

FIN511 Week 2

First code chunk used to load the necessary libraries in R if you don't have these libraries, please uncomment the code and install them or install them in R-Studio.

```
# load libraries

# install readxl and tidyverse (or just ggplot2 and dplyr)
# install.packages("readxl", "ggplot2", "dplyr")

library(ggplot2)
library(readxl)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##   filter, lag

## The following objects are masked from 'package:base':
##
##   intersect, setdiff, setequal, union

library(reshape2)
```

The following code chunk shows a very “dumb” way to load excel spreadsheets in R directly, skipping lines if necessary, like in this case and use the function “head” to see if the spreadsheet is loaded properly

```
# Load all the datasets and separate sheets, clean up the data and leave a single row for column names.
# You will still need the original excel sheet to read the instructions at the top or additional information
# modify the files paths to match your needs
# I didn't set working directories or anything else to keep the customization to a minimum

# This excel spreadsheet is not very clean, data starts on row 4, there is an empty column and on column 10
# Let see how to clean it up.

df.small_value <- read_xlsx("/Users/ataru074/Desktop/Education/MBA/03 2020 Fall/FIN511 Investments/SmallValue.xlsx")

## New names:
## * `` -> ...6
## * `` -> ...9
## * `` -> ...10

# we observe that column 6 is empty and 9 and 10 are not useful
head(df.small_value)

## # A tibble: 6 x 10
##   date Mkt_RF   SMB   HML   RF ...6 SmallValue SmallValue_RF ...9 ...10
##   <dbl> <dbl> <dbl> <dbl> <dbl> <lgl>      <dbl>      <dbl> <lgl> <chr>
## 1 192701 -0.06 -0.56  4.83  0.25 NA          3.93        3.68 NA    SmallVal~
```

```
## 2 192702    4.18 -0.1    3.17  0.26 NA          6.62          6.36 NA    1.486704~
## 3 192703    0.13 -1.6   -2.67  0.3  NA         -3.17          -3.47 NA    <NA>
## 4 192704    0.46  0.39  0.67  0.25 NA          3.48          3.23 NA    SmallVal~
## 5 192705    5.44  1.41  4.92  0.3  NA         13.3           13.0  NA    <NA>
## 6 192706   -2.34  0.48 -1.53  0.26 NA         -3.94          -4.2   NA    <NA>
```

*# let's clean up: nothing easier, we just say that our dataframe is the same dataframe minus column 6,9
 # just remember that the indexes in the square brackets are [rows, columns] and notice the "-c" that ind
 # minus this list, otherwise we would have kept only column 6, 9, 10*

```
df.small_value <- df.small_value[,-c(6,9,10)]
```

```
# double check
head(df.small_value)
```

```
## # A tibble: 6 x 7
##   date Mkt_RF   SMB   HML   RF SmallValue SmallValue_RF
##   <dbl> <dbl> <dbl> <dbl> <dbl>      <dbl>      <dbl>
## 1 192701 -0.06 -0.56  4.83  0.25      3.93      3.68
## 2 192702  4.18 -0.1    3.17  0.26      6.62      6.36
## 3 192703  0.13 -1.6   -2.67  0.3     -3.17     -3.47
## 4 192704  0.46  0.39  0.67  0.25      3.48      3.23
## 5 192705  5.44  1.41  4.92  0.3     13.3     13.0
## 6 192706 -2.34  0.48 -1.53  0.26     -3.94     -4.2
```

Evaluation of Small-Value Stock investment strategy

here we are going to compute the required values and present them.

```
av.return.in.pct = round(mean(df.small_value$SmallValue),digits = 3)
av.exc.ret.in.pct = round(mean(df.small_value$SmallValue_RF),digits = 3)
us.stock.mkt.exc.ret = round(mean(df.small_value$Mkt_RF), digits = 3)
small.cap.minus.large.cap = round(mean(df.small_value$SMB), digits = 3)
value.min.growth = round(mean(df.small_value$HML), digits = 3)
```

3-Factor Model

```
# step 1 let build the model
model <- lm(SmallValue_RF ~ Mkt_RF ,data=df.small_value)
```

```
# step 2 let see the model and extract the coefficients
model
```

```
##
## Call:
## lm(formula = SmallValue_RF ~ Mkt_RF, data = df.small_value)
##
## Coefficients:
## (Intercept)      Mkt_RF
##      0.341      1.325
```

```
alpha <- model$coefficients[[1]]
beta <- model$coefficients[[2]]
```

```
# step 3 let verify r-squared (if you have multiple beta coefficients use adj.r.squared)
r_squared <- summary(model)$r.squared
```

```
# let show the anova table to verify if the model is valid  
anova(model)
```

```
## Analysis of Variance Table  
##  
## Response: SmallValue_RF  
##           Df Sum Sq Mean Sq F value    Pr(>F)  
## Mkt_RF      1  54377    54377  3264.8 < 2.2e-16 ***  
## Residuals 1054  17555         17  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# and the summary of the model
```

```
summary(model)  
  
##  
## Call:  
## lm(formula = SmallValue_RF ~ Mkt_RF, data = df.small_value)  
##  
## Residuals:  
##      Min       1Q   Median       3Q      Max   
## -17.242  -2.183  -0.257   1.687  44.557   
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)      
## (Intercept)  0.34101    0.12649   2.696  0.00713 **     
## Mkt_RF       1.32532    0.02319  57.139 < 2e-16 ***   
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 4.081 on 1054 degrees of freedom  
## Multiple R-squared:  0.756, Adjusted R-squared:  0.7557   
## F-statistic: 3265 on 1 and 1054 DF, p-value: < 2.2e-16
```