R\_Mini\_Project

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# Call packages to accomodate Project

library(readr)  
library(tidyr)  
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(lubridate)

##   
## Attaching package: 'lubridate'

## The following object is masked from 'package:base':  
##   
## date

library(knitr)  
library(ggplot2)

# Append data files

eqs\_frame <- list.files(path = "G:/Hennie/R Studio/Project Data/First R Project", full.names = TRUE) %>%  
 lapply(read\_csv) %>%  
 bind\_rows()

## Parsed with column specification:  
## cols(  
## .default = col\_double(),  
## date = col\_date(format = ""),  
## Universe = col\_character(),  
## EQS = col\_character(),  
## Ticker = col\_character(),  
## Short.Name = col\_character(),  
## Curncy = col\_character(),  
## GICS.Sector = col\_character(),  
## GICS.Ind.Name = col\_character(),  
## BICS\_LEVEL\_1\_SECTOR\_NAME = col\_character(),  
## BICS\_LEVEL\_2\_INDUSTRY\_GROUP\_NAME = col\_character(),  
## BICS\_LEVEL\_3\_INDUSTRY\_NAME = col\_character()  
## )

## See spec(...) for full column specifications.

## Parsed with column specification:  
## cols(  
## .default = col\_double(),  
## date = col\_date(format = ""),  
## Universe = col\_character(),  
## EQS = col\_character(),  
## Ticker = col\_character(),  
## Short.Name = col\_character(),  
## Curncy = col\_character(),  
## GICS.Sector = col\_character(),  
## GICS.Ind.Name = col\_character(),  
## Price.D.1 = col\_integer(),  
## BICS\_LEVEL\_1\_SECTOR\_NAME = col\_character(),  
## BICS\_LEVEL\_2\_INDUSTRY\_GROUP\_NAME = col\_character(),  
## BICS\_LEVEL\_3\_INDUSTRY\_NAME = col\_character()  
## )

## See spec(...) for full column specifications.

## Parsed with column specification:  
## cols(  
## .default = col\_double(),  
## date = col\_date(format = ""),  
## Universe = col\_character(),  
## EQS = col\_character(),  
## Ticker = col\_character(),  
## Short.Name = col\_character(),  
## Curncy = col\_character(),  
## GICS.Sector = col\_character(),  
## GICS.Ind.Name = col\_character(),  
## Price.D.1 = col\_integer(),  
## BICS\_LEVEL\_1\_SECTOR\_NAME = col\_character(),  
## BICS\_LEVEL\_2\_INDUSTRY\_GROUP\_NAME = col\_character(),  
## BICS\_LEVEL\_3\_INDUSTRY\_NAME = col\_character()  
## )

## See spec(...) for full column specifications.

# Filter Data to return Top 20 Market Cap Stocks for each month

Top20 <- eqs\_frame %>%  
 group\_by(date) %>%  
 arrange (desc(MarketCapUSD)) %>%  
 filter(!is.na(MarketCapUSD)) %>%  
 slice (1:20) %>%  
 ungroup() %>%   
 select (date, Ticker, MarketCapUSD)

# Provide a Table to outline results for January

Top20\_Jan <- filter(Top20,date == "2016-01-31")  
kable(Top20\_Jan, digits =1, caption = "Top 20 Market Cap Stocks: January")

Top 20 Market Cap Stocks: January

|  |  |  |
| --- | --- | --- |
| date | Ticker | MarketCapUSD |
| 2016-01-31 | BTI SJ Equity | 102431801344 |
| 2016-01-31 | SAB SJ Equity | 95895371776 |
| 2016-01-31 | BIL SJ Equity | 55212236800 |
| 2016-01-31 | NPN SJ Equity | 55029301248 |
| 2016-01-31 | CFR SJ Equity | 37148319744 |
| 2016-01-31 | SNH SJ Equity | 18577870848 |
| 2016-01-31 | SOL SJ Equity | 17115645952 |
| 2016-01-31 | MTN SJ Equity | 16183143424 |
| 2016-01-31 | FSR SJ Equity | 15768893440 |
| 2016-01-31 | VOD SJ Equity | 13584759808 |
| 2016-01-31 | OML SJ Equity | 11915514880 |
| 2016-01-31 | SBK SJ Equity | 11414423552 |
| 2016-01-31 | REM SJ Equity | 8144907776 |
| 2016-01-31 | SLM SJ Equity | 7898729984 |
| 2016-01-31 | MND SJ Equity | 7879941120 |
| 2016-01-31 | MNP SJ Equity | 7879941120 |
| 2016-01-31 | APN SJ Equity | 7716632576 |
| 2016-01-31 | BVT SJ Equity | 7690031616 |
| 2016-01-31 | BGA SJ Equity | 7671604224 |
| 2016-01-31 | MDC SJ Equity | 7416112128 |
| # Calculating | and outlining z | -score for January |

zscore\_eqs <- eqs\_frame %>%  
group\_by(date) %>%  
mutate (z\_score = (BookYield - mean(BookYield, na.rm = TRUE))/sd(BookYield, na.rm = TRUE))  
  
  
zscore\_jan <- zscore\_eqs %>%  
filter(date == "2016-01-31") %>%  
arrange(desc(z\_score)) %>%  
select (date,Ticker, z\_score)   
kable(zscore\_jan, digits = 2, caption = "All January Stocks ranked by Z-Score")

All January Stocks ranked by Z-Score

|  |  |  |
| --- | --- | --- |
| date | Ticker | z\_score |
| 2016-01-31 | LON SJ Equity | 12.38 |
| 2016-01-31 | AGL SJ Equity | 0.97 |
| 2016-01-31 | RBP SJ Equity | 0.46 |
| 2016-01-31 | IMP SJ Equity | 0.44 |
| 2016-01-31 | GND SJ Equity | 0.42 |
| 2016-01-31 | HAR SJ Equity | 0.32 |
| 2016-01-31 | ASR SJ Equity | 0.32 |
| 2016-01-31 | ARI SJ Equity | 0.31 |
| 2016-01-31 | KIO SJ Equity | 0.26 |
| 2016-01-31 | MUR SJ Equity | 0.25 |
| 2016-01-31 | GRF SJ Equity | 0.24 |
| 2016-01-31 | EXX SJ Equity | 0.18 |
| 2016-01-31 | DTC SJ Equity | 0.16 |
| 2016-01-31 | DLT SJ Equity | 0.14 |
| 2016-01-31 | TRE SJ Equity | 0.14 |
| 2016-01-31 | REI SJ Equity | 0.14 |
| 2016-01-31 | HCI SJ Equity | 0.13 |
| 2016-01-31 | LEW SJ Equity | 0.12 |
| 2016-01-31 | AQP SJ Equity | 0.11 |
| 2016-01-31 | ADR SJ Equity | 0.10 |
| 2016-01-31 | RBX SJ Equity | 0.10 |
| 2016-01-31 | OCT SJ Equity | 0.09 |
| 2016-01-31 | BIL SJ Equity | 0.08 |
| 2016-01-31 | GPL SJ Equity | 0.07 |
| 2016-01-31 | REB SJ Equity | 0.07 |
| 2016-01-31 | BAW SJ Equity | 0.06 |
| 2016-01-31 | INL SJ Equity | 0.05 |
| 2016-01-31 | ITU SJ Equity | 0.05 |
| 2016-01-31 | APF SJ Equity | 0.05 |
| 2016-01-31 | VKE SJ Equity | 0.04 |
| 2016-01-31 | IPF SJ Equity | 0.04 |
| 2016-01-31 | EMI SJ Equity | 0.04 |
| 2016-01-31 | TEX SJ Equity | 0.04 |
| 2016-01-31 | TON SJ Equity | 0.02 |
| 2016-01-31 | ATT SJ Equity | 0.02 |
| 2016-01-31 | RDF SJ Equity | 0.02 |
| 2016-01-31 | GRT SJ Equity | 0.01 |
| 2016-01-31 | ZED SJ Equity | 0.01 |
| 2016-01-31 | STP SJ Equity | 0.00 |
| 2016-01-31 | AWA SJ Equity | 0.00 |
| 2016-01-31 | AWB SJ Equity | 0.00 |
| 2016-01-31 | FFA SJ Equity | 0.00 |
| 2016-01-31 | FFB SJ Equity | 0.00 |
| 2016-01-31 | GFI SJ Equity | -0.01 |
| 2016-01-31 | ILU SJ Equity | -0.01 |
| 2016-01-31 | CLR SJ Equity | -0.03 |
| 2016-01-31 | MSP SJ Equity | -0.03 |
| 2016-01-31 | BRN SJ Equity | -0.03 |
| 2016-01-31 | OMN SJ Equity | -0.03 |
| 2016-01-31 | NT1 SJ Equity | -0.03 |
| 2016-01-31 | CCO SJ Equity | -0.04 |
| 2016-01-31 | SAC SJ Equity | -0.04 |
| 2016-01-31 | IVT SJ Equity | -0.04 |
| 2016-01-31 | HYP SJ Equity | -0.04 |
| 2016-01-31 | CAT SJ Equity | -0.04 |
| 2016-01-31 | OML SJ Equity | -0.04 |
| 2016-01-31 | AMS SJ Equity | -0.04 |
| 2016-01-31 | RPL SJ Equity | -0.05 |
| 2016-01-31 | MTA SJ Equity | -0.05 |
| 2016-01-31 | NHM SJ Equity | -0.05 |
| 2016-01-31 | AFH SJ Equity | -0.05 |
| 2016-01-31 | INP SJ Equity | -0.05 |
| 2016-01-31 | IAP SJ Equity | -0.05 |
| 2016-01-31 | AFE SJ Equity | -0.06 |
| 2016-01-31 | SNH SJ Equity | -0.06 |
| 2016-01-31 | SBK SJ Equity | -0.07 |
| 2016-01-31 | NED SJ Equity | -0.07 |
| 2016-01-31 | ANG SJ Equity | -0.07 |
| 2016-01-31 | BAT SJ Equity | -0.08 |
| 2016-01-31 | PAN SJ Equity | -0.08 |
| 2016-01-31 | IPL SJ Equity | -0.09 |
| 2016-01-31 | SOL SJ Equity | -0.09 |
| 2016-01-31 | TKG SJ Equity | -0.09 |
| 2016-01-31 | MMI SJ Equity | -0.09 |
| 2016-01-31 | BGA SJ Equity | -0.10 |
| 2016-01-31 | ROC SJ Equity | -0.10 |
| 2016-01-31 | TDH SJ Equity | -0.10 |
| 2016-01-31 | CIL SJ Equity | -0.10 |
| 2016-01-31 | WBO SJ Equity | -0.10 |
| 2016-01-31 | NPK SJ Equity | -0.11 |
| 2016-01-31 | LBH SJ Equity | -0.11 |
| 2016-01-31 | AFX SJ Equity | -0.11 |
| 2016-01-31 | ILV SJ Equity | -0.12 |
| 2016-01-31 | RES SJ Equity | -0.13 |
| 2016-01-31 | TTO SJ Equity | -0.13 |
| 2016-01-31 | RLO SJ Equity | -0.13 |
| 2016-01-31 | ARL SJ Equity | -0.13 |
| 2016-01-31 | REM SJ Equity | -0.13 |
| 2016-01-31 | NIV SJ Equity | -0.13 |
| 2016-01-31 | KAP SJ Equity | -0.14 |
| 2016-01-31 | HDC SJ Equity | -0.14 |
| 2016-01-31 | MTN SJ Equity | -0.16 |
| 2016-01-31 | ACT SJ Equity | -0.16 |
| 2016-01-31 | BLU SJ Equity | -0.16 |
| 2016-01-31 | NEP SJ Equity | -0.16 |
| 2016-01-31 | MPT SJ Equity | -0.16 |
| 2016-01-31 | PGR SJ Equity | -0.16 |
| 2016-01-31 | AIP SJ Equity | -0.16 |
| 2016-01-31 | SGL SJ Equity | -0.17 |
| 2016-01-31 | RMH SJ Equity | -0.17 |
| 2016-01-31 | HSP SJ Equity | -0.17 |
| 2016-01-31 | CFR SJ Equity | -0.17 |
| 2016-01-31 | TCP SJ Equity | -0.18 |
| 2016-01-31 | MDC SJ Equity | -0.18 |
| 2016-01-31 | SPG SJ Equity | -0.18 |
| 2016-01-31 | SAP SJ Equity | -0.18 |
| 2016-01-31 | MNP SJ Equity | -0.18 |
| 2016-01-31 | MND SJ Equity | -0.18 |
| 2016-01-31 | PPC SJ Equity | -0.18 |
| 2016-01-31 | ASC SJ Equity | -0.19 |
| 2016-01-31 | SLM SJ Equity | -0.19 |
| 2016-01-31 | FSR SJ Equity | -0.19 |
| 2016-01-31 | TFG SJ Equity | -0.19 |
| 2016-01-31 | TSH SJ Equity | -0.20 |
| 2016-01-31 | SNT SJ Equity | -0.20 |
| 2016-01-31 | DSY SJ Equity | -0.20 |
| 2016-01-31 | BVT SJ Equity | -0.21 |
| 2016-01-31 | CVH SJ Equity | -0.21 |
| 2016-01-31 | SUR SJ Equity | -0.21 |
| 2016-01-31 | CGR SJ Equity | -0.21 |
| 2016-01-31 | SUI SJ Equity | -0.21 |
| 2016-01-31 | PSG SJ Equity | -0.21 |
| 2016-01-31 | AFT SJ Equity | -0.21 |
| 2016-01-31 | RMI SJ Equity | -0.21 |
| 2016-01-31 | APN SJ Equity | -0.22 |
| 2016-01-31 | DST SJ Equity | -0.22 |
| 2016-01-31 | CHP SJ Equity | -0.22 |
| 2016-01-31 | OCE SJ Equity | -0.22 |
| 2016-01-31 | MSM SJ Equity | -0.22 |
| 2016-01-31 | EOH SJ Equity | -0.22 |
| 2016-01-31 | TBS SJ Equity | -0.22 |
| 2016-01-31 | BWN SJ Equity | -0.23 |
| 2016-01-31 | SHP SJ Equity | -0.23 |
| 2016-01-31 | PFG SJ Equity | -0.23 |
| 2016-01-31 | NTC SJ Equity | -0.23 |
| 2016-01-31 | ITE SJ Equity | -0.23 |
| 2016-01-31 | SAB SJ Equity | -0.23 |
| 2016-01-31 | JSE SJ Equity | -0.23 |
| 2016-01-31 | CPI SJ Equity | -0.23 |
| 2016-01-31 | CSB SJ Equity | -0.24 |
| 2016-01-31 | RFG SJ Equity | -0.24 |
| 2016-01-31 | ADH SJ Equity | -0.24 |
| 2016-01-31 | COH SJ Equity | -0.24 |
| 2016-01-31 | TRU SJ Equity | -0.24 |
| 2016-01-31 | KST SJ Equity | -0.24 |
| 2016-01-31 | FGL SJ Equity | -0.25 |
| 2016-01-31 | WHL SJ Equity | -0.25 |
| 2016-01-31 | AVI SJ Equity | -0.25 |
| 2016-01-31 | CLI SJ Equity | -0.25 |
| 2016-01-31 | LHC SJ Equity | -0.26 |
| 2016-01-31 | FBR SJ Equity | -0.26 |
| 2016-01-31 | NPN SJ Equity | -0.26 |
| 2016-01-31 | MRP SJ Equity | -0.26 |
| 2016-01-31 | CLH SJ Equity | -0.26 |
| 2016-01-31 | VOD SJ Equity | -0.27 |
| 2016-01-31 | PIK SJ Equity | -0.27 |
| 2016-01-31 | SPP SJ Equity | -0.27 |
| 2016-01-31 | CML SJ Equity | -0.27 |
| 2016-01-31 | CLS SJ Equity | -0.27 |
| 2016-01-31 | BTI SJ Equity | -0.27 |
| 2016-01-31 | NVS SJ Equity | NA |
| 2016-01-31 | PGL SJ Equity | NA |
| 2016-01-31 | PIV SJ Equity | NA |

# Grouping Book Yield Z Score by month and filter to reveal Top 10 across the respective months

zscore\_group <- zscore\_eqs %>%  
 group\_by(date) %>%  
 arrange (desc(z\_score)) %>%  
 filter(!is.na(z\_score)) %>%  
 slice(1:10) %>%  
 ungroup() %>%  
 select(date, Ticker, MarketCapUSD, EarningsYield, z\_score)  
 kable (zscore\_group, digits = 2, caption = "Monthly Top 10 z-score stocks")

Monthly Top 10 z-score stocks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| date | Ticker | MarketCapUSD | EarningsYield | z\_score |
| 2016-01-31 | LON SJ Equity | 210962976 | -4406.48 | 12.38 |
| 2016-01-31 | AGL SJ Equity | 5106916864 | -137.86 | 0.97 |
| 2016-01-31 | RBP SJ Equity | 344141568 | 8.46 | 0.46 |
| 2016-01-31 | IMP SJ Equity | 1518673408 | 1.09 | 0.44 |
| 2016-01-31 | GND SJ Equity | 474549600 | 10.01 | 0.42 |
| 2016-01-31 | HAR SJ Equity | 799154112 | -8.59 | 0.32 |
| 2016-01-31 | ASR SJ Equity | 726279680 | 23.14 | 0.32 |
| 2016-01-31 | ARI SJ Equity | 781963264 | 14.07 | 0.31 |
| 2016-01-31 | KIO SJ Equity | 704170176 | 62.94 | 0.26 |
| 2016-01-31 | MUR SJ Equity | 220854224 | 26.84 | 0.25 |
| 2016-02-29 | LON SJ Equity | 361541600 | -2637.76 | 12.13 |
| 2016-02-29 | GND SJ Equity | 441646208 | 8.12 | 0.94 |
| 2016-02-29 | IMP SJ Equity | 1554501504 | 0.69 | 0.74 |
| 2016-02-29 | FFA SJ Equity | 3169245440 | 30.58 | 0.73 |
| 2016-02-29 | FFB SJ Equity | 3169245440 | 30.58 | 0.73 |
| 2016-02-29 | RBP SJ Equity | 459334304 | 6.37 | 0.52 |
| 2016-02-29 | AGL SJ Equity | 8476591104 | -65.29 | 0.52 |
| 2016-02-29 | MUR SJ Equity | 252234048 | 23.75 | 0.45 |
| 2016-02-29 | ADR SJ Equity | 103935456 | 18.25 | 0.36 |
| 2016-02-29 | GRF SJ Equity | 138344832 | 11.64 | 0.34 |
| 2016-03-31 | LON SJ Equity | 539555264 | -1795.77 | 11.87 |
| 2016-03-31 | FFA SJ Equity | 3668782336 | 29.22 | 1.06 |
| 2016-03-31 | FFB SJ Equity | 3668782336 | 29.22 | 1.06 |
| 2016-03-31 | GND SJ Equity | 597419520 | 6.46 | 1.03 |
| 2016-03-31 | IMP SJ Equity | 2350650624 | 0.49 | 0.66 |
| 2016-03-31 | AGL SJ Equity | 10140030976 | -54.90 | 0.61 |
| 2016-03-31 | ADR SJ Equity | 112263560 | 18.19 | 0.59 |
| 2016-03-31 | REI SJ Equity | 4233201920 | 16.87 | 0.52 |
| 2016-03-31 | RBP SJ Equity | 504771200 | -2.17 | 0.51 |
| 2016-03-31 | DLT SJ Equity | 242028368 | 23.72 | 0.48 |

# Calculate the Market Cap weighted weight across the 3 months (USD market caps used for entire data set)

cap\_weighted <- eqs\_frame %>%  
 group\_by(date) %>%  
 mutate(weight = MarketCapUSD/sum(MarketCapUSD, na.rm = TRUE)) %>%  
 ungroup()

# Calculate the EarningsYield for each Cap-Weighted portfolio

earnings\_capweighted <- cap\_weighted %>%  
 group\_by(date) %>%  
 mutate(ey\_weights = EarningsYield \* weight) %>%  
 ungroup()

# Filter data set across months to calculate EY per month

ey\_jan <- filter(earnings\_capweighted, date =="2016-01-31")  
summarise(ey\_jan, jan\_ey = sum(ey\_weights, na.rm = TRUE))

## # A tibble: 1 x 1  
## jan\_ey  
## <dbl>  
## 1 4.340506

ey\_feb <- filter(earnings\_capweighted, date =="2016-02-29")  
summarise(ey\_feb, feb\_ey = sum(ey\_weights, na.rm = TRUE))

## # A tibble: 1 x 1  
## feb\_ey  
## <dbl>  
## 1 2.952246

ey\_mar <- filter(earnings\_capweighted, date =="2016-03-31")  
summarise(ey\_mar, mar\_ey = sum(ey\_weights, na.rm = TRUE))

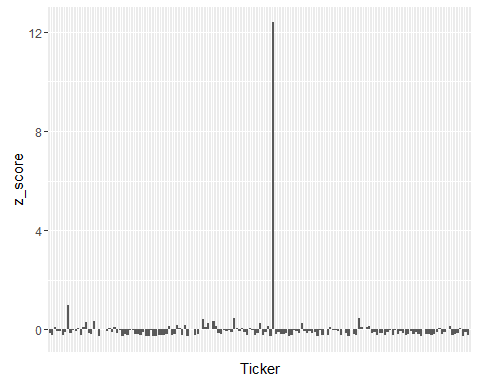
## # A tibble: 1 x 1  
## mar\_ey  
## <dbl>  
## 1 2.734298

# Plot Z\_Scores for January: Bar Chart

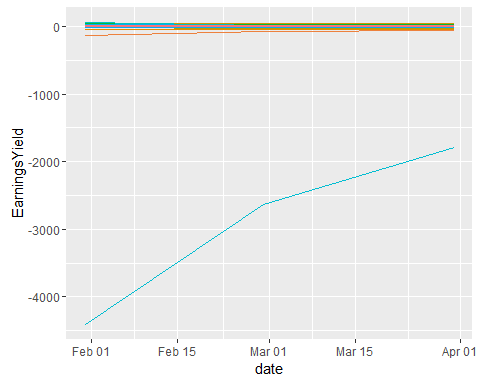
janeqs <- filter(zscore\_eqs, date =="2016-01-31")  
ggplot(janeqs, aes(x = Ticker, y = z\_score)) +  
 geom\_bar(stat = "identity") +  
 theme(axis.text.x=element\_blank(),   
 axis.ticks.x=element\_blank())

## Warning: Removed 3 rows containing missing values (position\_stack).

## Warning: Stacking not well defined when ymin != 0

 # Plot Earnings Yield for Cap Weighted Portfolio Stocks: Time-Series Chart

ggplot(earnings\_capweighted, aes(x = date, y = EarningsYield)) +  
 geom\_line(aes(color = Ticker), size = 0.30, show.legend = FALSE)



# Time Series Chart for Earnings Yield at a Portfolio Level

timeseries\_ey <- earnings\_capweighted %>%  
 group\_by(date) %>%  
 mutate(portfolio\_ey = sum(ey\_weights, na.rm = TRUE)) %>%  
 ungroup()  
  
ggplot(timeseries\_ey, aes(x = date, y = portfolio\_ey)) +  
 geom\_line(size = 0.30, show.legend = FALSE)

