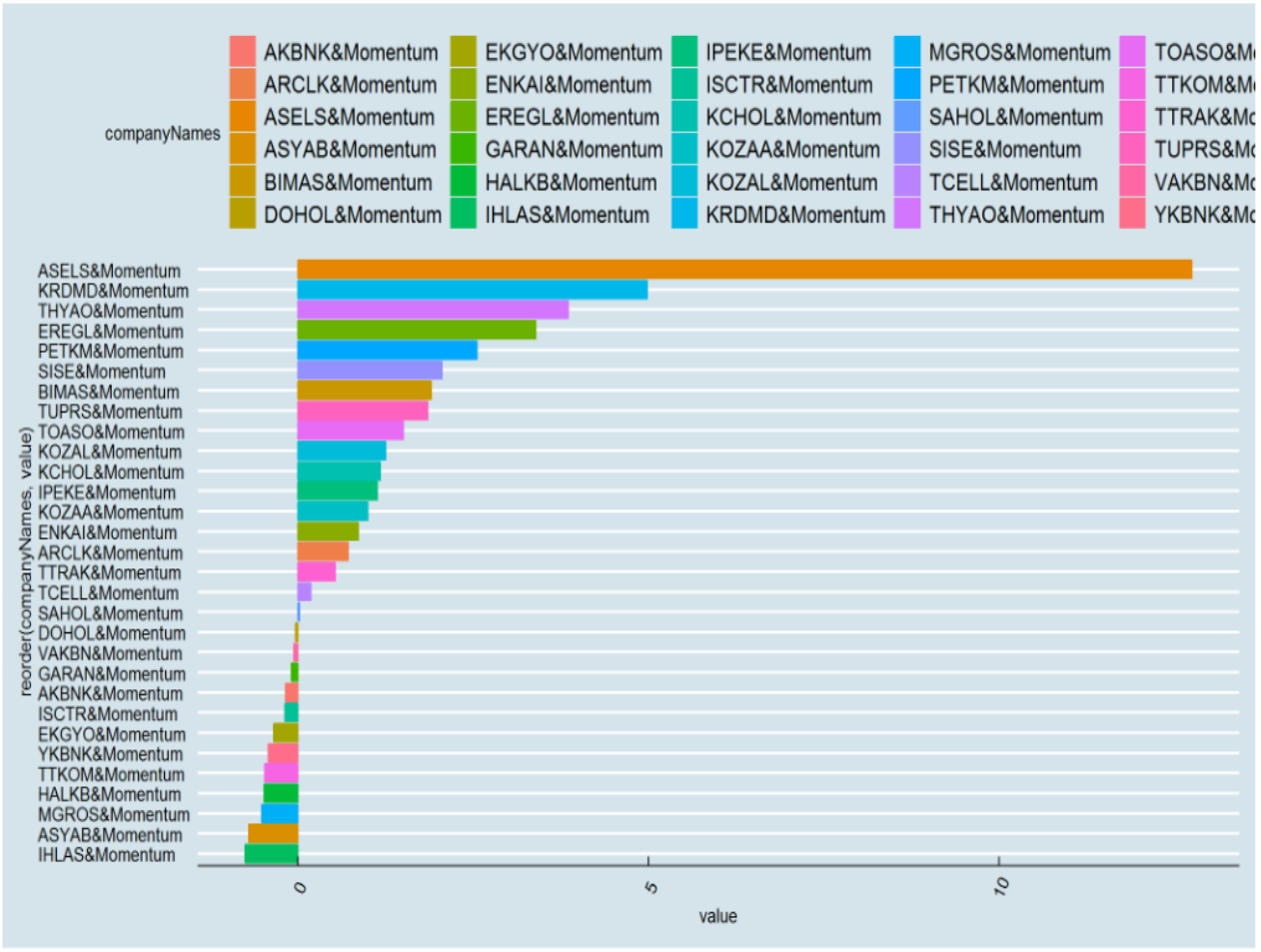


- Consequently, we can assume Aselsan as an outlier, so the result of k-means match up with our first assumption (there are two groups in bist30 stock such as real sector and financial sector) with regards to group classification.

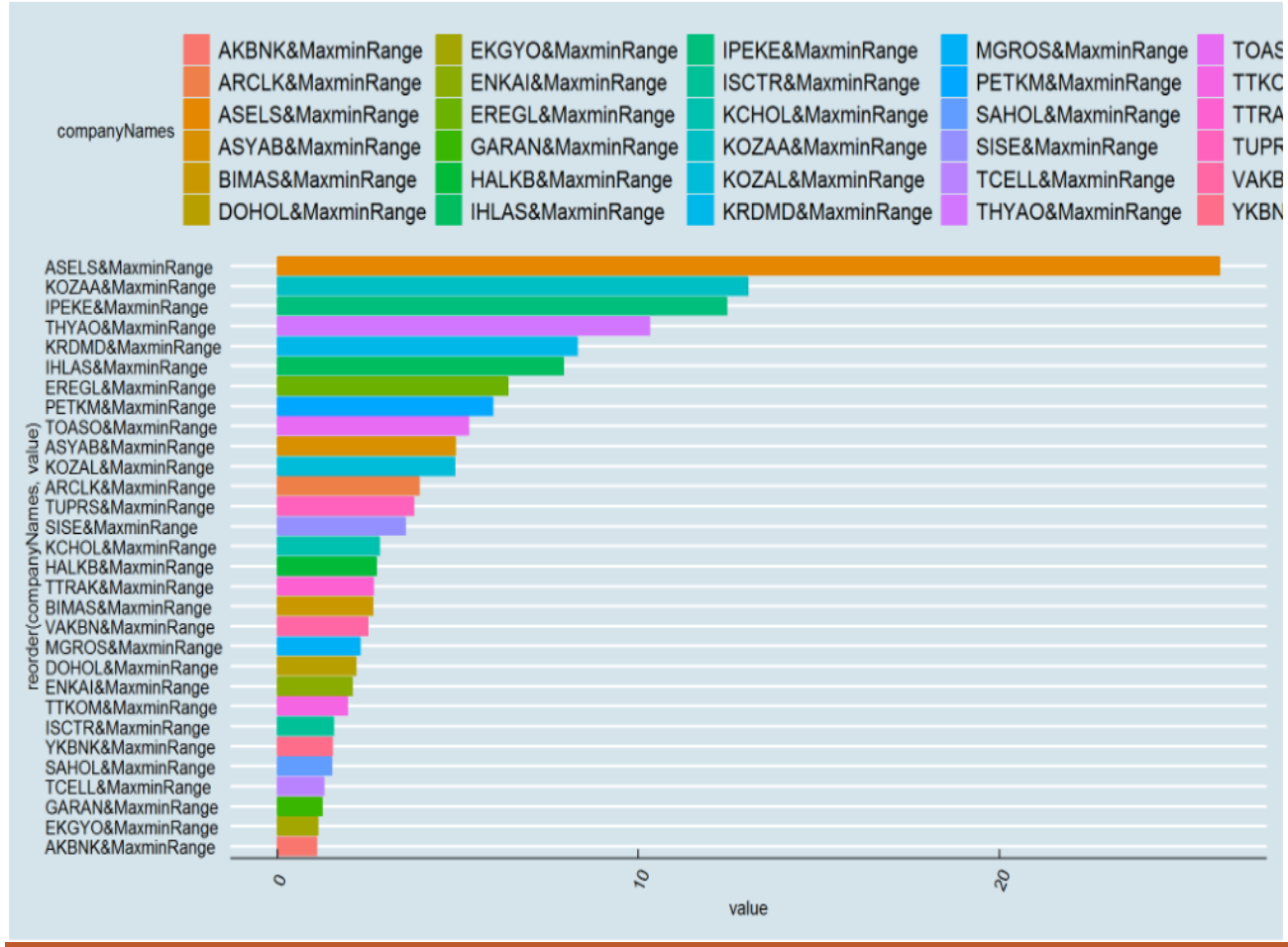
- $$\frac{betweenSS}{totalSS} = 87.5$$

Comperasion of Company Stocks

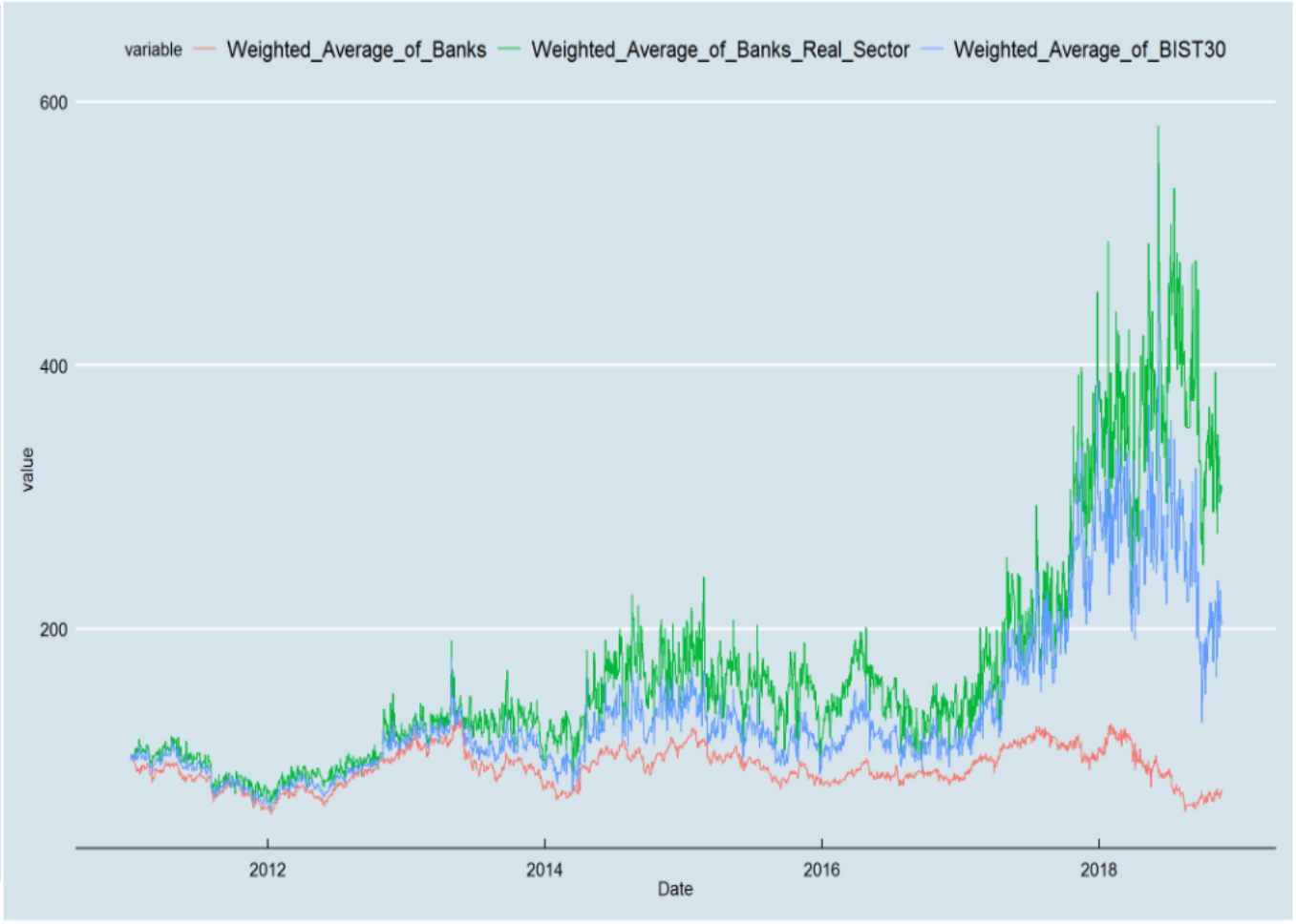
We can measure the change in momentums by looking last and first 3 months average differences



We can find the max and min values of prices and calculate the measure of it (possible highset income)



General Comperasion of Two Sector Banks and Others – Simple & Weighted



After all, banking sector is below of the other sectors by means of price values.

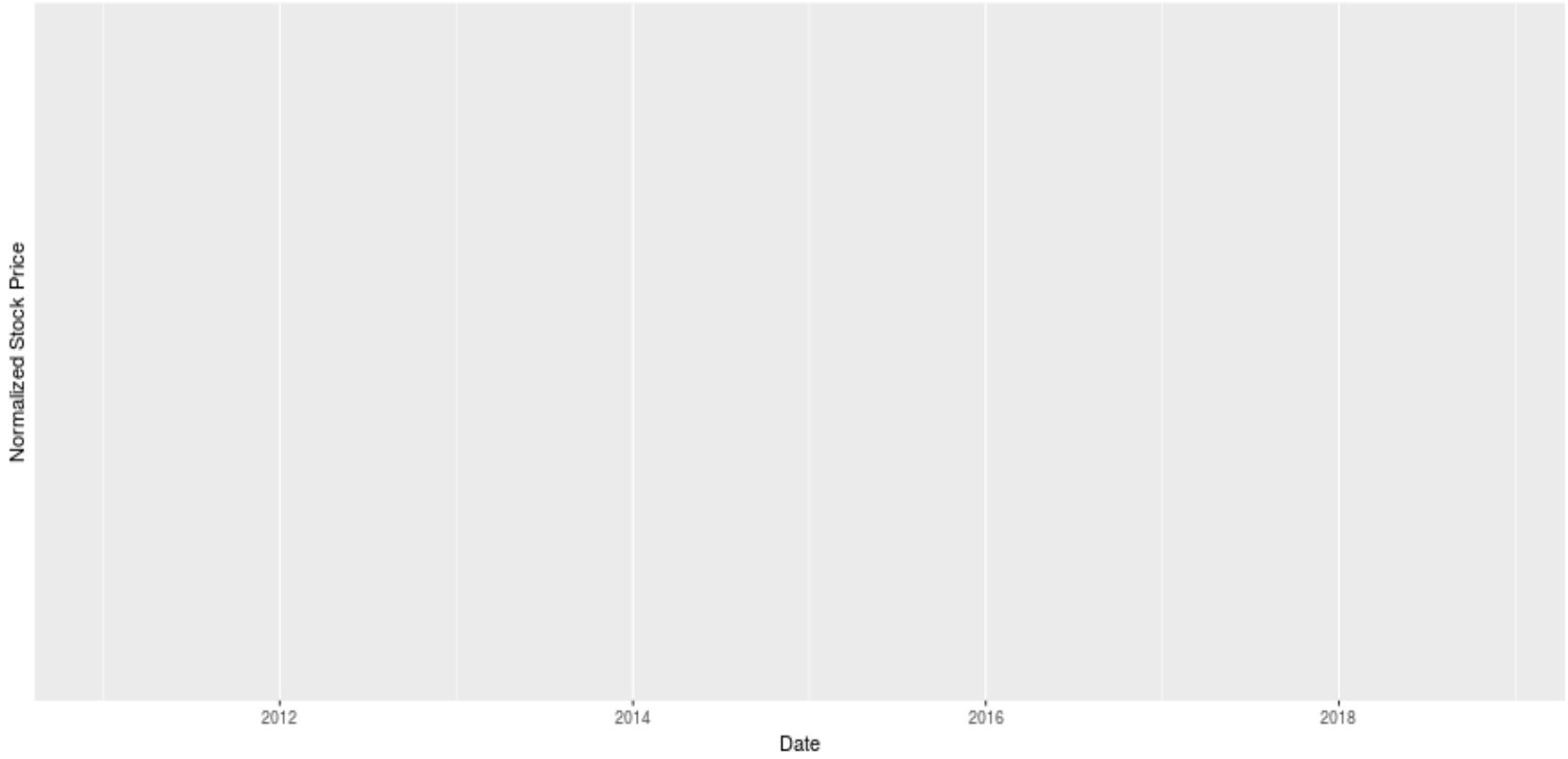
Shiny

Data Jugglers

Stocks:

Date

03/01/2011 - 19/11/2018



Conclusions

- K-means shows us the differences among the price volatilities of the BIST30 stocks and classify these stocks due to these volatilities. Aselsan is the outlier because of its highly increase in its normalized price. Consequently, we can prove our initial assumption as BIST030 can be divided into two groups such as real sector stocks and financial sector stocks.

- There is a high correlation between ASELS and KRDMD which can mean that the purchase willingness of these two stocks are similar.

- The price correlation can show the relation between some stocks which have high yields. This relation can support the investment decision of investors who search for high beta. TUPRS & ASELS, ASELS & PETKM, EREGL & SISE,TOASO & KCHOL couples have higher yields than average of real sector stocks.

Conclusions

- The product of volume-price or in other terms traded value are widely used by institutional investors. Giant institutional investors prefer to invest stock which have high traded values. In this context, it can be argued that GARAN can be selected into international investors portfolios.

- As it is mentioned before, traded value of a company and the price changes are not correlated.

- The beta of banking sector is below the beta of real sector.

- The volatility in the volume weighted average price of real sector stocks is higher than financial sector stocks which reflects the diversity of sub sectors among the real sectors stocks. On the other hand financial sector stock comprise of only banks.

References & Used Libraries

[1] - Correlation Graphs link

[2] - Correlation Graphs link

[3] - General Graphs link

[4] - Math formulas for R Markdown link

[5] - R Markdown Style link

[6] - Merging line plots link

[7] - Column drop options link

[8] - Summarising the total columns link

[9] - Row Summation link


```
library(ggthemes)
library(Hmisc)
library(gridExtra)
library(GGally)
library(tibble)
library(dplyr)
library(tidyr)
library(reshape2)
library(tidyverse)
library(ggplot2)
library(corrgram)
library(corrplot)
library(date)
library(readxl)
library(knitr)
```

Bizi dinlediğiniz için teşekkür ederiz ☺