Capstone Project - Week1-8

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set.seed(123)  
library(tidyverse)

## -- Attaching packages ----------------------------------------------------------------------------------------------------------------------------------------- tidyverse 1.3.0 --

## v ggplot2 3.3.2 v purrr 0.3.4  
## v tibble 3.0.1 v dplyr 1.0.0  
## v tidyr 1.1.0 v stringr 1.4.0  
## v readr 1.3.1 v forcats 0.5.0

## -- Conflicts -------------------------------------------------------------------------------------------------------------------------------------------- tidyverse\_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag() masks stats::lag()

library(caret)

## Loading required package: lattice

##   
## Attaching package: 'caret'

## The following object is masked from 'package:purrr':  
##   
## lift

library(corrplot)

## corrplot 0.84 loaded

library(tidyverse)  
library(ROCR)  
library(gbm)

## Loaded gbm 2.1.8

library(ROSE)

## Loaded ROSE 0.0-3

library(gridExtra)

##   
## Attaching package: 'gridExtra'

## The following object is masked from 'package:dplyr':  
##   
## combine

library(parallel)   
library(tree)

## Registered S3 method overwritten by 'tree':  
## method from  
## print.tree cli

library(rpart)  
library(rpart.plot)

fundamentals\_ds <- read.csv("./data/Fundamentals\_DS.csv", na.strings=c(""," "))  
nrow(fundamentals\_ds)

## [1] 17416

fundamentals\_ds\_sjm <- fundamentals\_ds %>%  
 filter(tic == 'SJM')  
gsector\_sjm <- head(fundamentals\_ds\_sjm$gsector, 1)  
fundamentals\_ds <- fundamentals\_ds %>%  
 filter(gsector == gsector\_sjm)  
nrow(fundamentals\_ds)

## [1] 2323

names(fundamentals\_ds)[names(fundamentals\_ds) == "ï..gvkey"] <- "gvkey"  
fundamentals\_ds\_filter <- fundamentals\_ds %>%  
 filter(datafmt == 'STD')   
nrow(fundamentals\_ds\_filter)

## [1] 1243

fundamentals\_ds\_filter\_1 <- fundamentals\_ds\_filter[ lapply( fundamentals\_ds\_filter, function(x) sum(is.na(x)) / length(x) ) < 0.25 ]  
ncol(fundamentals\_ds\_filter\_1)

## [1] 318

nrow(fundamentals\_ds\_filter\_1)

## [1] 1243

write.csv(fundamentals\_ds\_filter\_1, file = "data/fundamentals\_ds\_filter\_1.csv", row.names=FALSE)

#fundamentals\_ds\_filter\_1 <- fundamentals\_ds\_filter\_1[ lapply( fundamentals\_ds\_filter\_1, function(x) sum(is.na(x)) / length(x) ) < 0.25 ]  
ncol(fundamentals\_ds\_filter\_1)

## [1] 318

fundamentals\_ds\_filter\_1 <- subset(fundamentals\_ds\_filter\_1, select = -c(datadate,indfmt,curncd,consol,popsrc,conm,curcd,apdedate,fdate,add1,addzip,busdesc,  
 city,conml,weburl,phone,loc,final,fyr,acchg,fic,  
 xido,xidoc,naicsh,sich,au,auop,auopic,fyrc,ggroup,gind,gsector,gsubind,priusa))  
write.csv(fundamentals\_ds\_filter\_1, file = "data/fundamentals\_ds\_filter\_2.csv", row.names=FALSE, na="")  
ncol(fundamentals\_ds\_filter\_1)

## [1] 284

nrow(fundamentals\_ds\_filter\_1)

## [1] 1243

nzv\_ds <- nearZeroVar(fundamentals\_ds\_filter\_1, saveMetrics = TRUE)  
nzv\_ds <- nzv\_ds[nzv\_ds[,"nzv"] > 0, ]  
nzv\_ds

## freqRatio percentUnique zeroVar nzv  
## datafmt 0.00000 0.08045052 TRUE TRUE  
## ajex 50.59091 3.05711987 FALSE TRUE  
## ajp 50.59091 3.05711987 FALSE TRUE  
## currtr 121.77778 5.79243765 FALSE TRUE  
## ismod 45.48000 0.16090105 FALSE TRUE  
## pddur 1239.00000 0.40225261 FALSE TRUE  
## scf 0.00000 0.08045052 TRUE TRUE  
## upd 94.61538 0.16090105 FALSE TRUE  
## acdo 1161.00000 3.13757039 FALSE TRUE  
## aldo 1187.00000 1.04585680 FALSE TRUE  
## aocisecgl 0.00000 0.08045052 TRUE TRUE  
## ciother 217.20000 7.88415125 FALSE TRUE  
## cstke 272.75000 7.88415125 FALSE TRUE  
## dcom 1177.00000 1.76991150 FALSE TRUE  
## dcvsr 276.75000 5.87288817 FALSE TRUE  
## dcvsub 291.75000 1.44810941 FALSE TRUE  
## dcvt 217.60000 6.99919549 FALSE TRUE  
## diladj 220.60000 4.82703138 FALSE TRUE  
## donr 538.50000 5.47063556 FALSE TRUE  
## drlt 561.00000 5.06838294 FALSE TRUE  
## ds 284.00000 2.73531778 FALSE TRUE  
## dudd 374.33333 5.14883347 FALSE TRUE  
## dvp 223.60000 5.06838294 FALSE TRUE  
## dvpa 1176.00000 1.20675784 FALSE TRUE  
## esopct 1168.00000 2.33306516 FALSE TRUE  
## esopnr 598.50000 0.64360418 FALSE TRUE  
## esopr 0.00000 0.08045052 TRUE TRUE  
## esopt 598.50000 0.64360418 FALSE TRUE  
## fatn 254.00000 1.20675784 FALSE TRUE  
## itcb 0.00000 0.08045052 TRUE TRUE  
## mib 383.66667 4.02252615 FALSE TRUE  
## pnrsho 208.60000 7.16009654 FALSE TRUE  
## prcad 21.23404 2.01126307 FALSE TRUE  
## prcaeps 20.72917 2.01126307 FALSE TRUE  
## prsho 393.33333 1.28720837 FALSE TRUE  
## pstk 93.90909 7.96460177 FALSE TRUE  
## pstkc 135.87500 5.55108608 FALSE TRUE  
## pstkl 92.63636 8.68865648 FALSE TRUE  
## pstkn 96.09091 6.19469027 FALSE TRUE  
## pstkr 393.33333 1.93081255 FALSE TRUE  
## pstkrv 92.63636 8.68865648 FALSE TRUE  
## rdip 1202.00000 0.16090105 FALSE TRUE  
## rdipa 1194.00000 0.16090105 FALSE TRUE  
## rdipd 1157.00000 0.16090105 FALSE TRUE  
## rdipeps 1157.00000 0.16090105 FALSE TRUE  
## rea 957.00000 5.06838294 FALSE TRUE  
## tstkp 297.00000 0.16090105 FALSE TRUE  
## txndbr 1120.00000 0.16090105 FALSE TRUE  
## txo 1106.00000 3.29847144 FALSE TRUE  
## txw 1026.00000 8.20595334 FALSE TRUE  
## xi 1202.00000 0.16090105 FALSE TRUE  
## xintopt 1025.00000 0.16090105 FALSE TRUE  
## xoptd 0.00000 0.08045052 TRUE TRUE  
## xopteps 0.00000 0.08045052 TRUE TRUE  
## adjex\_c 50.28571 2.97666935 FALSE TRUE  
## adjex\_f 50.38095 2.97666935 FALSE TRUE  
## rank 0.00000 0.08045052 TRUE TRUE  
## dpact\_fn 23.02174 0.32180209 FALSE TRUE  
## rdipa\_fn 0.00000 0.08045052 TRUE TRUE  
## rdipd\_fn 285.75000 0.16090105 FALSE TRUE  
## rdipeps\_fn 228.40000 0.16090105 FALSE TRUE  
## stkco\_fn 0.00000 0.08045052 TRUE TRUE

nzv\_ds\_cols <- nearZeroVar(fundamentals\_ds\_filter\_1)  
fundamentals\_ds\_filter\_1 <- fundamentals\_ds\_filter\_1[, -nzv\_ds\_cols]  
write.csv(fundamentals\_ds\_filter\_1, file = "data/fundamentals\_ds\_filter\_3.csv", row.names=FALSE, na="")

ncol(fundamentals\_ds\_filter\_1)

## [1] 222

nrow(fundamentals\_ds\_filter\_1)

## [1] 1243

fundamentals\_ds\_filter\_1 <- subset(fundamentals\_ds\_filter\_1, select = -c(acctstd,src,acodo,acox,  
 aox,capxv,ceql,cibegni,cicurr,cidergl,  
 cimii,cipen,cisecgl,citotal,cshfd,cshpri,dclo,dcpstk,  
 dltis,dlto,dltr,do,dp,dpvieb,drc,  
 dv,dvc,epsfx,epspx,exre,  
 fopox,ibadj,ibc,ibcom,ibmii,  
 invch,ivaco,ivao,lco,  
 lcox,lcoxdr,lct,loxdr,mibn,  
 mibt,mii,msa,niadj,np,oprepsx,pnca,ppent,ppeveb,  
 recco,rectr,sale,spced,spceeps,  
 tstkc,txbco,txbcof,txdb,  
 txdbca,txdi,  
 txditc,txndb,xopr,exchg,costat,  
 ceoso,cfoso,idbflag,naics,sic,stko))  
write.csv(fundamentals\_ds\_filter\_1, file = "data/fundamentals\_ds\_filter\_4.csv", row.names=FALSE, na="")

ncol(fundamentals\_ds\_filter\_1)

## [1] 147

nrow(fundamentals\_ds\_filter\_1)

## [1] 1243

#fundamentals\_ds\_filter\_1

fundamentals\_restmt\_ds\_filter <- fundamentals\_ds %>%  
 filter(datafmt == 'SUMM\_STD' & gsector == gsector\_sjm)  
 #filter(datafmt == 'SUMM\_STD')  
   
std\_cols <- colnames(fundamentals\_ds\_filter\_1)  
fundamentals\_restmt\_ds\_filter <- subset(fundamentals\_restmt\_ds\_filter, select = c(std\_cols))  
fundamentals\_restmt\_ds\_filter <- fundamentals\_restmt\_ds\_filter[ lapply( fundamentals\_restmt\_ds\_filter, function(x) sum(is.na(x)) / length(x) ) < 0.1 ]  
summary(fundamentals\_restmt\_ds\_filter)

## gvkey fyear tic at   
## Min. : 1239 Min. :2009 0161A : 5 Min. : 0.00   
## 1st Qu.: 10852 1st Qu.:2010 0173A : 5 1st Qu.: 19.66   
## Median : 29517 Median :2011 AOI : 5 Median : 317.63   
## Mean : 75238 Mean :2011 BF.B : 5 Mean : 5919.97   
## 3rd Qu.:162517 3rd Qu.:2012 BNNY : 5 3rd Qu.: 2767.12   
## Max. :264393 Max. :2013 CASY : 5 Max. :204751.00   
## (Other):1050 NA's :20   
## capx cogs dltt epsfi   
## Min. : 0.000 Min. : 0 Min. : 0.00 Min. : -70.300   
## 1st Qu.: 0.366 1st Qu.: 13 1st Qu.: 0.00 1st Qu.: -0.035   
## Median : 12.813 Median : 245 Median : 16.23 Median : 0.430   
## Mean : 229.376 Mean : 5040 Mean : 1469.99 Mean : 4.928   
## 3rd Qu.: 101.290 3rd Qu.: 2172 3rd Qu.: 789.47 3rd Qu.: 1.985   
## Max. :13510.000 Max. :349199 Max. :47079.00 Max. :1126.180   
## NA's :41 NA's :40 NA's :33 NA's :65   
## epspi ib ni nopi   
## Min. : -70.300 Min. :-1728.282 Min. :-1575.621 Min. :-2366.000   
## 1st Qu.: -0.040 1st Qu.: -0.682 1st Qu.: -0.693 1st Qu.: -5.813   
## Median : 0.395 Median : 11.068 Median : 10.489 Median : 0.000   
## Mean : 5.007 Mean : 424.227 Mean : 413.637 Mean : 10.569   
## 3rd Qu.: 1.960 3rd Qu.: 108.980 3rd Qu.: 110.281 3rd Qu.: 0.738   
## Max. :1126.180 Max. :16963.000 Max. :16999.000 Max. : 8234.000   
## NA's :86 NA's :27 NA's :30 NA's :44   
## pi reuna seq teq   
## Min. :-2251.837 Min. :-7883.37 Min. :-7766.00 Min. :-6274.00   
## 1st Qu.: -0.712 1st Qu.: -9.31 1st Qu.: 4.14 1st Qu.: 4.13   
## Median : 16.577 Median : 27.36 Median : 110.65 Median : 110.66   
## Mean : 577.995 Mean : 2151.53 Mean : 2123.17 Mean : 2184.02   
## 3rd Qu.: 158.523 3rd Qu.: 443.86 3rd Qu.: 924.87 3rd Qu.: 976.52   
## Max. :25662.000 Max. :80197.00 Max. :76343.00 Max. :81738.00   
## NA's :33 NA's :35 NA's :17 NA's :21   
## txt wcap xint xsga   
## Min. :-523.555 Min. :-11878.000 Min. : 0.000 Min. : 0.00   
## 1st Qu.: 0.000 1st Qu.: 0.337 1st Qu.: 0.150 1st Qu.: 7.22   
## Median : 3.554 Median : 27.381 Median : 3.711 Median : 87.06   
## Mean : 166.817 Mean : 213.857 Mean : 89.108 Mean : 1392.23   
## 3rd Qu.: 48.900 3rd Qu.: 257.084 3rd Qu.: 61.965 3rd Qu.: 662.60   
## Max. :8105.000 Max. : 9900.000 Max. :3341.000 Max. :90920.00   
## NA's :30 NA's :64 NA's :107 NA's :73   
## dvpsp\_c dvpsx\_c dvpsp\_f dvpsx\_f   
## Min. : 0.0000 Min. : 0.0000 Min. : 0.0000 Min. : 0.0000   
## 1st Qu.: 0.0000 1st Qu.: 0.0000 1st Qu.: 0.0000 1st Qu.: 0.0000   
## Median : 0.0000 Median : 0.0000 Median : 0.0000 Median : 0.0000   
## Mean : 0.4543 Mean : 0.4558 Mean : 0.4490 Mean : 0.4505   
## 3rd Qu.: 0.5867 3rd Qu.: 0.5950 3rd Qu.: 0.5769 3rd Qu.: 0.5825   
## Max. :21.0000 Max. :21.0000 Max. :21.0000 Max. :21.0000   
## NA's :65 NA's :65 NA's :62 NA's :62   
## ein incorp   
## 13-4306188: 5 DE :495   
## 16-0716709: 5 NV :179   
## 16-0733425: 5 FL : 43   
## 20-1266625: 5 VA : 35   
## 23-1614034: 5 CO : 32   
## (Other) :1014 (Other):241   
## NA's : 41 NA's : 55

nrow(fundamentals\_restmt\_ds\_filter)

## [1] 1080

sample\_restmt\_ds\_filter <- fundamentals\_restmt\_ds\_filter #%>%  
 #filter(gvkey == 1076)  
sample\_ds\_filter <- fundamentals\_ds\_filter\_1 #%>%  
 #filter(gvkey == 1076)  
#nrow(sample\_restmt\_ds\_filter)  
#nrow(sample\_ds\_filter)  
#head(sample\_restmt\_ds\_filter)  
#head(sample\_ds\_filter)  
  
fundamentals\_ds\_filter\_1$restmt\_at <- 0  
fundamentals\_ds\_filter\_1$restmt\_at\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_capx <- 0  
fundamentals\_ds\_filter\_1$restmt\_capx\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_cogs <- 0  
fundamentals\_ds\_filter\_1$restmt\_cogs\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_dltt <- 0  
fundamentals\_ds\_filter\_1$restmt\_dltt\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_epsfi <- 0  
fundamentals\_ds\_filter\_1$restmt\_epsfi\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_epspi <- 0  
fundamentals\_ds\_filter\_1$restmt\_epspi\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_ib <- 0  
fundamentals\_ds\_filter\_1$restmt\_ib\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_ni <- 0  
fundamentals\_ds\_filter\_1$restmt\_ni\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_nopi <- 0  
fundamentals\_ds\_filter\_1$restmt\_nopi\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_pi <- 0  
fundamentals\_ds\_filter\_1$restmt\_pi\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_reuna <- 0  
fundamentals\_ds\_filter\_1$restmt\_reuna\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_seq <- 0  
fundamentals\_ds\_filter\_1$restmt\_seq\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_teq <- 0  
fundamentals\_ds\_filter\_1$restmt\_teq\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_txt <- 0  
fundamentals\_ds\_filter\_1$restmt\_txt\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_wcap <- 0  
fundamentals\_ds\_filter\_1$restmt\_wcap\_mag <- 0.0  
  
#fundamentals\_ds\_filter\_1$restmt\_ci <- 0  
#fundamentals\_ds\_filter\_1$restmt\_ci\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_xint <- 0  
fundamentals\_ds\_filter\_1$restmt\_xint\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_xsga <- 0  
fundamentals\_ds\_filter\_1$restmt\_xsga\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_dvpsp\_f <- 0  
fundamentals\_ds\_filter\_1$restmt\_dvpsp\_f\_mag <- 0.0  
  
fundamentals\_ds\_filter\_1$restmt\_dvpsx\_f <- 0  
fundamentals\_ds\_filter\_1$restmt\_dvpsx\_f\_mag <- 0.0  
  
for (row in 1:nrow(sample\_restmt\_ds\_filter)){  
 restmt\_item\_gvkey <- as.integer(sample\_restmt\_ds\_filter[row, "gvkey"])  
 restmt\_item\_fyear <- sample\_restmt\_ds\_filter[row, "fyear"]  
 restmt\_item\_at <- sample\_restmt\_ds\_filter[row, "at"]  
 restmt\_item\_capx <- sample\_restmt\_ds\_filter[row, "capx"]  
 restmt\_item\_cogs <- sample\_restmt\_ds\_filter[row, "cogs"]  
 restmt\_item\_dltt <- sample\_restmt\_ds\_filter[row, "dltt"]  
 restmt\_item\_epsfi <- sample\_restmt\_ds\_filter[row, "epsfi"]  
 restmt\_item\_epspi <- sample\_restmt\_ds\_filter[row, "epspi"]  
   
 restmt\_item\_ib <- sample\_restmt\_ds\_filter[row, "ib"]  
 restmt\_item\_ni <- sample\_restmt\_ds\_filter[row, "ni"]  
 restmt\_item\_nopi <- sample\_restmt\_ds\_filter[row, "nopi"]  
 restmt\_item\_pi <- sample\_restmt\_ds\_filter[row, "pi"]  
 restmt\_item\_reuna <- sample\_restmt\_ds\_filter[row, "reuna"]  
 restmt\_item\_seq <- sample\_restmt\_ds\_filter[row, "seq"]  
 restmt\_item\_teq <- sample\_restmt\_ds\_filter[row, "teq"]  
 restmt\_item\_txt <- sample\_restmt\_ds\_filter[row, "txt"]  
 restmt\_item\_wcap <- sample\_restmt\_ds\_filter[row, "wcap"]  
   
 restmt\_item\_xint <- sample\_restmt\_ds\_filter[row, "xint"]  
 restmt\_item\_xsga <- sample\_restmt\_ds\_filter[row, "xsga"]  
 restmt\_item\_dvpsp\_f <- sample\_restmt\_ds\_filter[row, "dvpsp\_f"]  
 restmt\_item\_dvpsx\_f <- sample\_restmt\_ds\_filter[row, "dvpsx\_f"]  
  
 row\_count <- as.integer(nrow(subset(fundamentals\_ds\_filter\_1, gvkey == restmt\_item\_gvkey & fyear == restmt\_item\_fyear)))  
   
 if (row\_count > 0){  
 fundamental\_stmt\_row <- fundamentals\_ds\_filter\_1 %>%  
 filter(gvkey == restmt\_item\_gvkey & fyear == restmt\_item\_fyear)  
  
 stmt\_item\_gvkey <- fundamental\_stmt\_row["gvkey"]  
 stmt\_item\_fyear <- fundamental\_stmt\_row["fyear"]  
 stmt\_item\_at <- fundamental\_stmt\_row["at"]  
 stmt\_item\_capx <- fundamental\_stmt\_row["capx"]  
 stmt\_item\_cogs <- fundamental\_stmt\_row["cogs"]  
 stmt\_item\_dltt <- fundamental\_stmt\_row["dltt"]  
 stmt\_item\_epsfi <- fundamental\_stmt\_row["epsfi"]  
 stmt\_item\_epspi <- fundamental\_stmt\_row["epspi"]  
 stmt\_item\_ib <- fundamental\_stmt\_row["ib"]  
 stmt\_item\_ni <- fundamental\_stmt\_row["ni"]  
 stmt\_item\_nopi <- fundamental\_stmt\_row["nopi"]  
 stmt\_item\_pi <- fundamental\_stmt\_row["pi"]  
 stmt\_item\_reuna <- fundamental\_stmt\_row["reuna"]  
 stmt\_item\_seq <- fundamental\_stmt\_row["seq"]  
 stmt\_item\_teq <- fundamental\_stmt\_row["teq"]  
 stmt\_item\_txt <- fundamental\_stmt\_row["txt"]  
 stmt\_item\_wcap <- fundamental\_stmt\_row["wcap"]  
 stmt\_item\_xint <- fundamental\_stmt\_row["xint"]  
 stmt\_item\_xsga <- fundamental\_stmt\_row["xsga"]  
 stmt\_item\_dvpsp\_f <- fundamental\_stmt\_row["dvpsp\_f"]  
 stmt\_item\_dvpsx\_f <- fundamental\_stmt\_row["dvpsx\_f"]  
  
   
  
 if (!is.na(restmt\_item\_at) & !is.na(stmt\_item\_at) & stmt\_item\_at != 0 & restmt\_item\_at != stmt\_item\_at){  
 fundamentals\_ds\_filter\_1$restmt\_at[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_at - stmt\_item\_at)/stmt\_item\_at) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_at\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_capx) & !is.na(stmt\_item\_capx) & restmt\_item\_capx != stmt\_item\_capx){  
 fundamentals\_ds\_filter\_1$restmt\_capx[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_capx == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_capx - stmt\_item\_capx)/stmt\_item\_capx) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_capx\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_cogs) & !is.na(stmt\_item\_cogs) & restmt\_item\_cogs != stmt\_item\_cogs){  
 fundamentals\_ds\_filter\_1$restmt\_cogs[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_cogs == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_cogs - stmt\_item\_cogs)/stmt\_item\_cogs) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_cogs\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_dltt) & !is.na(stmt\_item\_dltt) & restmt\_item\_dltt != stmt\_item\_dltt){  
 fundamentals\_ds\_filter\_1$restmt\_dltt[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_dltt == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_dltt - stmt\_item\_dltt)/stmt\_item\_dltt) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_dltt\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_epsfi) & !is.na(stmt\_item\_epsfi) & restmt\_item\_epsfi != stmt\_item\_epsfi){  
 fundamentals\_ds\_filter\_1$restmt\_epsfi[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_epsfi == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_epsfi - stmt\_item\_epsfi)/stmt\_item\_epsfi) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_epsfi\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_epspi) & !is.na(stmt\_item\_epspi) & restmt\_item\_epspi != stmt\_item\_epspi){  
 fundamentals\_ds\_filter\_1$restmt\_epspi[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_epspi == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_epspi - stmt\_item\_epspi)/stmt\_item\_epspi) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_epspi\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_ib) & !is.na(stmt\_item\_ib) & restmt\_item\_ib != stmt\_item\_ib){  
 fundamentals\_ds\_filter\_1$restmt\_ib[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_ib - stmt\_item\_ib)/stmt\_item\_ib) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_ib\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_ni) & !is.na(stmt\_item\_ni) & restmt\_item\_ni != stmt\_item\_ni){  
 fundamentals\_ds\_filter\_1$restmt\_ni[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_ni - stmt\_item\_ni)/stmt\_item\_ni) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_ni\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_nopi) & !is.na(stmt\_item\_nopi) & restmt\_item\_nopi != stmt\_item\_nopi){  
 fundamentals\_ds\_filter\_1$restmt\_nopi[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_nopi == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_nopi - stmt\_item\_nopi)/stmt\_item\_nopi) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_nopi\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_pi) & !is.na(stmt\_item\_pi) & restmt\_item\_pi != stmt\_item\_pi){  
 fundamentals\_ds\_filter\_1$restmt\_pi[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_pi - stmt\_item\_pi)/stmt\_item\_pi) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_pi\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_reuna) & !is.na(stmt\_item\_reuna) & restmt\_item\_reuna != stmt\_item\_reuna){  
 fundamentals\_ds\_filter\_1$restmt\_reuna[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_reuna - stmt\_item\_reuna)/stmt\_item\_reuna) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_reuna\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_seq) & !is.na(stmt\_item\_seq) & restmt\_item\_seq != stmt\_item\_seq){  
 fundamentals\_ds\_filter\_1$restmt\_seq[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_seq - stmt\_item\_seq)/stmt\_item\_seq) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_seq\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_teq) & !is.na(stmt\_item\_teq) & restmt\_item\_teq != stmt\_item\_teq){  
 fundamentals\_ds\_filter\_1$restmt\_teq[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_teq - stmt\_item\_teq)/stmt\_item\_teq) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_teq\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_txt) & !is.na(stmt\_item\_txt) & restmt\_item\_txt != stmt\_item\_txt){  
 fundamentals\_ds\_filter\_1$restmt\_txt[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 if (stmt\_item\_txt == 0.0){  
 magnitude <- 100.00  
 }  
 else{  
 magnitude <- ((restmt\_item\_txt - stmt\_item\_txt)/stmt\_item\_txt) \* 100.0  
 }  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_txt\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
  
 if (!is.na(restmt\_item\_wcap) & !is.na(stmt\_item\_wcap) & restmt\_item\_wcap != stmt\_item\_wcap){  
 fundamentals\_ds\_filter\_1$restmt\_wcap[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_wcap - stmt\_item\_wcap)/stmt\_item\_wcap) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_wcap\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
   
 if (!is.na(restmt\_item\_xint) & !is.na(stmt\_item\_xint) & stmt\_item\_xint != 0 & restmt\_item\_xint != stmt\_item\_xint){  
 fundamentals\_ds\_filter\_1$restmt\_xint[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_xint - stmt\_item\_xint)/stmt\_item\_xint) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_xint\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
   
 if (!is.na(restmt\_item\_xsga) & !is.na(stmt\_item\_xsga) & restmt\_item\_xsga != stmt\_item\_xsga){  
 fundamentals\_ds\_filter\_1$restmt\_xsga[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_xsga - stmt\_item\_xsga)/stmt\_item\_xsga) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_xsga\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
   
 if (!is.na(restmt\_item\_dvpsp\_f) & !is.na(stmt\_item\_dvpsp\_f) & restmt\_item\_dvpsp\_f != stmt\_item\_dvpsp\_f){  
 fundamentals\_ds\_filter\_1$restmt\_dvpsp\_f[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_dvpsp\_f - stmt\_item\_dvpsp\_f)/stmt\_item\_dvpsp\_f) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_dvpsp\_f\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
   
 if (!is.na(restmt\_item\_dvpsx\_f) & !is.na(stmt\_item\_dvpsx\_f) & restmt\_item\_dvpsx\_f != stmt\_item\_dvpsx\_f){  
 fundamentals\_ds\_filter\_1$restmt\_dvpsx\_f[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- 1  
 magnitude <- ((restmt\_item\_dvpsx\_f - stmt\_item\_dvpsx\_f)/stmt\_item\_dvpsx\_f) \* 100.0  
 magnitude <- as.double(round(magnitude, digits = 3))  
 fundamentals\_ds\_filter\_1$restmt\_dvpsx\_f\_mag[fundamentals\_ds\_filter\_1$gvkey == restmt\_item\_gvkey & fundamentals\_ds\_filter\_1$fyear == restmt\_item\_fyear] <- magnitude  
 }  
   
 }  
}  
#head(fundamentals\_ds\_filter\_1)  
nrow(fundamentals\_ds\_filter\_1)

## [1] 1243

nrow(fundamentals\_ds\_filter\_1)

## [1] 1243

# Removing aco == NA as all those rows do not have any data  
fundamentals\_ds\_filter\_2 <- subset(fundamentals\_ds\_filter\_1, !is.na(aco))  
nrow(fundamentals\_ds\_filter\_2)

## [1] 1205

fundamentals\_ds\_filter\_2[is.na(fundamentals\_ds\_filter\_2)] <- 0  
#nrow(fundamentals\_ds\_filter\_2)  
#head(fundamentals\_ds\_filter\_2)  
summary(fundamentals\_ds\_filter\_2)

## gvkey fyear tic aco   
## Min. : 1239 Min. :2009 0161A : 5 Min. : 0.000   
## 1st Qu.: 11178 1st Qu.:2010 0173A : 5 1st Qu.: 0.688   
## Median : 30651 Median :2011 AOI : 5 Median : 14.229   
## Mean : 78271 Mean :2011 BF.B : 5 Mean : 216.805   
## 3rd Qu.:163887 3rd Qu.:2012 BNNY : 5 3rd Qu.: 126.500   
## Max. :277487 Max. :2013 CAG : 5 Max. :6593.000   
## (Other):1175   
## acominc act am ao   
## Min. :-23363.657 Min. : 0.00 Min. : 0.000 Min. : 0.000   
## 1st Qu.: -43.616 1st Qu.: 14.54 1st Qu.: 0.000 1st Qu.: 0.251   
## Median : -0.009 Median : 209.70 Median : 0.184 Median : 13.293   
## Mean : -223.117 Mean : 2239.24 Mean : 22.033 Mean : 231.775   
## 3rd Qu.: 0.000 3rd Qu.: 1673.25 3rd Qu.: 6.200 3rd Qu.: 125.966   
## Max. : 5241.118 Max. :61185.00 Max. :736.211 Max. :6847.000   
##   
## aocidergl aociother aocipen aodo   
## Min. :-5300.00 Min. :-7685.00 Min. :-4296.00 Min. : 0.000   
## 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: -15.90 1st Qu.: 0.124   
## Median : 0.00 Median : 0.00 Median : 0.00 Median : 9.919   
## Mean : -10.23 Mean : -16.07 Mean : -108.57 Mean : 217.871   
## 3rd Qu.: 0.00 3rd Qu.: 0.00 3rd Qu.: 0.00 3rd Qu.: 117.008   
## Max. : 455.00 Max. : 1576.49 Max. : 85.61 Max. :6847.000   
##   
## aoloch ap aqc at   
## Min. :-1738.853 Min. : 0.00 Min. : -684.417 Min. : 0.0   
## 1st Qu.: -3.612 1st Qu.: 2.07 1st Qu.: 0.000 1st Qu.: 32.4   
## Median : 0.000 Median : 39.08 Median : 0.000 Median : 565.0   
## Mean : 7.200 Mean : 776.93 Mean : 122.530 Mean : 7580.3   
## 3rd Qu.: 4.886 3rd Qu.: 310.32 3rd Qu.: 1.723 3rd Qu.: 4400.0   
## Max. : 2141.000 Max. :38080.00 Max. :17538.000 Max. :204751.0   
##   
## bkvlps caps capx ceq   
## Min. :-142340 Min. : -782.34 Min. : 0.000 Min. :-7766.00   
## 1st Qu.: 0 1st Qu.: 5.38 1st Qu.: 0.529 1st Qu.: 7.42   
## Median : 5 Median : 50.10 Median : 19.535 Median : 166.72   
## Mean : 9513 Mean : 1101.50 Mean : 288.775 Mean : 2790.13   
## 3rd Qu.: 13 3rd Qu.: 539.48 3rd Qu.: 157.216 3rd Qu.: 1485.40   
## Max. :4231100 Max. :63538.00 Max. :13510.000 Max. :76343.00   
##   
## ceqt ch che   
## Min. :-48900.00 Min. : 0.000 Min. : 0.000   
## 1st Qu.: -4.50 1st Qu.: 1.722 1st Qu.: 2.421   
## Median : 20.38 Median : 26.881 Median : 38.884   
## Mean : 118.05 Mean : 449.550 Mean : 561.182   
## 3rd Qu.: 257.78 3rd Qu.: 242.818 3rd Qu.: 307.335   
## Max. : 56745.00 Max. :12803.000 Max. :20268.000   
##   
## chech ci cogs cshi   
## Min. :-4361.000 Min. :-1645.04 Min. : 0.0 Min. : 0.00   
## 1st Qu.: -2.195 1st Qu.: -0.43 1st Qu.: 17.9 1st Qu.: 15.51   
## Median : 0.274 Median : 16.03 Median : 407.3 Median : 49.95   
## Mean : 49.167 Mean : 562.03 Mean : 6143.1 Mean : 297.18   
## 3rd Qu.: 23.018 3rd Qu.: 220.28 3rd Qu.: 3390.7 3rd Qu.: 163.73   
## Max. : 4295.100 Max. :32850.89 Max. :349199.0 Max. :15664.33   
##   
## csho cshr cstk cstkcv   
## Min. : 0.00 Min. : 0.000 Min. : 0.000 Min. : 0.0000   
## 1st Qu.: 15.70 1st Qu.: 0.026 1st Qu.: 0.026 1st Qu.: 0.0010   
## Median : 49.33 Median : 0.371 Median : 0.413 Median : 0.0100   
## Mean : 266.38 Mean : 14.241 Mean : 218.565 Mean : 0.6711   
## 3rd Qu.: 157.79 3rd Qu.: 3.481 3rd Qu.: 39.000 3rd Qu.: 0.3200   
## Max. :15662.93 Max. :2311.000 Max. :24144.697 Max. :80.3400   
##   
## dc dd dd1 dd2   
## Min. : 0.000 Min. : 0.0 Min. : 0.000 Min. : 0.00   
## 1st Qu.: 0.000 1st Qu.: 0.0 1st Qu.: 0.000 1st Qu.: 0.00   
## Median : 0.000 Median : 0.0 Median : 1.304 Median : 0.21   
## Mean : 5.573 Mean : 391.5 Mean : 200.709 Mean : 145.27   
## 3rd Qu.: 0.000 3rd Qu.: 0.0 3rd Qu.: 34.376 3rd Qu.: 19.00   
## Max. :901.000 Max. :40526.0 Max. :7846.000 Max. :5748.00   
##   
## dd3 dd4 dd5 dilavx   
## Min. : 0.000 Min. : 0.00 Min. : 0.000 Min. :-1579.237   
## 1st Qu.: 0.000 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.: -0.354   
## Median : 0.031 Median : 0.00 Median : 0.000 Median : 14.425   
## Mean : 139.008 Mean : 119.12 Mean : 139.030 Mean : 540.741   
## 3rd Qu.: 17.921 3rd Qu.: 10.04 3rd Qu.: 8.526 3rd Qu.: 221.645   
## Max. :5658.000 Max. :5247.00 Max. :5971.641 Max. :16999.000   
##   
## dlc dltp dltt dm   
## Min. : 0.000 Min. :-199.212 Min. : 0.00 Min. : 0.000   
## 1st Qu.: 0.248 1st Qu.: 0.000 1st Qu.: 0.02 1st Qu.: 0.000   
## Median : 6.107 Median : 0.000 Median : 42.74 Median : 0.637   
## Mean : 435.065 Mean : 149.923 Mean : 1736.06 Mean : 177.689   
## 3rd Qu.: 111.090 3rd Qu.: 9.112 3rd Qu.: 1216.60 3rd Qu.: 61.622   
## Max. :20281.813 Max. :5629.040 Max. :47079.00 Max. :4413.000   
##   
## dn dpact dpc dvt   
## Min. : 0 Min. : 0.00 Min. : 0.000 Min. : -0.457   
## 1st Qu.: 0 1st Qu.: 4.36 1st Qu.: 0.507 1st Qu.: 0.000   
## Median : 0 Median : 93.46 Median : 11.751 Median : 0.000   
## Mean : 1089 Mean : 1548.38 Mean : 202.612 Mean : 261.726   
## 3rd Qu.: 400 3rd Qu.: 939.05 3rd Qu.: 114.538 3rd Qu.: 61.738   
## Max. :45073 Max. :60771.00 Max. :8870.000 Max. :7358.491   
##   
## ebit ebitda emp epsfi   
## Min. : -348.830 Min. : -150.53 Min. : 0.000 Min. : -18.340   
## 1st Qu.: 0.108 1st Qu.: 1.18 1st Qu.: 0.076 1st Qu.: -0.010   
## Median : 41.259 Median : 63.07 Median : 1.797 Median : 0.500   
## Mean : 890.581 Mean : 1105.73 Mean : 30.407 Mean : 4.659   
## 3rd Qu.: 471.209 3rd Qu.: 634.12 3rd Qu.: 14.800 3rd Qu.: 2.020   
## Max. :26027.000 Max. :34528.00 Max. :2200.000 Max. :1126.180   
##   
## epspi esub esubc fatb   
## Min. : -18.340 Min. : -35.0 Min. :-1078.02 Min. : 0.00   
## 1st Qu.: -0.010 1st Qu.: 0.0 1st Qu.: 0.00 1st Qu.: 0.00   
## Median : 0.500 Median : 0.0 Median : 0.00 Median : 4.54   
## Mean : 4.677 Mean : 30.2 Mean : -13.12 Mean : 840.15   
## 3rd Qu.: 2.030 3rd Qu.: 0.0 3rd Qu.: 0.00 3rd Qu.: 239.91   
## Max. :1126.180 Max. :1419.6 Max. : 100.21 Max. :95488.00   
##   
## fatc fatp fiao fincf   
## Min. : 0.00 Min. : 0.000 Min. :-9494.08 Min. :-27546.163   
## 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.: -5.60 1st Qu.: -134.000   
## Median : 0.00 Median : 0.347 Median : 0.00 Median : -1.583   
## Mean : 85.38 Mean : 217.919 Mean : -50.73 Mean : -390.433   
## 3rd Qu.: 21.64 3rd Qu.: 49.619 3rd Qu.: 0.00 3rd Qu.: 2.296   
## Max. :5828.00 Max. :26184.000 Max. :10337.10 Max. : 4188.000   
##   
## fopo gdwl gp ib   
## Min. :-5386.000 Min. : 0.00 Min. : -49.55 Min. :-1579.237   
## 1st Qu.: 0.053 1st Qu.: 0.00 1st Qu.: 11.33 1st Qu.: -0.353   
## Median : 2.511 Median : 8.32 Median : 194.64 Median : 17.409   
## Mean : 84.244 Mean : 1717.86 Mean : 2958.37 Mean : 549.144   
## 3rd Qu.: 29.462 3rd Qu.: 535.00 3rd Qu.: 1543.17 3rd Qu.: 243.376   
## Max. : 2526.000 Max. :69927.00 Max. :125060.00 Max. :16999.000   
##   
## icapt intan intano intc   
## Min. : -647.66 Min. : 0.00 Min. : 0.00 Min. : 0.000   
## 1st Qu.: 20.63 1st Qu.: 0.38 1st Qu.: 0.01 1st Qu.: 0.000   
## Median : 381.19 Median : 31.93 Median : 9.11 Median : 0.000   
## Mean : 4694.26 Mean : 2716.80 Mean : 998.94 Mean : 1.713   
## 3rd Qu.: 2881.55 3rd Qu.: 1012.93 3rd Qu.: 332.00 3rd Qu.: 0.000   
## Max. :127389.00 Max. :99265.00 Max. :32620.00 Max. :110.000   
##   
## intpn invt ivaeq ivch   
## Min. : -0.046 Min. : 0.00 Min. : 0.0 Min. : 0.00   
## 1st Qu.: 0.024 1st Qu.: 4.12 1st Qu.: 0.0 1st Qu.: 0.00   
## Median : 1.925 Median : 71.76 Median : 0.0 Median : 0.00   
## Mean : 92.475 Mean : 890.93 Mean : 222.3 Mean : 69.64   
## 3rd Qu.: 67.000 3rd Qu.: 648.95 3rd Qu.: 0.9 3rd Qu.: 0.00   
## Max. :2612.000 Max. :44858.00 Max. :13830.9 Max. :14782.00   
##   
## ivncf ivst ivstch lifr   
## Min. :-16609.000 Min. : 0.000 Min. :-6702.000 Min. : -87.00   
## 1st Qu.: -195.000 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 0.00   
## Median : -24.559 Median : 0.000 Median : 0.000 Median : 0.00   
## Mean : -370.668 Mean : 101.460 Mean : -3.398 Mean : 29.28   
## 3rd Qu.: -0.342 3rd Qu.: 1.753 3rd Qu.: 0.000 3rd Qu.: 0.00   
## Max. : 15528.872 Max. :9854.000 Max. : 6707.000 Max. :2100.00   
##   
## lo lse lt mrc1   
## Min. :-8821.23 Min. : 0.0 Min. : 0.00 Min. : 0.000   
## 1st Qu.: 0.00 1st Qu.: 32.4 1st Qu.: 11.47 1st Qu.: 0.097   
## Median : 10.99 Median : 565.0 Median : 227.58 Median : 4.200   
## Mean : 543.28 Mean : 7580.3 Mean : 4610.42 Mean : 74.821   
## 3rd Qu.: 287.15 3rd Qu.: 4400.0 3rd Qu.: 3149.50 3rd Qu.: 41.407   
## Max. :19714.69 Max. :204751.0 Max. :121921.00 Max. :2536.000   
##   
## mrcta ni nopi nopio   
## Min. : 0.000 Min. :-1575.62 Min. :-686.000 Min. :-686.000   
## 1st Qu.: 0.000 1st Qu.: -0.36 1st Qu.: 0.000 1st Qu.: -0.004   
## Median : 2.459 Median : 17.43 Median : 0.262 Median : 0.075   
## Mean : 331.950 Mean : 586.58 Mean : 57.630 Mean : 46.064   
## 3rd Qu.: 57.463 3rd Qu.: 246.64 3rd Qu.: 8.000 3rd Qu.: 4.000   
## Max. :25428.000 Max. :36538.58 Max. :2377.000 Max. :2196.000   
##   
## oancf oiadp oibdp opeps   
## Min. :-2435.00 Min. : -348.830 Min. : -150.53 Min. : -11.330   
## 1st Qu.: 0.00 1st Qu.: 0.108 1st Qu.: 1.18 1st Qu.: 0.000   
## Median : 34.25 Median : 41.259 Median : 63.07 Median : 0.600   
## Mean : 818.08 Mean : 890.581 Mean : 1105.73 Mean : 4.693   
## 3rd Qu.: 394.71 3rd Qu.: 471.209 3rd Qu.: 634.12 3rd Qu.: 2.140   
## Max. :26249.00 Max. :26027.000 Max. :34528.00 Max. :1126.180   
##   
## pi pncad pncaeps ppegt   
## Min. :-2052.598 Min. :-3.6800 Min. :-3.6800 Min. : 0.00   
## 1st Qu.: -0.309 1st Qu.: 0.0000 1st Qu.: 0.0000 1st Qu.: 11.03   
## Median : 25.386 Median : 0.0000 Median : 0.0000 Median : 237.26   
## Mean : 796.445 Mean : 0.1224 Mean : 0.1226 Mean : 3502.95   
## 3rd Qu.: 340.990 3rd Qu.: 0.0000 3rd Qu.: 0.0000 3rd Qu.: 2046.90   
## Max. :25737.000 Max. :54.5500 Max. :54.5500 Max. :178678.00   
##   
## prca prstkc re   
## Min. :-261.3000 Min. : 0.000 Min. :-29020.54   
## 1st Qu.: 0.0000 1st Qu.: 0.000 1st Qu.: -7.75   
## Median : 0.0000 Median : 0.000 Median : 39.15   
## Mean : -0.7143 Mean : 210.080 Mean : 2240.66   
## 3rd Qu.: 0.0000 3rd Qu.: 8.481 3rd Qu.: 781.40   
## Max. : 95.5500 Max. :14776.000 Max. : 73570.00   
##   
## reajo recch recd rect   
## Min. :-28991.49 Min. :-2882.000 Min. : 0.000 Min. : 0.000   
## 1st Qu.: -26.71 1st Qu.: -9.045 1st Qu.: 0.000 1st Qu.: 2.419   
## Median : 0.00 Median : -0.243 Median : 0.195 Median : 48.531   
## Mean : -92.22 Mean : -23.466 Mean : 12.795 Mean : 585.366   
## 3rd Qu.: 0.00 3rd Qu.: 0.063 3rd Qu.: 4.000 3rd Qu.: 427.000   
## Max. : 10590.65 Max. : 1121.637 Max. :620.109 Max. :15764.063   
##   
## recta reuna revt seq   
## Min. :-23372.642 Min. :-7883.37 Min. : 0.0 Min. :-7766.0   
## 1st Qu.: -0.225 1st Qu.: -7.21 1st Qu.: 34.6 1st Qu.: 10.1   
## Median : 0.000 Median : 40.20 Median : 654.1 Median : 180.7   
## Mean : -107.092 Mean : 2356.02 Mean : 9101.4 Mean : 2852.3   
## 3rd Qu.: 0.200 3rd Qu.: 767.05 3rd Qu.: 4825.3 3rd Qu.: 1501.3   
## Max. : 5631.000 Max. :80197.00 Max. :474259.0 Max. :76343.0   
##   
## seqo siv spce spi   
## Min. :-30165.16 Min. : 0.00 Min. : -688.784 Min. :-2628.00   
## 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: -0.186 1st Qu.: -13.92   
## Median : 0.00 Median : 0.00 Median : 16.625 Median : 0.00   
## Mean : 42.27 Mean : 65.66 Mean : 538.722 Mean : -39.93   
## 3rd Qu.: 0.00 3rd Qu.: 0.00 3rd Qu.: 239.164 3rd Qu.: 0.00   
## Max. : 11023.33 Max. :12791.00 Max. :16999.000 Max. : 6523.00   
##   
## sppe sppiv sstk stkco   
## Min. : 0.000 Min. :-26151.137 Min. : -1.831 Min. : -2.446   
## 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 0.000   
## Median : 0.000 Median : 0.000 Median : 0.115 Median : 0.980   
## Mean : 12.176 Mean : -37.163 Mean : 41.794 Mean : 19.963   
## 3rd Qu.: 1.254 3rd Qu.: 0.001 3rd Qu.: 7.560 3rd Qu.: 12.000   
## Max. :1002.000 Max. : 1409.479 Max. :1750.000 Max. :453.000   
##   
## teq tstk tstkn txc   
## Min. :-6274.00 Min. : -1.45 Min. : 0.000 Min. :-247.200   
## 1st Qu.: 10.37 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.: 0.000   
## Median : 185.46 Median : 0.00 Median : 0.000 Median : 0.068   
## Mean : 2948.62 Mean : 1031.13 Mean : 31.347 Mean : 152.731   
## 3rd Qu.: 1538.49 3rd Qu.: 14.53 3rd Qu.: 1.933 3rd Qu.: 30.277   
## Max. :81738.00 Max. :71966.00 Max. :2638.000 Max. :8619.000   
##   
## txdba txdbcl txdc txfed   
## Min. : 0.00 Min. : 0.000 Min. :-929.000 Min. :-489.00   
## 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.: -0.067 1st Qu.: 0.00   
## Median : 0.00 Median : 0.000 Median : 0.000 Median : 0.00   
## Mean : 63.63 Mean : 5.507 Mean : 9.010 Mean : 85.17   
## 3rd Qu.: 9.20 3rd Qu.: 0.000 3rd Qu.: 3.515 3rd Qu.: 14.12   
## Max. :3170.95 Max. :469.000 Max. :1050.000 Max. :6377.00   
##   
## txfo txndba txndbl txp   
## Min. :-688.66 Min. : 0.00 Min. : 0.00 Min. : -0.252   
## 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.00 1st Qu.: 0.000   
## Median : 0.00 Median : 10.11 Median : 13.24 Median : 0.000   
## Mean : 62.96 Mean : 251.72 Mean : 489.69 Mean : 50.853   
## 3rd Qu.: 4.00 3rd Qu.: 141.46 3rd Qu.: 249.48 3rd Qu.: 6.420   
## Max. :3855.00 Max. :6450.00 Max. :15376.00 Max. :2211.000   
##   
## txpd txr txs txt   
## Min. :-115.974 Min. : 0.00 Min. :-58.000 Min. :-456.811   
## 1st Qu.: 0.000 1st Qu.: 0.00 1st Qu.: 0.000 1st Qu.: 0.000   
## Median : 3.335 Median : 0.00 Median : 0.000 Median : 6.439   
## Mean : 198.654 Mean : 13.58 Mean : 12.208 Mean : 223.756   
## 3rd Qu.: 56.992 3rd Qu.: 0.00 3rd Qu.: 2.336 3rd Qu.: 86.628   
## Max. :8641.000 Max. :1292.68 Max. :743.000 Max. :8105.000   
##   
## wcap xacc xint xrent   
## Min. :-11878.000 Min. : 0.000 Min. : 0.000 Min. : 0.000   
## 1st Qu.: 0.257 1st Qu.: 0.293 1st Qu.: 0.174 1st Qu.: 0.080   
## Median : 39.370 Median : 12.423 Median : 4.871 Median : 3.753   
## Mean : 262.231 Mean : 433.890 Mean : 111.833 Mean : 83.986   
## 3rd Qu.: 347.414 3rd Qu.: 168.000 3rd Qu.: 88.811 3rd Qu.: 45.200   
## Max. : 14286.000 Max. :18202.000 Max. :3341.000 Max. :2800.000   
##   
## xsga cshtr\_c dvpsp\_c dvpsx\_c   
## Min. : 0.00 Min. :0.000e+00 Min. : 0.0000 Min. : 0.0000   
## 1st Qu.: 7.42 1st Qu.:1.871e+06 1st Qu.: 0.0000 1st Qu.: 0.0000   
## Median : 106.32 Median :1.698e+07 Median : 0.0000 Median : 0.0000   
## Mean : 1845.66 Mean :2.287e+08 Mean : 0.4928 Mean : 0.4959   
## 3rd Qu.: 868.97 3rd Qu.:1.430e+08 3rd Qu.: 0.6397 3rd Qu.: 0.6400   
## Max. :90920.00 Max. :5.728e+09 Max. :21.0000 Max. :21.0000   
##   
## prcc\_c prch\_c prcl\_c cshtr\_f   
## Min. : 0.00 Min. : 0.00 Min. : 0.00 Min. :0.000e+00   
## 1st Qu.: 0.70 1st Qu.: 1.80 1st Qu.: 0.33 1st Qu.:1.778e+06   
## Median : 9.64 Median : 14.25 Median : 6.59 Median :1.672e+07   
## Mean : 29.67 Mean : 34.17 Mean : 22.30 Mean :2.295e+08   
## 3rd Qu.: 34.75 3rd Qu.: 39.71 3rd Qu.: 26.21 3rd Qu.:1.398e+08   
## Max. :2794.97 Max. :2948.24 Max. :2500.00 Max. :6.052e+09   
##   
## dvpsp\_f dvpsx\_f mkvalt prcc\_f   
## Min. : 0.0000 Min. : 0.0000 Min. : 0.00 Min. : 0.00   
## 1st Qu.: 0.0000 1st Qu.: 0.0000 1st Qu.: 2.30 1st Qu.: 0.79   
## Median : 0.0000 Median : 0.0000 Median : 71.92 Median : 9.86   
## Mean : 0.4891 Mean : 0.4921 Mean : 5786.58 Mean : 29.48   
## 3rd Qu.: 0.6218 3rd Qu.: 0.6397 3rd Qu.: 1404.11 3rd Qu.: 34.49   
## Max. :21.0000 Max. :21.0000 Max. :241440.44 Max. :2794.97   
##   
## prch\_f prcl\_f ein incorp   
## Min. : 0.00 Min. : 0.00 13-4306188: 5 DE :487   
## 1st Qu.: 1.90 1st Qu.: 0.35 16-0716709: 5 NV :166   
## Median : 14.50 Median : 6.80 16-0733425: 5 FL : 43   
## Mean : 34.07 Mean : 22.18 20-1266625: 5 VA : 35   
## 3rd Qu.: 39.59 3rd Qu.: 26.10 23-1614034: 5 CO : 32   
## Max. :2948.24 Max. :2500.00 (Other) :999 (Other):240   
## NA's :181 NA's :202   
## state restmt\_at restmt\_at\_mag restmt\_capx   
## CA :140 Min. :0.00000 Min. :-93.6120 Min. :0.00000   
## NY : 99 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.00000   
## FL : 72 Median :0.00000 Median : 0.0000 Median :0.00000   
## IL : 65 Mean :0.07801 Mean : 0.5079 Mean :0.03983   
## NJ : 62 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.00000   
## (Other):511 Max. :1.00000 Max. :729.9070 Max. :1.00000   
## NA's :256   
## restmt\_capx\_mag restmt\_cogs restmt\_cogs\_mag restmt\_dltt   
## Min. : -100.00 Min. :0.0000 Min. : -100.00 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.00 Median :0.0000 Median : 0.00 Median :0.00000   
## Mean : 22.87 Mean :0.2788 Mean : 32.33 Mean :0.03154   
## 3rd Qu.: 0.00 3rd Qu.:1.0000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. :28133.57 Max. :1.0000 Max. :31225.00 Max. :1.00000   
##   
## restmt\_dltt\_mag restmt\_epsfi restmt\_epsfi\_mag restmt\_epspi   
## Min. :-100.0000 Min. :0.000 Min. : -165.8 Min. :0.000   
## 1st Qu.: 0.0000 1st Qu.:0.000 1st Qu.: 0.0 1st Qu.:0.000   
## Median : 0.0000 Median :0.000 Median : 0.0 Median :0.000   
## Mean : 0.2049 Mean :0.112 Mean : 396.6 Mean :0.112   
## 3rd Qu.: 0.0000 3rd Qu.:0.000 3rd Qu.: 0.0 3rd Qu.:0.000   
## Max. : 399.2380 Max. :1.000 Max. :198666.7 Max. :1.000   
##   
## restmt\_epspi\_mag restmt\_ib restmt\_ib\_mag restmt\_ni   
## Min. : -163.3 Min. :0.0000 Min. :-313.738 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.0 Median :0.0000 Median : 0.000 Median :0.00000   
## Mean : 399.2 Mean :0.1029 Mean : 5.186 Mean :0.04481   
## 3rd Qu.: 0.0 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :198666.7 Max. :1.0000 Max. :8051.351 Max. :1.00000   
##   
## restmt\_ni\_mag restmt\_nopi restmt\_nopi\_mag restmt\_pi   
## Min. :-168.75 Min. :0.0000 Min. :-1868600.0 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.0000 1st Qu.: -51.6 1st Qu.:0.00000   
## Median : 0.00 Median :1.0000 Median : 0.0 Median :0.00000   
## Mean : 7.04 Mean :0.5718 Mean : -1923.0 Mean :0.09876   
## 3rd Qu.: 0.00 3rd Qu.:1.0000 3rd Qu.: 0.0 3rd Qu.:0.00000   
## Max. :8051.35 Max. :1.0000 Max. : 274013.7 Max. :1.00000   
##   
## restmt\_pi\_mag restmt\_reuna restmt\_reuna\_mag restmt\_seq   
## Min. :-8243.033 Min. :0.00000 Min. :-9841.348 Min. :0.00000   
## 1st Qu.: 0.000 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.000 Median :0.00000 Median : 0.000 Median :0.00000   
## Mean : -1.457 Mean :0.06639 Mean : -2.913 Mean :0.07884   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. : 8051.351 Max. :1.00000 Max. :12545.000 Max. :1.00000   
##   
## restmt\_seq\_mag restmt\_teq restmt\_teq\_mag restmt\_txt   
## Min. : -388.04 Min. :0.00000 Min. : -375.93 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.00000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.00 Median :0.00000 Median : 0.00 Median :0.00000   
## Mean : 46.03 Mean :0.07469 Mean : 46.61 Mean :0.06473   
## 3rd Qu.: 0.00 3rd Qu.:0.00000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. :37620.00 Max. :1.00000 Max. :37620.00 Max. :1.00000   
##   
## restmt\_txt\_mag restmt\_wcap restmt\_wcap\_mag restmt\_xint   
## Min. :-8437.071 Min. :0.00000 Min. :-130.3750 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.0000   
## Median : 0.000 Median :0.00000 Median : 0.0000 Median :0.0000   
## Mean : -8.021 Mean :0.07137 Mean : 0.5482 Mean :0.1228   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.0000   
## Max. : 361.538 Max. :1.00000 Max. : 825.0000 Max. :1.0000   
##   
## restmt\_xint\_mag restmt\_xsga restmt\_xsga\_mag restmt\_dvpsp\_f  
## Min. :-100.000 Min. :0.0000 Min. :-100.000 Min. :0   
## 1st Qu.: 0.000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0   
## Median : 0.000 Median :0.0000 Median : 0.000 Median :0   
## Mean : 1.988 Mean :0.1461 Mean : 4.145 Mean :0   
## 3rd Qu.: 0.000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0   
## Max. :3814.830 Max. :1.0000 Max. :5651.351 Max. :0   
##   
## restmt\_dvpsp\_f\_mag restmt\_dvpsx\_f restmt\_dvpsx\_f\_mag  
## Min. :0 Min. :0 Min. :0   
## 1st Qu.:0 1st Qu.:0 1st Qu.:0   
## Median :0 Median :0 Median :0   
## Mean :0 Mean :0 Mean :0   
## 3rd Qu.:0 3rd Qu.:0 3rd Qu.:0   
## Max. :0 Max. :0 Max. :0   
##

colnames(fundamentals\_ds\_filter\_2)

## [1] "gvkey" "fyear" "tic"   
## [4] "aco" "acominc" "act"   
## [7] "am" "ao" "aocidergl"   
## [10] "aociother" "aocipen" "aodo"   
## [13] "aoloch" "ap" "aqc"   
## [16] "at" "bkvlps" "caps"   
## [19] "capx" "ceq" "ceqt"   
## [22] "ch" "che" "chech"   
## [25] "ci" "cogs" "cshi"   
## [28] "csho" "cshr" "cstk"   
## [31] "cstkcv" "dc" "dd"   
## [34] "dd1" "dd2" "dd3"   
## [37] "dd4" "dd5" "dilavx"   
## [40] "dlc" "dltp" "dltt"   
## [43] "dm" "dn" "dpact"   
## [46] "dpc" "dvt" "ebit"   
## [49] "ebitda" "emp" "epsfi"   
## [52] "epspi" "esub" "esubc"   
## [55] "fatb" "fatc" "fatp"   
## [58] "fiao" "fincf" "fopo"   
## [61] "gdwl" "gp" "ib"   
## [64] "icapt" "intan" "intano"   
## [67] "intc" "intpn" "invt"   
## [70] "ivaeq" "ivch" "ivncf"   
## [73] "ivst" "ivstch" "lifr"   
## [76] "lo" "lse" "lt"   
## [79] "mrc1" "mrcta" "ni"   
## [82] "nopi" "nopio" "oancf"   
## [85] "oiadp" "oibdp" "opeps"   
## [88] "pi" "pncad" "pncaeps"   
## [91] "ppegt" "prca" "prstkc"   
## [94] "re" "reajo" "recch"   
## [97] "recd" "rect" "recta"   
## [100] "reuna" "revt" "seq"   
## [103] "seqo" "siv" "spce"   
## [106] "spi" "sppe" "sppiv"   
## [109] "sstk" "stkco" "teq"   
## [112] "tstk" "tstkn" "txc"   
## [115] "txdba" "txdbcl" "txdc"   
## [118] "txfed" "txfo" "txndba"   
## [121] "txndbl" "txp" "txpd"   
## [124] "txr" "txs" "txt"   
## [127] "wcap" "xacc" "xint"   
## [130] "xrent" "xsga" "cshtr\_c"   
## [133] "dvpsp\_c" "dvpsx\_c" "prcc\_c"   
## [136] "prch\_c" "prcl\_c" "cshtr\_f"   
## [139] "dvpsp\_f" "dvpsx\_f" "mkvalt"   
## [142] "prcc\_f" "prch\_f" "prcl\_f"   
## [145] "ein" "incorp" "state"   
## [148] "restmt\_at" "restmt\_at\_mag" "restmt\_capx"   
## [151] "restmt\_capx\_mag" "restmt\_cogs" "restmt\_cogs\_mag"   
## [154] "restmt\_dltt" "restmt\_dltt\_mag" "restmt\_epsfi"   
## [157] "restmt\_epsfi\_mag" "restmt\_epspi" "restmt\_epspi\_mag"   
## [160] "restmt\_ib" "restmt\_ib\_mag" "restmt\_ni"   
## [163] "restmt\_ni\_mag" "restmt\_nopi" "restmt\_nopi\_mag"   
## [166] "restmt\_pi" "restmt\_pi\_mag" "restmt\_reuna"   
## [169] "restmt\_reuna\_mag" "restmt\_seq" "restmt\_seq\_mag"   
## [172] "restmt\_teq" "restmt\_teq\_mag" "restmt\_txt"   
## [175] "restmt\_txt\_mag" "restmt\_wcap" "restmt\_wcap\_mag"   
## [178] "restmt\_xint" "restmt\_xint\_mag" "restmt\_xsga"   
## [181] "restmt\_xsga\_mag" "restmt\_dvpsp\_f" "restmt\_dvpsp\_f\_mag"  
## [184] "restmt\_dvpsx\_f" "restmt\_dvpsx\_f\_mag"

nrow(fundamentals\_ds\_filter\_2)

## [1] 1205

final\_ds\_initial <- fundamentals\_ds\_filter\_2 %>%  
 group\_by(gvkey,tic) %>%  
 summarize(  
 aco = mean(aco),  
 acominc = mean(acominc),  
 act = mean(act),  
 ao = mean(ao),  
 aocidergl = mean(aocidergl),  
 aocipen = mean(aocipen),  
 aodo = mean(aodo),  
 aoloch = mean(aoloch),  
 ap = mean(ap),  
 aqc = mean(aqc),  
 at = mean(at),  
 bkvlps = mean(bkvlps),  
 caps = mean(caps),  
 capx = mean(capx),  
 ceq = mean(ceq),  
 ceqt = mean(ceqt),  
 ch = mean(ch),  
 che = mean(che),  
 chech = mean(chech),  
 ci = mean(ci),  
 cogs = mean(cogs),  
 cshi = mean(cshi),  
 csho = mean(csho),  
 cstk = mean(cstk),  
 cstkcv = mean(cstkcv),  
 dd1 = mean(dd1),  
 dilavx = mean(dilavx),  
 dlc = mean(dlc),  
 dltt = mean(dltt),  
 dm = mean(dm),  
 dn = mean(dn),  
 dpact = mean(dpact),  
 dpc = mean(dpc),  
 dvt = mean(dvt),  
 ebit = mean(ebit),  
 ebitda = mean(ebitda),  
 epsfi = mean(epsfi),  
 epspi = mean(epspi),  
 fiao = mean(fiao),  
 fincf = mean(fincf),  
 fopo = mean(fopo),  
 gdwl = mean(gdwl),  
 gp = mean(gp),  
 ib = mean(ib),  
 icapt = mean(icapt),  
 intan = mean(intan),  
 intano = mean(intano),  
 invt = mean(invt),  
 ivch = mean(ivch),  
 ivncf = mean(ivncf),  
 ivst = mean(ivst),  
 lo = mean(lo),  
 lse = mean(lse),  
 lt = mean(lt),  
 ni = mean(ni),  
 nopi = mean(nopi),  
 nopio = mean(nopio),  
 oancf = mean(oancf),  
 oiadp = mean(oiadp),  
 oibdp = mean(oibdp),  
 opeps = mean(opeps),  
 pi = mean(pi),  
 ppegt = mean(ppegt),  
 re = mean(re),  
 reajo = mean(reajo),  
 rect = mean(rect),  
 recta = mean(recta),  
 reuna = mean(reuna),  
 revt = mean(revt),  
 seq = mean( seq ),  
 siv = mean( siv ),  
 spce = mean(spce),  
 spi = mean(spi),  
 sppiv = mean(sppiv),  
 sstk = mean(sstk),  
 teq = mean(teq),  
 tstk = mean(tstk),  
 tstkn = mean(tstkn),  
 txp = mean(txp),  
 txr = mean(txr),  
 txt = mean(txt),  
 wcap = mean(wcap),  
 xint = mean(xint),  
 restmt\_at = mean(restmt\_at),  
 restmt\_at\_mag = mean(restmt\_at\_mag),  
 restmt\_capx = mean(restmt\_capx),  
 restmt\_capx\_mag = mean(restmt\_capx\_mag),  
 restmt\_cogs = mean(restmt\_cogs),  
 restmt\_cogs\_mag = mean(restmt\_cogs\_mag),  
 restmt\_dltt = mean(restmt\_dltt),  
 restmt\_dltt\_mag = mean(restmt\_dltt\_mag),  
 restmt\_epsfi = mean(restmt\_epsfi),  
 restmt\_epsfi\_mag = mean(restmt\_epsfi\_mag),  
 restmt\_epspi = mean(restmt\_epspi),  
 restmt\_epspi\_mag = mean(restmt\_epspi\_mag),  
 restmt\_ib = mean(restmt\_ib),  
 restmt\_ib\_mag = mean(restmt\_ib\_mag),  
 restmt\_ni = mean(restmt\_ni),  
 restmt\_ni\_mag = mean(restmt\_ni\_mag),  
 restmt\_nopi = mean(restmt\_nopi),  
 restmt\_nopi\_mag = mean(restmt\_nopi\_mag),  
 restmt\_pi = mean(restmt\_pi),  
 restmt\_pi\_mag = mean(restmt\_pi\_mag),  
 restmt\_reuna = mean(restmt\_reuna),  
 restmt\_reuna\_mag = mean(restmt\_reuna\_mag),  
 restmt\_seq = mean(restmt\_seq),  
 restmt\_seq\_mag = mean(restmt\_seq\_mag),  
 restmt\_teq = mean(restmt\_teq),  
 restmt\_teq\_mag = mean(restmt\_teq\_mag),  
 restmt\_txt = mean(restmt\_txt),  
 restmt\_txt\_mag = mean(restmt\_txt\_mag),  
 restmt\_wcap = mean(restmt\_wcap),  
 restmt\_wcap\_mag = mean(restmt\_wcap\_mag),  
   
 restmt\_xint = mean(restmt\_xint),  
 restmt\_xint\_mag = mean(restmt\_xint\_mag),  
   
 restmt\_xsga = mean(restmt\_xsga),  
 restmt\_xsga\_mag = mean(restmt\_xsga\_mag),  
   
 restmt\_dvpsp\_f = mean(restmt\_dvpsp\_f),  
 restmt\_dvpsp\_f\_mag = mean(restmt\_dvpsp\_f\_mag),  
   
 restmt\_dvpsx\_f = mean(restmt\_dvpsx\_f),  
 restmt\_dvpsx\_f\_mag = mean(restmt\_dvpsx\_f\_mag),  
   
 )

## `summarise()` regrouping output by 'gvkey' (override with `.groups` argument)

summary(final\_ds\_initial)

## gvkey tic aco acominc   
## Min. : 1239 0161A : 1 Min. : 0.000 Min. :-19306.57   
## 1st Qu.: 12107 0170A : 1 1st Qu.: 0.447 1st Qu.: -30.39   
## Median : 61311 0171A : 1 Median : 8.858 Median : 0.00   
## Mean : 83018 0173A : 1 Mean : 188.577 Mean : -194.14   
## 3rd Qu.:165694 0270B : 1 3rd Qu.: 94.290 3rd Qu.: 0.00   
## Max. :277487 0563B : 1 Max. :4760.750 Max. : 3495.34   
## (Other):342   
## act ao aocidergl aocipen   
## Min. : 0.00 Min. : 0.000 Min. :-2207.250 Min. :-2803.25   
## 1st Qu.: 10.27 1st Qu.: 0.145 1st Qu.: 0.000 1st Qu.: -10.48   
## Median : 115.71 Median : 8.322 Median : 0.000 Median : 0.00   
## Mean : 1918.97 Mean : 200.854 Mean : -9.098 Mean : -91.21   
## 3rd Qu.: 1225.80 3rd Qu.: 93.865 3rd Qu.: 0.000 3rd Qu.: 0.00   
## Max. :55264.80 Max. :5330.250 Max. : 119.000 Max. : 30.75   
##   
## aodo aoloch ap aqc   
## Min. : 0.000 Min. :-667.500 Min. : 0.00 Min. : -12.45   
## 1st Qu.: 0.070 1st Qu.: -1.851 1st Qu.: 1.17 1st Qu.: 0.00   
## Median : 6.675 Median : 0.000 Median : 18.13 Median : 0.00   
## Mean : 188.752 Mean : 6.660 Mean : 660.17 Mean : 105.33   
## 3rd Qu.: 91.195 3rd Qu.: 1.530 3rd Qu.: 241.09 3rd Qu.: 14.95   
## Max. :5330.250 Max. : 744.000 Max. :35222.20 Max. :5559.02   
##   
## at bkvlps caps capx   
## Min. : 0.00 Min. :-130515.0 Min. : -701.48 Min. : 0.000   
## 1st Qu.: 20.64 1st Qu.: 0.1 1st Qu.: 5.25 1st Qu.: 0.343   
## Median : 283.75 Median : 3.8 Median : 37.25 Median : 12.573   
## Mean : 6489.03 Mean : 11681.8 Mean : 951.28 Mean : 242.490   
## 3rd Qu.: 3172.25 3rd Qu.: 12.5 3rd Qu.: 363.48 3rd Qu.: 119.642   
## Max. :190526.20 Max. :1881687.0 Max. :62705.25 Max. :12881.200   
##   
## ceq ceqt ch che   
## Min. :-2342.49 Min. :-40530.25 Min. : 0.000 Min. : 0.000   
## 1st Qu.: 3.36 1st Qu.: -3.63 1st Qu.: 1.399 1st Qu.: 1.496   
## Median : 105.08 Median : 13.54 Median : 21.299 Median : 26.194   
## Mean : 2388.45 Mean : 54.96 Mean : 389.436 Mean : 487.347   
## 3rd Qu.: 1033.62 3rd Qu.: 189.37 3rd Qu.: 179.819 3rd Qu.: 217.474   
## Max. :72640.80 Max. : 53931.40 Max. :10044.000 Max. :15547.750   
##   
## chech ci cogs cshi   
## Min. :-305.7500 Min. : -722.617 Min. : 0.0 Min. : 0.0   
## 1st Qu.: -0.1368 1st Qu.: -1.477 1st Qu.: 12.1 1st Qu.: 16.2   
## Median : 0.5806 Median : 9.139 Median : 216.7 Median : 49.8   
## Mean : 42.2654 Mean : 475.730 Mean : 5116.2 Mean : 267.3   
## 3rd Qu.: 10.6559 3rd Qu.: 130.370 3rd Qu.: 2471.9 3rd Qu.: 145.1   
## Max. :1543.0000 Max. :16365.200 Max. :325065.8 Max. :6253.5   
##   
## csho cstk cstkcv dd1   
## Min. : 0.00 Min. : 0.000 Min. : 0.0000 Min. : 0.000   
## 1st Qu.: 16.32 1st Qu.: 0.026 1st Qu.: 0.0010 1st Qu.: 0.000   
## Median : 49.41 Median : 0.248 Median : 0.0100 Median : 1.451   
## Mean : 240.67 Mean : 191.237 Mean : 0.6068 Mean : 169.076   
## 3rd Qu.: 142.42 3rd Qu.: 21.315 3rd Qu.: 0.2500 3rd Qu.: 39.533   
## Max. :6252.56 Max. :7290.750 Max. :20.8642 Max. :5428.500   
##   
## dilavx dlc dltt dm   
## Min. : -738.263 Min. : 0.000 Min. : 0.00 Min. : 0.000   
## 1st Qu.: -1.320 1st Qu.: 0.302 1st Qu.: 0.16 1st Qu.: 0.000   
## Median : 4.824 Median : 5.257 Median : 17.03 Median : 1.218   
## Mean : 460.750 Mean : 374.668 Mean : 1477.91 Mean : 157.728   
## 3rd Qu.: 125.014 3rd Qu.: 99.945 3rd Qu.: 902.29 3rd Qu.: 62.483   
## Max. :15690.400 Max. :15926.126 Max. :42659.60 Max. :3900.400   
##   
## dn dpact dpc dvt   
## Min. : 0.0 Min. : 0.00 Min. : 0.000 Min. : -0.006   
## 1st Qu.: 0.0 1st Qu.: 2.02 1st Qu.: 0.319 1st Qu.: 0.000   
## Median : 0.0 Median : 52.40 Median : 7.505 Median : 0.000   
## Mean : 902.6 Mean : 1303.11 Mean : 170.666 Mean : 226.759   
## 3rd Qu.: 252.3 3rd Qu.: 768.89 3rd Qu.: 95.563 3rd Qu.: 35.368   
## Max. :42561.8 Max. :50449.80 Max. :8059.800 Max. :6572.535   
##   
## ebit ebitda epsfi epspi   
## Min. : -208.760 Min. : -33.68 Min. :-14.0200 Min. :-14.0200   
## 1st Qu.: -0.369 1st Qu.: 0.02 1st Qu.: -0.0512 1st Qu.: -0.0512   
## Median : 23.871 Median : 31.53 Median : 0.2288 Median : 0.2362   
## Mean : 761.483 Mean : 940.88 Mean : 3.9554 Mean : 3.9707   
## 3rd Qu.: 345.869 3rd Qu.: 441.54 3rd Qu.: 1.8338 3rd Qu.: 1.8638   
## Max. :24345.400 Max. :32405.20 Max. :881.6400 Max. :881.6400   
##   
## fiao fincf fopo   
## Min. :-3427.000 Min. :-11533.200 Min. :-389.5000   
## 1st Qu.: -7.661 1st Qu.: -50.075 1st Qu.: 0.1661   
## Median : -0.047 Median : -0.005 Median : 2.0777   
## Mean : -45.439 Mean : -332.514 Mean : 74.1085   
## 3rd Qu.: 0.000 3rd Qu.: 4.030 3rd Qu.: 23.4436   
## Max. : 1800.250 Max. : 824.184 Max. :1979.4552   
##   
## gdwl gp ib icapt   
## Min. : 0.00 Min. : -3.19 Min. : -727.025 Min. : -23.14   
## 1st Qu.: 0.00 1st Qu.: 6.98 1st Qu.: -1.320 1st Qu.: 10.74   
## Median : 1.95 Median : 102.86 Median : 6.421 Median : 192.63   
## Mean : 1492.38 Mean : 2502.66 Mean : 467.872 Mean : 4010.77   
## 3rd Qu.: 390.49 3rd Qu.: 1238.36 3rd Qu.: 136.674 3rd Qu.: 2098.22   
## Max. :56373.25 Max. :117445.60 Max. :15690.400 Max. :119888.20   
##   
## intan intano invt ivch   
## Min. : 0.00 Min. : 0.00 Min. : 0.00 Min. : 0.00   
## 1st Qu.: 0.17 1st Qu.: 0.04 1st Qu.: 2.19 1st Qu.: 0.00   
## Median : 18.61 Median : 7.21 Median : 37.47 Median : 0.00   
## Mean : 2370.53 Mean : 878.15 Mean : 745.30 Mean : 60.27   
## 3rd Qu.: 715.80 3rd Qu.: 217.88 3rd Qu.: 464.24 3rd Qu.: 0.27   
## Max. :86837.75 Max. :31704.00 Max. :39770.60 Max. :4366.68   
##   
## ivncf ivst lo lse   
## Min. :-13066.20 Min. : 0.000 Min. : -128.941 Min. : 0.00   
## 1st Qu.: -176.92 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 20.64   
## Median : -19.36 Median : 0.000 Median : 5.334 Median : 283.75   
## Mean : -314.10 Mean : 88.668 Mean : 475.282 Mean : 6489.03   
## 3rd Qu.: -0.24 3rd Qu.: 2.429 3rd Qu.: 203.087 3rd Qu.: 3172.25   
## Max. : 985.75 Max. :5503.750 Max. :14517.069 Max. :190526.20   
##   
## lt ni nopi   
## Min. : 0.02 Min. : -737.537 Min. :-230.2500   
## 1st Qu.: 8.05 1st Qu.: -1.661 1st Qu.: 0.0000   
## Median : 108.02 Median : 6.217 Median : 0.1979   
## Mean : 3948.06 Mean : 499.241 Mean : 47.9687   
## 3rd Qu.: 2056.19 3rd Qu.: 125.392 3rd Qu.: 4.8163   
## Max. :113297.60 Max. :17374.318 Max. :2224.4000   
##   
## nopio oancf oiadp oibdp   
## Min. :-230.2500 Min. : -61.444 Min. : -208.760 Min. : -33.68   
## 1st Qu.: -0.0111 1st Qu.: -0.142 1st Qu.: -0.369 1st Qu.: 0.02   
## Median : 0.0664 Median : 20.797 Median : 23.871 Median : 31.53   
## Mean : 37.9242 Mean : 696.038 Mean : 761.483 Mean : 940.88   
## 3rd Qu.: 2.5212 3rd Qu.: 282.996 3rd Qu.: 345.869 3rd Qu.: 441.54   
## Max. :2054.4000 Max. :24599.000 Max. :24345.400 Max. :32405.20   
##   
## opeps pi ppegt re   
## Min. : -9.8200 Min. : -739.921 Min. : 0.00 Min. :-7570.29   
## 1st Qu.: -0.0350 1st Qu.: -1.287 1st Qu.: 5.51 1st Qu.: -9.35   
## Median : 0.2971 Median : 11.654 Median : 146.66 Median : 19.16   
## Mean : 3.9977 Mean : 678.381 Mean : 2919.87 Mean : 1909.92   
## 3rd Qu.: 1.8725 3rd Qu.: 215.671 3rd Qu.: 1576.40 3rd Qu.: 441.34   
## Max. :856.8325 Max. :24079.000 Max. :161869.20 Max. :68884.60   
##   
## reajo rect recta reuna   
## Min. :-7860.75 Min. : 0.000 Min. :-19466.259 Min. :-7527.73   
## 1st Qu.: -19.79 1st Qu.: 1.636 1st Qu.: -0.169 1st Qu.: -9.13   
## Median : 0.00 Median : 28.478 Median : 0.000 Median : 21.03   
## Mean : -78.00 Mean : 510.810 Mean : -96.126 Mean : 2011.34   
## 3rd Qu.: 0.00 3rd Qu.: 312.676 3rd Qu.: 0.060 3rd Qu.: 435.07   
## Max. : 7171.53 Max. :15020.067 Max. : 1946.250 Max. :72710.50   
##   
## revt seq siv spce   
## Min. : 0.0 Min. :-2208.96 Min. : 0.000 Min. : -600.364   
## 1st Qu.: 22.4 1st Qu.: 4.15 1st Qu.: 0.000 1st Qu.: -1.121   
## Median : 333.1 Median : 106.70 Median : 0.000 Median : 6.643   
## Mean : 7618.9 Mean : 2442.71 Mean : 56.788 Mean : 459.367   
## 3rd Qu.: 3826.2 3rd Qu.: 1091.19 3rd Qu.: 0.512 3rd Qu.: 138.243   
## Max. :442511.4 Max. :72640.80 Max. :4366.827 Max. :15690.400   
##   
## spi sppiv sstk teq   
## Min. :-921.2962 Min. :-6191.874 Min. : 0.0000 Min. :-2208.96   
## 1st Qu.: -15.8642 1st Qu.: -0.046 1st Qu.: 0.0006 1st Qu.: 4.19   
## Median : -0.4417 Median : 0.000 Median : 1.2209 Median : 106.70   
## Mean : -35.2648 Mean : -32.516 Mean : 36.8987 Mean : 2524.10   
## 3rd Qu.: 0.0000 3rd Qu.: 0.007 3rd Qu.: 14.5968 3rd Qu.: 1095.88   
## Max. :1115.5000 Max. : 27.017 Max. :1513.0000 Max. :76602.80   
##   
## tstk tstkn txp txr   
## Min. : 0.0 Min. : 0.000 Min. : -0.252 Min. : 0.0000   
## 1st Qu.: 0.0 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 0.0000   
## Median : 0.0 Median : 0.000 Median : 0.049 Median : 0.0000   
## Mean : 889.8 Mean : 27.024 Mean : 44.423 Mean : 11.9381   
## 3rd Qu.: 8.5 3rd Qu.: 1.282 3rd Qu.: 5.603 3rd Qu.: 0.0758   
## Max. :67539.2 Max. :1923.500 Max. :1469.476 Max. :1150.7513   
##   
## txt wcap xint restmt\_at   
## Min. : -76.388 Min. :-8236.800 Min. : 0.0000 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.: -0.011 1st Qu.: 0.1635 1st Qu.:0.0000   
## Median : 3.772 Median : 25.438 Median : 2.2978 Median :0.0000   
## Mean : 189.846 Mean : 228.503 Mean : 95.8065 Mean :0.0694   
## 3rd Qu.: 63.206 3rd Qu.: 279.322 3rd Qu.: 66.5683 3rd Qu.:0.0000   
## Max. :7749.600 Max. :12261.750 Max. :2859.7500 Max. :0.8000   
##   
## restmt\_at\_mag restmt\_capx restmt\_capx\_mag restmt\_cogs   
## Min. :-23.4030 Min. :0.00000 Min. : -28.79 Min. :0.000   
## 1st Qu.: 0.0000 1st Qu.:0.00000 1st Qu.: 0.00 1st Qu.:0.000   
## Median : 0.0000 Median :0.00000 Median : 0.00 Median :0.000   
## Mean : 0.4492 Mean :0.03654 Mean : 19.82 Mean :0.249   
## 3rd Qu.: 0.0000 3rd Qu.:0.00000 3rd Qu.: 0.00 3rd Qu.:0.500   
## Max. :182.4888 Max. :0.75000 Max. :7033.39 Max. :1.000   
##   
## restmt\_cogs\_mag restmt\_dltt restmt\_dltt\_mag restmt\_epsfi   
## Min. : -50.000 Min. :0.00000 Min. :-26.9567 Min. :0.0000   
## 1st Qu.: -0.001 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.0000   
## Median : 0.000 Median :0.00000 Median : 0.0000 Median :0.0000   
## Mean : 29.001 Mean :0.02998 Mean : 0.1961 Mean :0.1051   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.0000   
## Max. :9299.359 Max. :1.00000 Max. :100.9780 Max. :1.0000   
##   
## restmt\_epsfi\_mag restmt\_epspi restmt\_epspi\_mag restmt\_ib   
## Min. : -50.05 Min. :0.0000 Min. : -50.0 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.0000 1st Qu.: 0.0 1st Qu.:0.00000   
## Median : 0.00 Median :0.0000 Median : 0.0 Median :0.00000   
## Mean : 345.40 Mean :0.1056 Mean : 347.6 Mean :0.09334   
## 3rd Qu.: 0.00 3rd Qu.:0.0000 3rd Qu.: 0.0 3rd Qu.:0.00000   
## Max. :77081.67 Max. :1.0000 Max. :77081.7 Max. :0.80000   
##   
## restmt\_ib\_mag restmt\_ni restmt\_ni\_mag restmt\_nopi   
## Min. :-121.766 Min. :0.00000 Min. : -42.188 Min. :0.000   
## 1st Qu.: 0.000 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.000   
## Median : 0.000 Median :0.00000 Median : 0.000 Median :0.600   
## Mean : 6.455 Mean :0.04128 Mean : 8.054 Mean :0.553   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:1.000   
## Max. :2683.890 Max. :0.80000 Max. :2683.890 Max. :1.000   
##   
## restmt\_nopi\_mag restmt\_pi restmt\_pi\_mag restmt\_reuna   
## Min. :-1868600.0 Min. :0.00000 Min. :-2747.678 Min. :0.00000   
## 1st Qu.: -118.3 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.0 Median :0.00000 Median : 0.000 Median :0.00000   
## Mean : -5830.0 Mean :0.09004 Mean : -1.358 Mean :0.06303   
## 3rd Qu.: 48.9 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. : 68865.1 Max. :0.80000 Max. : 2683.890 Max. :1.00000   
##   
## restmt\_reuna\_mag restmt\_seq restmt\_seq\_mag restmt\_teq   
## Min. :-2461.679 Min. :0.00000 Min. : -105.4 Min. :0.00000   
## 1st Qu.: 0.000 1st Qu.:0.00000 1st Qu.: 0.0 1st Qu.:0.00000   
## Median : 0.000 Median :0.00000 Median : 0.0 Median :0.00000   
## Mean : -0.805 Mean :0.08501 Mean : 48.8 Mean :0.07926   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.0 3rd Qu.:0.00000   
## Max. : 4181.704 Max. :1.00000 Max. :12541.8 Max. :1.00000   
##   
## restmt\_teq\_mag restmt\_txt restmt\_txt\_mag restmt\_wcap   
## Min. : -105.4 Min. :0.00000 Min. :-2109.268 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.0 Median :0.00000 Median : 0.000 Median :0.00000   
## Mean : 49.3 Mean :0.05627 Mean : -6.922 Mean :0.07002   
## 3rd Qu.: 0.0 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :12541.8 Max. :0.80000 Max. : 47.318 Max. :1.00000   
##   
## restmt\_wcap\_mag restmt\_xint restmt\_xint\_mag restmt\_xsga   
## Min. :-43.249 Min. :0.0000 Min. :-62.735 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.0000   
## Median : 0.000 Median :0.0000 Median : 0.000 Median :0.0000   
## Mean : 1.006 Mean :0.1069 Mean : 1.676 Mean :0.1318   
## 3rd Qu.: 0.000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.2500   
## Max. :412.500 Max. :1.0000 Max. :953.707 Max. :1.0000   
##   
## restmt\_xsga\_mag restmt\_dvpsp\_f restmt\_dvpsp\_f\_mag restmt\_dvpsx\_f  
## Min. : -50.000 Min. :0 Min. :0 Min. :0   
## 1st Qu.: 0.000 1st Qu.:0 1st Qu.:0 1st Qu.:0   
## Median : 0.000 Median :0 Median :0 Median :0   
## Mean : 4.863 Mean :0 Mean :0 Mean :0   
## 3rd Qu.: 0.000 3rd Qu.:0 3rd Qu.:0 3rd Qu.:0   
## Max. :1884.021 Max. :0 Max. :0 Max. :0   
##   
## restmt\_dvpsx\_f\_mag  
## Min. :0   
## 1st Qu.:0   
## Median :0   
## Mean :0   
## 3rd Qu.:0   
## Max. :0   
##

nrow(final\_ds\_initial)

## [1] 348

final\_ds\_initial\_1 <- final\_ds\_initial   
  
for (row in 1:nrow(final\_ds\_initial\_1)){  
 row\_item\_gvkey <- as.integer(final\_ds\_initial\_1[row, "gvkey"])  
   
 restmt\_at <- final\_ds\_initial\_1[row, "restmt\_at"]  
 restmt\_at\_mag <- final\_ds\_initial\_1[row, "restmt\_at\_mag"]  
 if (restmt\_at >= 0.5){  
 restmt\_at <- 1  
 restmt\_at\_mag <- as.double(restmt\_at\_mag)  
 }  
 else{  
 restmt\_at <- 0  
 restmt\_at\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_at[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_at  
 final\_ds\_initial\_1$restmt\_at\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_at\_mag  
   
 restmt\_capx <- final\_ds\_initial\_1[row, "restmt\_capx"]  
 restmt\_capx\_mag <- final\_ds\_initial\_1[row, "restmt\_capx\_mag"]  
 if (restmt\_capx >= 0.5){  
 restmt\_capx <- 1  
 restmt\_capx\_mag <- as.double(restmt\_capx\_mag)  
 }  
 else{  
 restmt\_capx <- 0  
 restmt\_capx\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_capx[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_capx  
 final\_ds\_initial\_1$restmt\_capx\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_capx\_mag  
   
 restmt\_cogs <- final\_ds\_initial\_1[row, "restmt\_cogs"]  
 restmt\_cogs\_mag <- final\_ds\_initial\_1[row, "restmt\_cogs\_mag"]  
 if (restmt\_cogs >= 0.5){  
 restmt\_cogs <- 1  
 restmt\_cogs\_mag <- as.double(restmt\_cogs\_mag)  
 }  
 else{  
 restmt\_cogs <- 0  
 restmt\_cogs\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_cogs[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_cogs  
 final\_ds\_initial\_1$restmt\_cogs\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_cogs\_mag  
   
 restmt\_dltt <- final\_ds\_initial\_1[row, "restmt\_dltt"]  
 restmt\_dltt\_mag <- final\_ds\_initial\_1[row, "restmt\_dltt\_mag"]  
 if (restmt\_dltt >= 0.5){  
 restmt\_dltt <- 1  
 restmt\_dltt\_mag <- as.double(restmt\_dltt\_mag)  
 }  
 else{  
 restmt\_dltt <- 0  
 restmt\_dltt\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_dltt[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_dltt  
 final\_ds\_initial\_1$restmt\_dltt\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_dltt\_mag  
   
   
 restmt\_epsfi <- final\_ds\_initial\_1[row, "restmt\_epsfi"]  
 restmt\_epsfi\_mag <- final\_ds\_initial\_1[row, "restmt\_epsfi\_mag"]  
 if (restmt\_epsfi >= 0.5){  
 restmt\_epsfi <- 1  
 restmt\_epsfi\_mag <- as.double(restmt\_epsfi\_mag)  
 }  
 else{  
 restmt\_epsfi <- 0  
 restmt\_epsfi\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_epsfi[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_epsfi  
 final\_ds\_initial\_1$restmt\_epsfi\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_epsfi\_mag  
   
   
 restmt\_epspi <- final\_ds\_initial\_1[row, "restmt\_epspi"]  
 restmt\_epspi\_mag <- final\_ds\_initial\_1[row, "restmt\_epspi\_mag"]  
 if (restmt\_epspi >= 0.5){  
 restmt\_epspi <- 1  
 restmt\_epspi\_mag <- as.double(restmt\_epspi\_mag)  
 }  
 else{  
 restmt\_epspi <- 0  
 restmt\_epspi\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_epspi[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_epspi  
 final\_ds\_initial\_1$restmt\_epspi\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_epspi\_mag  
   
 restmt\_ib <- final\_ds\_initial\_1[row, "restmt\_ib"]  
 restmt\_ib\_mag <- final\_ds\_initial\_1[row, "restmt\_ib\_mag"]  
 if (restmt\_ib >= 0.5){  
 restmt\_ib <- 1  
 restmt\_ib\_mag <- as.double(restmt\_ib\_mag)  
 }  
 else{  
 restmt\_ib <- 0  
 restmt\_ib\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_ib[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_ib  
 final\_ds\_initial\_1$restmt\_ib\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_ib\_mag  
   
 restmt\_ni <- final\_ds\_initial\_1[row, "restmt\_ni"]  
 restmt\_ni\_mag <- final\_ds\_initial\_1[row, "restmt\_ni\_mag"]  
 if (restmt\_ni >= 0.5){  
 restmt\_ni <- 1  
 restmt\_ni\_mag <- as.double(restmt\_ni\_mag)  
 }  
 else{  
 restmt\_ni <- 0  
 restmt\_ni\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_ni[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_ni  
 final\_ds\_initial\_1$restmt\_ni\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_ni\_mag  
   
 restmt\_nopi <- final\_ds\_initial\_1[row, "restmt\_nopi"]  
 restmt\_nopi\_mag <- final\_ds\_initial\_1[row, "restmt\_nopi\_mag"]  
 if (restmt\_nopi >= 0.5){  
 restmt\_nopi <- 1  
 restmt\_nopi\_mag <- as.double(restmt\_nopi\_mag)  
 }  
 else{  
 restmt\_nopi <- 0  
 restmt\_nopi\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_nopi[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_nopi  
 final\_ds\_initial\_1$restmt\_nopi\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_nopi\_mag  
   
 restmt\_pi <- final\_ds\_initial\_1[row, "restmt\_pi"]  
 restmt\_pi\_mag <- final\_ds\_initial\_1[row, "restmt\_pi\_mag"]  
 if (restmt\_pi >= 0.5){  
 restmt\_pi <- 1  
 restmt\_pi\_mag <- as.double(restmt\_pi\_mag)  
 }  
 else{  
 restmt\_pi <- 0  
 restmt\_pi\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_pi[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_pi  
 final\_ds\_initial\_1$restmt\_pi\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_pi\_mag  
   
 restmt\_reuna <- final\_ds\_initial\_1[row, "restmt\_reuna"]  
 restmt\_reuna\_mag <- final\_ds\_initial\_1[row, "restmt\_reuna\_mag"]  
 if (restmt\_reuna >= 0.5){  
 restmt\_reuna <- 1  
 restmt\_reuna\_mag <- as.double(restmt\_reuna\_mag)  
 }  
 else{  
 restmt\_reuna <- 0  
 restmt\_reuna\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_reuna[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_reuna  
 final\_ds\_initial\_1$restmt\_reuna\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_reuna\_mag  
   
 restmt\_seq <- final\_ds\_initial\_1[row, "restmt\_seq"]  
 restmt\_seq\_mag <- final\_ds\_initial\_1[row, "restmt\_seq\_mag"]  
 if (restmt\_seq >= 0.5){  
 restmt\_seq <- 1  
 restmt\_seq\_mag <- as.double(restmt\_seq\_mag)  
 }  
 else{  
 restmt\_seq <- 0  
 restmt\_seq\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_seq[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_seq  
 final\_ds\_initial\_1$restmt\_seq\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_seq\_mag  
   
 restmt\_teq <- final\_ds\_initial\_1[row, "restmt\_teq"]  
 restmt\_teq\_mag <- final\_ds\_initial\_1[row, "restmt\_teq\_mag"]  
 if (restmt\_teq >= 0.5){  
 restmt\_teq <- 1  
 restmt\_teq\_mag <- as.double(restmt\_teq\_mag)  
 }  
 else{  
 restmt\_teq <- 0  
 restmt\_teq\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_teq[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_teq  
 final\_ds\_initial\_1$restmt\_teq\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_teq\_mag  
   
 restmt\_txt <- final\_ds\_initial\_1[row, "restmt\_txt"]  
 restmt\_txt\_mag <- final\_ds\_initial\_1[row, "restmt\_txt\_mag"]  
 if (restmt\_txt >= 0.5){  
 restmt\_txt <- 1  
 restmt\_txt\_mag <- as.double(restmt\_txt\_mag)  
 }  
 else{  
 restmt\_txt <- 0  
 restmt\_txt\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_txt[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_txt  
 final\_ds\_initial\_1$restmt\_txt\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_txt\_mag  
   
 restmt\_wcap <- final\_ds\_initial\_1[row, "restmt\_wcap"]  
 restmt\_wcap\_mag <- final\_ds\_initial\_1[row, "restmt\_wcap\_mag"]  
 if (restmt\_wcap >= 0.5){  
 restmt\_wcap <- 1  
 restmt\_wcap\_mag <- as.double(restmt\_wcap\_mag)  
 }  
 else{  
 restmt\_wcap <- 0  
 restmt\_wcap\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_wcap[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_wcap  
 final\_ds\_initial\_1$restmt\_wcap\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_wcap\_mag  
   
 restmt\_xint <- final\_ds\_initial\_1[row, "restmt\_xint"]  
 restmt\_xint\_mag <- final\_ds\_initial\_1[row, "restmt\_xint\_mag"]  
 if (restmt\_xint >= 0.5){  
 restmt\_xint <- 1  
 restmt\_xint\_mag <- as.double(restmt\_xint\_mag)  
 }  
 else{  
 restmt\_xint <- 0  
 restmt\_xint\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_xint[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_xint  
 final\_ds\_initial\_1$restmt\_xint\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_xint\_mag  
   
 restmt\_xsga <- final\_ds\_initial\_1[row, "restmt\_xsga"]  
 restmt\_xsga\_mag <- final\_ds\_initial\_1[row, "restmt\_xsga\_mag"]  
 if (restmt\_xsga >= 0.5){  
 restmt\_xsga <- 1  
 restmt\_xsga\_mag <- as.double(restmt\_xsga\_mag)  
 }  
 else{  
 restmt\_xsga <- 0  
 restmt\_xsga\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_xsga[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_xsga  
 final\_ds\_initial\_1$restmt\_xsga\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_xsga\_mag  
   
 restmt\_dvpsp\_f <- final\_ds\_initial\_1[row, "restmt\_dvpsp\_f"]  
 restmt\_dvpsp\_f\_mag <- final\_ds\_initial\_1[row, "restmt\_dvpsp\_f\_mag"]  
 if (restmt\_dvpsp\_f >= 0.5){  
 restmt\_dvpsp\_f <- 1  
 restmt\_dvpsp\_f\_mag <- as.double(restmt\_dvpsp\_f\_mag)  
 }  
 else{  
 restmt\_dvpsp\_f <- 0  
 restmt\_dvpsp\_f\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_dvpsp\_f[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_dvpsp\_f  
 final\_ds\_initial\_1$restmt\_dvpsp\_f\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_dvpsp\_f\_mag  
   
 restmt\_dvpsx\_f <- final\_ds\_initial\_1[row, "restmt\_dvpsx\_f"]  
 restmt\_dvpsx\_f\_mag <- final\_ds\_initial\_1[row, "restmt\_dvpsx\_f\_mag"]  
 if (restmt\_dvpsx\_f >= 0.5){  
 restmt\_dvpsx\_f <- 1  
 restmt\_dvpsx\_f\_mag <- as.double(restmt\_dvpsx\_f\_mag)  
 }  
 else{  
 restmt\_dvpsx\_f <- 0  
 restmt\_dvpsx\_f\_mag <- 0.0  
 }  
 final\_ds\_initial\_1$restmt\_dvpsx\_f[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_dvpsx\_f  
 final\_ds\_initial\_1$restmt\_dvpsx\_f\_mag[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- restmt\_dvpsx\_f\_mag  
}  
  
restmt\_var\_ds <- subset(final\_ds\_initial\_1, select = c(gvkey,  
 restmt\_at,restmt\_at\_mag,  
 restmt\_capx,restmt\_capx\_mag,  
 restmt\_cogs, restmt\_cogs\_mag,  
 restmt\_dltt, restmt\_dltt\_mag,  
 restmt\_epsfi, restmt\_epsfi\_mag,  
 restmt\_epspi, restmt\_epspi\_mag,  
 restmt\_ib, restmt\_ib\_mag,  
 restmt\_ni, restmt\_ni\_mag,  
 restmt\_nopi, restmt\_nopi\_mag,  
 restmt\_pi, restmt\_pi\_mag,  
 restmt\_reuna, restmt\_reuna\_mag,  
 restmt\_seq, restmt\_seq\_mag,  
 restmt\_teq, restmt\_teq\_mag,  
 restmt\_txt, restmt\_txt\_mag,  
 restmt\_wcap, restmt\_wcap\_mag,  
   
 restmt\_xint, restmt\_xint\_mag,  
 restmt\_xsga, restmt\_xsga\_mag,  
 restmt\_dvpsp\_f, restmt\_dvpsp\_f\_mag,  
 restmt\_dvpsx\_f, restmt\_dvpsx\_f\_mag  
 ))  
  
summary(restmt\_var\_ds)

## gvkey restmt\_at restmt\_at\_mag restmt\_capx   
## Min. : 1239 Min. :0.00000 Min. : -1.4907 Min. :0.00000   
## 1st Qu.: 12107 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.00000   
## Median : 61311 Median :0.00000 Median : 0.0000 Median :0.00000   
## Mean : 83018 Mean :0.06322 Mean : 0.5283 Mean :0.02874   
## 3rd Qu.:165694 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.00000   
## Max. :277487 Max. :1.00000 Max. :182.4888 Max. :1.00000   
## restmt\_capx\_mag restmt\_cogs restmt\_cogs\_mag restmt\_dltt   
## Min. :-22.71625 Min. :0.0000 Min. : -50.00 Min. :0.00000   
## 1st Qu.: 0.00000 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.00000 Median :0.0000 Median : 0.00 Median :0.00000   
## Mean : -0.06393 Mean :0.3046 Mean : 29.37 Mean :0.01724   
## 3rd Qu.: 0.00000 3rd Qu.:1.0000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. : 8.33350 Max. :1.0000 Max. :9299.36 Max. :1.00000   
## restmt\_dltt\_mag restmt\_epsfi restmt\_epsfi\_mag restmt\_epspi   
## Min. :-26.9567 Min. :0.0000 Min. : -50.05 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.0000   
## Median : 0.0000 Median :0.0000 Median : 0.00 Median :0.0000   
## Mean : 0.1794 Mean :0.1293 Mean : 344.76 Mean :0.1351   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.00 3rd Qu.:0.0000   
## Max. :100.9780 Max. :1.0000 Max. :77081.67 Max. :1.0000   
## restmt\_epspi\_mag restmt\_ib restmt\_ib\_mag restmt\_ni   
## Min. : -50.0 Min. :0.0000 Min. :-121.766 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.0 Median :0.0000 Median : 0.000 Median :0.00000   
## Mean : 346.9 Mean :0.1121 Mean : 6.836 Mean :0.04598   
## 3rd Qu.: 0.0 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :77081.7 Max. :1.0000 Max. :2683.890 Max. :1.00000   
## restmt\_ni\_mag restmt\_nopi restmt\_nopi\_mag restmt\_pi   
## Min. : -9.801 Min. :0.0000 Min. :-1868600.0 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.0000 1st Qu.: -92.7 1st Qu.:0.0000   
## Median : 0.000 Median :1.0000 Median : 0.0 Median :0.0000   
## Mean : 8.153 Mean :0.6322 Mean : -5817.4 Mean :0.0977   
## 3rd Qu.: 0.000 3rd Qu.:1.0000 3rd Qu.: 21.5 3rd Qu.:0.0000   
## Max. :2683.890 Max. :1.0000 Max. : 68865.1 Max. :1.0000   
## restmt\_pi\_mag restmt\_reuna restmt\_reuna\_mag restmt\_seq   
## Min. :-135.28 Min. :0.00000 Min. :-2461.679 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.00 Median :0.00000 Median : 0.000 Median :0.00000   
## Mean : 6.98 Mean :0.07759 Mean : 5.001 Mean :0.09483   
## 3rd Qu.: 0.00 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :2683.89 Max. :1.00000 Max. : 4181.704 Max. :1.00000   
## restmt\_seq\_mag restmt\_teq restmt\_teq\_mag restmt\_txt   
## Min. : -105.4 Min. :0.00000 Min. : -105.39 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.00000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.0 Median :0.00000 Median : 0.00 Median :0.00000   
## Mean : 49.1 Mean :0.08621 Mean : 49.71 Mean :0.07184   
## 3rd Qu.: 0.0 3rd Qu.:0.00000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. :12541.8 Max. :1.00000 Max. :12541.75 Max. :1.00000   
## restmt\_txt\_mag restmt\_wcap restmt\_wcap\_mag restmt\_xint   
## Min. :-88.7704 Min. :0.0000 Min. :-43.249 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.0000   
## Median : 0.0000 Median :0.0000 Median : 0.000 Median :0.0000   
## Mean : -0.7665 Mean :0.0431 Mean : 1.043 Mean :0.1178   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.0000   
## Max. : 47.3182 Max. :1.0000 Max. :412.500 Max. :1.0000   
## restmt\_xint\_mag restmt\_xsga restmt\_xsga\_mag restmt\_dvpsp\_f  
## Min. :-62.7347 Min. :0.0000 Min. : -50.000 Min. :0   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0   
## Median : 0.0000 Median :0.0000 Median : 0.000 Median :0   
## Mean : -0.8803 Mean :0.1552 Mean : 4.984 Mean :0   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0   
## Max. : 0.5620 Max. :1.0000 Max. :1884.021 Max. :0   
## restmt\_dvpsp\_f\_mag restmt\_dvpsx\_f restmt\_dvpsx\_f\_mag  
## Min. :0 Min. :0 Min. :0   
## 1st Qu.:0 1st Qu.:0 1st Qu.:0   
## Median :0 Median :0 Median :0   
## Mean :0 Mean :0 Mean :0   
## 3rd Qu.:0 3rd Qu.:0 3rd Qu.:0   
## Max. :0 Max. :0 Max. :0

final\_ds\_initial\_2 <- final\_ds\_initial\_1  
summary(final\_ds\_initial\_2)

## gvkey tic aco acominc   
## Min. : 1239 0161A : 1 Min. : 0.000 Min. :-19306.57   
## 1st Qu.: 12107 0170A : 1 1st Qu.: 0.447 1st Qu.: -30.39   
## Median : 61311 0171A : 1 Median : 8.858 Median : 0.00   
## Mean : 83018 0173A : 1 Mean : 188.577 Mean : -194.14   
## 3rd Qu.:165694 0270B : 1 3rd Qu.: 94.290 3rd Qu.: 0.00   
## Max. :277487 0563B : 1 Max. :4760.750 Max. : 3495.34   
## (Other):342   
## act ao aocidergl aocipen   
## Min. : 0.00 Min. : 0.000 Min. :-2207.250 Min. :-2803.25   
## 1st Qu.: 10.27 1st Qu.: 0.145 1st Qu.: 0.000 1st Qu.: -10.48   
## Median : 115.71 Median : 8.322 Median : 0.000 Median : 0.00   
## Mean : 1918.97 Mean : 200.854 Mean : -9.098 Mean : -91.21   
## 3rd Qu.: 1225.80 3rd Qu.: 93.865 3rd Qu.: 0.000 3rd Qu.: 0.00   
## Max. :55264.80 Max. :5330.250 Max. : 119.000 Max. : 30.75   
##   
## aodo aoloch ap aqc   
## Min. : 0.000 Min. :-667.500 Min. : 0.00 Min. : -12.45   
## 1st Qu.: 0.070 1st Qu.: -1.851 1st Qu.: 1.17 1st Qu.: 0.00   
## Median : 6.675 Median : 0.000 Median : 18.13 Median : 0.00   
## Mean : 188.752 Mean : 6.660 Mean : 660.17 Mean : 105.33   
## 3rd Qu.: 91.195 3rd Qu.: 1.530 3rd Qu.: 241.09 3rd Qu.: 14.95   
## Max. :5330.250 Max. : 744.000 Max. :35222.20 Max. :5559.02   
##   
## at bkvlps caps capx   
## Min. : 0.00 Min. :-130515.0 Min. : -701.48 Min. : 0.000   
## 1st Qu.: 20.64 1st Qu.: 0.1 1st Qu.: 5.25 1st Qu.: 0.343   
## Median : 283.75 Median : 3.8 Median : 37.25 Median : 12.573   
## Mean : 6489.03 Mean : 11681.8 Mean : 951.28 Mean : 242.490   
## 3rd Qu.: 3172.25 3rd Qu.: 12.5 3rd Qu.: 363.48 3rd Qu.: 119.642   
## Max. :190526.20 Max. :1881687.0 Max. :62705.25 Max. :12881.200   
##   
## ceq ceqt ch che   
## Min. :-2342.49 Min. :-40530.25 Min. : 0.000 Min. : 0.000   
## 1st Qu.: 3.36 1st Qu.: -3.63 1st Qu.: 1.399 1st Qu.: 1.496   
## Median : 105.08 Median : 13.54 Median : 21.299 Median : 26.194   
## Mean : 2388.45 Mean : 54.96 Mean : 389.436 Mean : 487.347   
## 3rd Qu.: 1033.62 3rd Qu.: 189.37 3rd Qu.: 179.819 3rd Qu.: 217.474   
## Max. :72640.80 Max. : 53931.40 Max. :10044.000 Max. :15547.750   
##   
## chech ci cogs cshi   
## Min. :-305.7500 Min. : -722.617 Min. : 0.0 Min. : 0.0   
## 1st Qu.: -0.1368 1st Qu.: -1.477 1st Qu.: 12.1 1st Qu.: 16.2   
## Median : 0.5806 Median : 9.139 Median : 216.7 Median : 49.8   
## Mean : 42.2654 Mean : 475.730 Mean : 5116.2 Mean : 267.3   
## 3rd Qu.: 10.6559 3rd Qu.: 130.370 3rd Qu.: 2471.9 3rd Qu.: 145.1   
## Max. :1543.0000 Max. :16365.200 Max. :325065.8 Max. :6253.5   
##   
## csho cstk cstkcv dd1   
## Min. : 0.00 Min. : 0.000 Min. : 0.0000 Min. : 0.000   
## 1st Qu.: 16.32 1st Qu.: 0.026 1st Qu.: 0.0010 1st Qu.: 0.000   
## Median : 49.41 Median : 0.248 Median : 0.0100 Median : 1.451   
## Mean : 240.67 Mean : 191.237 Mean : 0.6068 Mean : 169.076   
## 3rd Qu.: 142.42 3rd Qu.: 21.315 3rd Qu.: 0.2500 3rd Qu.: 39.533   
## Max. :6252.56 Max. :7290.750 Max. :20.8642 Max. :5428.500   
##   
## dilavx dlc dltt dm   
## Min. : -738.263 Min. : 0.000 Min. : 0.00 Min. : 0.000   
## 1st Qu.: -1.320 1st Qu.: 0.302 1st Qu.: 0.16 1st Qu.: 0.000   
## Median : 4.824 Median : 5.257 Median : 17.03 Median : 1.218   
## Mean : 460.750 Mean : 374.668 Mean : 1477.91 Mean : 157.728   
## 3rd Qu.: 125.014 3rd Qu.: 99.945 3rd Qu.: 902.29 3rd Qu.: 62.483   
## Max. :15690.400 Max. :15926.126 Max. :42659.60 Max. :3900.400   
##   
## dn dpact dpc dvt   
## Min. : 0.0 Min. : 0.00 Min. : 0.000 Min. : -0.006   
## 1st Qu.: 0.0 1st Qu.: 2.02 1st Qu.: 0.319 1st Qu.: 0.000   
## Median : 0.0 Median : 52.40 Median : 7.505 Median : 0.000   
## Mean : 902.6 Mean : 1303.11 Mean : 170.666 Mean : 226.759   
## 3rd Qu.: 252.3 3rd Qu.: 768.89 3rd Qu.: 95.563 3rd Qu.: 35.368   
## Max. :42561.8 Max. :50449.80 Max. :8059.800 Max. :6572.535   
##   
## ebit ebitda epsfi epspi   
## Min. : -208.760 Min. : -33.68 Min. :-14.0200 Min. :-14.0200   
## 1st Qu.: -0.369 1st Qu.: 0.02 1st Qu.: -0.0512 1st Qu.: -0.0512   
## Median : 23.871 Median : 31.53 Median : 0.2288 Median : 0.2362   
## Mean : 761.483 Mean : 940.88 Mean : 3.9554 Mean : 3.9707   
## 3rd Qu.: 345.869 3rd Qu.: 441.54 3rd Qu.: 1.8338 3rd Qu.: 1.8638   
## Max. :24345.400 Max. :32405.20 Max. :881.6400 Max. :881.6400   
##   
## fiao fincf fopo   
## Min. :-3427.000 Min. :-11533.200 Min. :-389.5000   
## 1st Qu.: -7.661 1st Qu.: -50.075 1st Qu.: 0.1661   
## Median : -0.047 Median : -0.005 Median : 2.0777   
## Mean : -45.439 Mean : -332.514 Mean : 74.1085   
## 3rd Qu.: 0.000 3rd Qu.: 4.030 3rd Qu.: 23.4436   
## Max. : 1800.250 Max. : 824.184 Max. :1979.4552   
##   
## gdwl gp ib icapt   
## Min. : 0.00 Min. : -3.19 Min. : -727.025 Min. : -23.14   
## 1st Qu.: 0.00 1st Qu.: 6.98 1st Qu.: -1.320 1st Qu.: 10.74   
## Median : 1.95 Median : 102.86 Median : 6.421 Median : 192.63   
## Mean : 1492.38 Mean : 2502.66 Mean : 467.872 Mean : 4010.77   
## 3rd Qu.: 390.49 3rd Qu.: 1238.36 3rd Qu.: 136.674 3rd Qu.: 2098.22   
## Max. :56373.25 Max. :117445.60 Max. :15690.400 Max. :119888.20   
##   
## intan intano invt ivch   
## Min. : 0.00 Min. : 0.00 Min. : 0.00 Min. : 0.00   
## 1st Qu.: 0.17 1st Qu.: 0.04 1st Qu.: 2.19 1st Qu.: 0.00   
## Median : 18.61 Median : 7.21 Median : 37.47 Median : 0.00   
## Mean : 2370.53 Mean : 878.15 Mean : 745.30 Mean : 60.27   
## 3rd Qu.: 715.80 3rd Qu.: 217.88 3rd Qu.: 464.24 3rd Qu.: 0.27   
## Max. :86837.75 Max. :31704.00 Max. :39770.60 Max. :4366.68   
##   
## ivncf ivst lo lse   
## Min. :-13066.20 Min. : 0.000 Min. : -128.941 Min. : 0.00   
## 1st Qu.: -176.92 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 20.64   
## Median : -19.36 Median : 0.000 Median : 5.334 Median : 283.75   
## Mean : -314.10 Mean : 88.668 Mean : 475.282 Mean : 6489.03   
## 3rd Qu.: -0.24 3rd Qu.: 2.429 3rd Qu.: 203.087 3rd Qu.: 3172.25   
## Max. : 985.75 Max. :5503.750 Max. :14517.069 Max. :190526.20   
##   
## lt ni nopi   
## Min. : 0.02 Min. : -737.537 Min. :-230.2500   
## 1st Qu.: 8.05 1st Qu.: -1.661 1st Qu.: 0.0000   
## Median : 108.02 Median : 6.217 Median : 0.1979   
## Mean : 3948.06 Mean : 499.241 Mean : 47.9687   
## 3rd Qu.: 2056.19 3rd Qu.: 125.392 3rd Qu.: 4.8163   
## Max. :113297.60 Max. :17374.318 Max. :2224.4000   
##   
## nopio oancf oiadp oibdp   
## Min. :-230.2500 Min. : -61.444 Min. : -208.760 Min. : -33.68   
## 1st Qu.: -0.0111 1st Qu.: -0.142 1st Qu.: -0.369 1st Qu.: 0.02   
## Median : 0.0664 Median : 20.797 Median : 23.871 Median : 31.53   
## Mean : 37.9242 Mean : 696.038 Mean : 761.483 Mean : 940.88   
## 3rd Qu.: 2.5212 3rd Qu.: 282.996 3rd Qu.: 345.869 3rd Qu.: 441.54   
## Max. :2054.4000 Max. :24599.000 Max. :24345.400 Max. :32405.20   
##   
## opeps pi ppegt re   
## Min. : -9.8200 Min. : -739.921 Min. : 0.00 Min. :-7570.29   
## 1st Qu.: -0.0350 1st Qu.: -1.287 1st Qu.: 5.51 1st Qu.: -9.35   
## Median : 0.2971 Median : 11.654 Median : 146.66 Median : 19.16   
## Mean : 3.9977 Mean : 678.381 Mean : 2919.87 Mean : 1909.92   
## 3rd Qu.: 1.8725 3rd Qu.: 215.671 3rd Qu.: 1576.40 3rd Qu.: 441.34   
## Max. :856.8325 Max. :24079.000 Max. :161869.20 Max. :68884.60   
##   
## reajo rect recta reuna   
## Min. :-7860.75 Min. : 0.000 Min. :-19466.259 Min. :-7527.73   
## 1st Qu.: -19.79 1st Qu.: 1.636 1st Qu.: -0.169 1st Qu.: -9.13   
## Median : 0.00 Median : 28.478 Median : 0.000 Median : 21.03   
## Mean : -78.00 Mean : 510.810 Mean : -96.126 Mean : 2011.34   
## 3rd Qu.: 0.00 3rd Qu.: 312.676 3rd Qu.: 0.060 3rd Qu.: 435.07   
## Max. : 7171.53 Max. :15020.067 Max. : 1946.250 Max. :72710.50   
##   
## revt seq siv spce   
## Min. : 0.0 Min. :-2208.96 Min. : 0.000 Min. : -600.364   
## 1st Qu.: 22.4 1st Qu.: 4.15 1st Qu.: 0.000 1st Qu.: -1.121   
## Median : 333.1 Median : 106.70 Median : 0.000 Median : 6.643   
## Mean : 7618.9 Mean : 2442.71 Mean : 56.788 Mean : 459.367   
## 3rd Qu.: 3826.2 3rd Qu.: 1091.19 3rd Qu.: 0.512 3rd Qu.: 138.243   
## Max. :442511.4 Max. :72640.80 Max. :4366.827 Max. :15690.400   
##   
## spi sppiv sstk teq   
## Min. :-921.2962 Min. :-6191.874 Min. : 0.0000 Min. :-2208.96   
## 1st Qu.: -15.8642 1st Qu.: -0.046 1st Qu.: 0.0006 1st Qu.: 4.19   
## Median : -0.4417 Median : 0.000 Median : 1.2209 Median : 106.70   
## Mean : -35.2648 Mean : -32.516 Mean : 36.8987 Mean : 2524.10   
## 3rd Qu.: 0.0000 3rd Qu.: 0.007 3rd Qu.: 14.5968 3rd Qu.: 1095.88   
## Max. :1115.5000 Max. : 27.017 Max. :1513.0000 Max. :76602.80   
##   
## tstk tstkn txp txr   
## Min. : 0.0 Min. : 0.000 Min. : -0.252 Min. : 0.0000   
## 1st Qu.: 0.0 1st Qu.: 0.000 1st Qu.: 0.000 1st Qu.: 0.0000   
## Median : 0.0 Median : 0.000 Median : 0.049 Median : 0.0000   
## Mean : 889.8 Mean : 27.024 Mean : 44.423 Mean : 11.9381   
## 3rd Qu.: 8.5 3rd Qu.: 1.282 3rd Qu.: 5.603 3rd Qu.: 0.0758   
## Max. :67539.2 Max. :1923.500 Max. :1469.476 Max. :1150.7513   
##   
## txt wcap xint restmt\_at   
## Min. : -76.388 Min. :-8236.800 Min. : 0.0000 Min. :0.00000   
## 1st Qu.: 0.000 1st Qu.: -0.011 1st Qu.: 0.1635 1st Qu.:0.00000   
## Median : 3.772 Median : 25.438 Median : 2.2978 Median :0.00000   
## Mean : 189.846 Mean : 228.503 Mean : 95.8065 Mean :0.06322   
## 3rd Qu.: 63.206 3rd Qu.: 279.322 3rd Qu.: 66.5683 3rd Qu.:0.00000   
## Max. :7749.600 Max. :12261.750 Max. :2859.7500 Max. :1.00000   
##   
## restmt\_at\_mag restmt\_capx restmt\_capx\_mag restmt\_cogs   
## Min. : -1.4907 Min. :0.00000 Min. :-22.71625 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.00000 1st Qu.: 0.00000 1st Qu.:0.0000   
## Median : 0.0000 Median :0.00000 Median : 0.00000 Median :0.0000   
## Mean : 0.5283 Mean :0.02874 Mean : -0.06393 Mean :0.3046   
## 3rd Qu.: 0.0000 3rd Qu.:0.00000 3rd Qu.: 0.00000 3rd Qu.:1.0000   
## Max. :182.4888 Max. :1.00000 Max. : 8.33350 Max. :1.0000   
##   
## restmt\_cogs\_mag restmt\_dltt restmt\_dltt\_mag restmt\_epsfi   
## Min. : -50.00 Min. :0.00000 Min. :-26.9567 Min. :0.0000   
## 1st Qu.: 0.00 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.0000   
## Median : 0.00 Median :0.00000 Median : 0.0000 Median :0.0000   
## Mean : 29.37 Mean :0.01724 Mean : 0.1794 Mean :0.1293   
## 3rd Qu.: 0.00 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.0000   
## Max. :9299.36 Max. :1.00000 Max. :100.9780 Max. :1.0000   
##   
## restmt\_epsfi\_mag restmt\_epspi restmt\_epspi\_mag restmt\_ib   
## Min. : -50.05 Min. :0.0000 Min. : -50.0 Min. :0.0000   
## 1st Qu.: 0.00 1st Qu.:0.0000 1st Qu.: 0.0 1st Qu.:0.0000   
## Median : 0.00 Median :0.0000 Median : 0.0 Median :0.0000   
## Mean : 344.76 Mean :0.1351 Mean : 346.9 Mean :0.1121   
## 3rd Qu.: 0.00 3rd Qu.:0.0000 3rd Qu.: 0.0 3rd Qu.:0.0000   
## Max. :77081.67 Max. :1.0000 Max. :77081.7 Max. :1.0000   
##   
## restmt\_ib\_mag restmt\_ni restmt\_ni\_mag restmt\_nopi   
## Min. :-121.766 Min. :0.00000 Min. : -9.801 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.0000   
## Median : 0.000 Median :0.00000 Median : 0.000 Median :1.0000   
## Mean : 6.836 Mean :0.04598 Mean : 8.153 Mean :0.6322   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:1.0000   
## Max. :2683.890 Max. :1.00000 Max. :2683.890 Max. :1.0000   
##   
## restmt\_nopi\_mag restmt\_pi restmt\_pi\_mag restmt\_reuna   
## Min. :-1868600.0 Min. :0.0000 Min. :-135.28 Min. :0.00000   
## 1st Qu.: -92.7 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.0 Median :0.0000 Median : 0.00 Median :0.00000   
## Mean : -5817.4 Mean :0.0977 Mean : 6.98 Mean :0.07759   
## 3rd Qu.: 21.5 3rd Qu.:0.0000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. : 68865.1 Max. :1.0000 Max. :2683.89 Max. :1.00000   
##   
## restmt\_reuna\_mag restmt\_seq restmt\_seq\_mag restmt\_teq   
## Min. :-2461.679 Min. :0.00000 Min. : -105.4 Min. :0.00000   
## 1st Qu.: 0.000 1st Qu.:0.00000 1st Qu.: 0.0 1st Qu.:0.00000   
## Median : 0.000 Median :0.00000 Median : 0.0 Median :0.00000   
## Mean : 5.001 Mean :0.09483 Mean : 49.1 Mean :0.08621   
## 3rd Qu.: 0.000 3rd Qu.:0.00000 3rd Qu.: 0.0 3rd Qu.:0.00000   
## Max. : 4181.704 Max. :1.00000 Max. :12541.8 Max. :1.00000   
##   
## restmt\_teq\_mag restmt\_txt restmt\_txt\_mag restmt\_wcap   
## Min. : -105.39 Min. :0.00000 Min. :-88.7704 Min. :0.0000   
## 1st Qu.: 0.00 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.0000   
## Median : 0.00 Median :0.00000 Median : 0.0000 Median :0.0000   
## Mean : 49.71 Mean :0.07184 Mean : -0.7665 Mean :0.0431   
## 3rd Qu.: 0.00 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.0000   
## Max. :12541.75 Max. :1.00000 Max. : 47.3182 Max. :1.0000   
##   
## restmt\_wcap\_mag restmt\_xint restmt\_xint\_mag restmt\_xsga   
## Min. :-43.249 Min. :0.0000 Min. :-62.7347 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.0000 1st Qu.: 0.0000 1st Qu.:0.0000   
## Median : 0.000 Median :0.0000 Median : 0.0000 Median :0.0000   
## Mean : 1.043 Mean :0.1178 Mean : -0.8803 Mean :0.1552   
## 3rd Qu.: 0.000 3rd Qu.:0.0000 3rd Qu.: 0.0000 3rd Qu.:0.0000   
## Max. :412.500 Max. :1.0000 Max. : 0.5620 Max. :1.0000   
##   
## restmt\_xsga\_mag restmt\_dvpsp\_f restmt\_dvpsp\_f\_mag restmt\_dvpsx\_f  
## Min. : -50.000 Min. :0 Min. :0 Min. :0   
## 1st Qu.: 0.000 1st Qu.:0 1st Qu.:0 1st Qu.:0   
## Median : 0.000 Median :0 Median :0 Median :0   
## Mean : 4.984 Mean :0 Mean :0 Mean :0   
## 3rd Qu.: 0.000 3rd Qu.:0 3rd Qu.:0 3rd Qu.:0   
## Max. :1884.021 Max. :0 Max. :0 Max. :0   
##   
## restmt\_dvpsx\_f\_mag  
## Min. :0   
## 1st Qu.:0   
## Median :0   
## Mean :0   
## 3rd Qu.:0   
## Max. :0   
##

nrow(final\_ds\_initial\_2)

## [1] 348

write.csv(final\_ds\_initial\_2, file = "data/final\_ds\_initial\_2.csv", row.names=FALSE, na="")

cor\_matrix\_ds <- subset(final\_ds\_initial\_2, select = -c(gvkey,tic, aodo,seq,ivch,nopio,spce,reuna,dilavx,ebitda,csho,epsfi,   
 ib,pi,  
 oiadp,oibdp,gdwl))  
cor\_matrix <- cor(cor\_matrix\_ds)  
cor\_matrix %>%  
 as.data.frame() %>%  
 mutate(var1 = rownames(.)) %>%  
 gather(var2, value, -var1) %>%  
 arrange(desc(value)) %>%  
 group\_by(value) %>%  
 filter(row\_number()==1)

## # A tibble: 5,052 x 3  
## # Groups: value [5,052]  
## var1 var2 value  
## <chr> <chr> <dbl>  
## 1 aco aco 1   
## 2 restmt\_epspi\_mag restmt\_epsfi\_mag 1.00   
## 3 restmt\_teq\_mag restmt\_seq\_mag 1.00   
## 4 opeps epspi 1.00   
## 5 restmt\_pi\_mag restmt\_ib\_mag 0.998  
## 6 restmt\_ni\_mag restmt\_ib\_mag 0.998  
## 7 restmt\_xsga\_mag restmt\_ni\_mag 0.997  
## 8 restmt\_xsga\_mag restmt\_pi\_mag 0.997  
## 9 restmt\_pi\_mag restmt\_ni\_mag 0.997  
## 10 restmt\_xsga\_mag restmt\_ib\_mag 0.997  
## # ... with 5,042 more rows

#corrplot(cor\_matrix, method = "ellipse")  
  
#ncol(cor\_matrix\_ds)

fundamentals\_final\_ds <- subset(final\_ds\_initial\_2, select = -c(aodo,seq,ivch,nopio,spce,reuna,dilavx,ebitda,csho,epsfi,   
 ib,pi,  
 oiadp,oibdp,gdwl))  
summary(fundamentals\_final\_ds)

## gvkey tic aco acominc   
## Min. : 1239 0161A : 1 Min. : 0.000 Min. :-19306.57   
## 1st Qu.: 12107 0170A : 1 1st Qu.: 0.447 1st Qu.: -30.39   
## Median : 61311 0171A : 1 Median : 8.858 Median : 0.00   
## Mean : 83018 0173A : 1 Mean : 188.577 Mean : -194.14   
## 3rd Qu.:165694 0270B : 1 3rd Qu.: 94.290 3rd Qu.: 0.00   
## Max. :277487 0563B : 1 Max. :4760.750 Max. : 3495.34   
## (Other):342   
## act ao aocidergl aocipen   
## Min. : 0.00 Min. : 0.000 Min. :-2207.250 Min. :-2803.25   
## 1st Qu.: 10.27 1st Qu.: 0.145 1st Qu.: 0.000 1st Qu.: -10.48   
## Median : 115.71 Median : 8.322 Median : 0.000 Median : 0.00   
## Mean : 1918.97 Mean : 200.854 Mean : -9.098 Mean : -91.21   
## 3rd Qu.: 1225.80 3rd Qu.: 93.865 3rd Qu.: 0.000 3rd Qu.: 0.00   
## Max. :55264.80 Max. :5330.250 Max. : 119.000 Max. : 30.75   
##   
## aoloch ap aqc at   
## Min. :-667.500 Min. : 0.00 Min. : -12.45 Min. : 0.00   
## 1st Qu.: -1.851 1st Qu.: 1.17 1st Qu.: 0.00 1st Qu.: 20.64   
## Median : 0.000 Median : 18.13 Median : 0.00 Median : 283.75   
## Mean : 6.660 Mean : 660.17 Mean : 105.33 Mean : 6489.03   
## 3rd Qu.: 1.530 3rd Qu.: 241.09 3rd Qu.: 14.95 3rd Qu.: 3172.25   
## Max. : 744.000 Max. :35222.20 Max. :5559.02 Max. :190526.20   
##   
## bkvlps caps capx ceq   
## Min. :-130515.0 Min. : -701.48 Min. : 0.000 Min. :-2342.49   
## 1st Qu.: 0.1 1st Qu.: 5.25 1st Qu.: 0.343 1st Qu.: 3.36   
## Median : 3.8 Median : 37.25 Median : 12.573 Median : 105.08   
## Mean : 11681.8 Mean : 951.28 Mean : 242.490 Mean : 2388.45   
## 3rd Qu.: 12.5 3rd Qu.: 363.48 3rd Qu.: 119.642 3rd Qu.: 1033.62   
## Max. :1881687.0 Max. :62705.25 Max. :12881.200 Max. :72640.80   
##   
## ceqt ch che   
## Min. :-40530.25 Min. : 0.000 Min. : 0.000   
## 1st Qu.: -3.63 1st Qu.: 1.399 1st Qu.: 1.496   
## Median : 13.54 Median : 21.299 Median : 26.194   
## Mean : 54.96 Mean : 389.436 Mean : 487.347   
## 3rd Qu.: 189.37 3rd Qu.: 179.819 3rd Qu.: 217.474   
## Max. : 53931.40 Max. :10044.000 Max. :15547.750   
##   
## chech ci cogs cshi   
## Min. :-305.7500 Min. : -722.617 Min. : 0.0 Min. : 0.0   
## 1st Qu.: -0.1368 1st Qu.: -1.477 1st Qu.: 12.1 1st Qu.: 16.2   
## Median : 0.5806 Median : 9.139 Median : 216.7 Median : 49.8   
## Mean : 42.2654 Mean : 475.730 Mean : 5116.2 Mean : 267.3   
## 3rd Qu.: 10.6559 3rd Qu.: 130.370 3rd Qu.: 2471.9 3rd Qu.: 145.1   
## Max. :1543.0000 Max. :16365.200 Max. :325065.8 Max. :6253.5   
##   
## cstk cstkcv dd1 dlc   
## Min. : 0.000 Min. : 0.0000 Min. : 0.000 Min. : 0.000   
## 1st Qu.: 0.026 1st Qu.: 0.0010 1st Qu.: 0.000 1st Qu.: 0.302   
## Median : 0.248 Median : 0.0100 Median : 1.451 Median : 5.257   
## Mean : 191.237 Mean : 0.6068 Mean : 169.076 Mean : 374.668   
## 3rd Qu.: 21.315 3rd Qu.: 0.2500 3rd Qu.: 39.533 3rd Qu.: 99.945   
## Max. :7290.750 Max. :20.8642 Max. :5428.500 Max. :15926.126   
##   
## dltt dm dn dpact   
## Min. : 0.00 Min. : 0.000 Min. : 0.0 Min. : 0.00   
## 1st Qu.: 0.16 1st Qu.: 0.000 1st Qu.: 0.0 1st Qu.: 2.02   
## Median : 17.03 Median : 1.218 Median : 0.0 Median : 52.40   
## Mean : 1477.91 Mean : 157.728 Mean : 902.6 Mean : 1303.11   
## 3rd Qu.: 902.29 3rd Qu.: 62.483 3rd Qu.: 252.3 3rd Qu.: 768.89   
## Max. :42659.60 Max. :3900.400 Max. :42561.8 Max. :50449.80   
##   
## dpc dvt ebit epspi   
## Min. : 0.000 Min. : -0.006 Min. : -208.760 Min. :-14.0200   
## 1st Qu.: 0.319 1st Qu.: 0.000 1st Qu.: -0.369 1st Qu.: -0.0512   
## Median : 7.505 Median : 0.000 Median : 23.871 Median : 0.2362   
## Mean : 170.666 Mean : 226.759 Mean : 761.483 Mean : 3.9707   
## 3rd Qu.: 95.563 3rd Qu.: 35.368 3rd Qu.: 345.869 3rd Qu.: 1.8638   
## Max. :8059.800 Max. :6572.535 Max. :24345.400 Max. :881.6400   
##   
## fiao fincf fopo   
## Min. :-3427.000 Min. :-11533.200 Min. :-389.5000   
## 1st Qu.: -7.661 1st Qu.: -50.075 1st Qu.: 0.1661   
## Median : -0.047 Median : -0.005 Median : 2.0777   
## Mean : -45.439 Mean : -332.514 Mean : 74.1085   
## 3rd Qu.: 0.000 3rd Qu.: 4.030 3rd Qu.: 23.4436   
## Max. : 1800.250 Max. : 824.184 Max. :1979.4552   
##   
## gp icapt intan intano   
## Min. : -3.19 Min. : -23.14 Min. : 0.00 Min. : 0.00   
## 1st Qu.: 6.98 1st Qu.: 10.74 1st Qu.: 0.17 1st Qu.: 0.04   
## Median : 102.86 Median : 192.63 Median : 18.61 Median : 7.21   
## Mean : 2502.66 Mean : 4010.77 Mean : 2370.53 Mean : 878.15   
## 3rd Qu.: 1238.36 3rd Qu.: 2098.22 3rd Qu.: 715.80 3rd Qu.: 217.88   
## Max. :117445.60 Max. :119888.20 Max. :86837.75 Max. :31704.00   
##   
## invt ivncf ivst lo   
## Min. : 0.00 Min. :-13066.20 Min. : 0.000 Min. : -128.941   
## 1st Qu.: 2.19 1st Qu.: -176.92 1st Qu.: 0.000 1st Qu.: 0.000   
## Median : 37.47 Median : -19.36 Median : 0.000 Median : 5.334   
## Mean : 745.30 Mean : -314.10 Mean : 88.668 Mean : 475.282   
## 3rd Qu.: 464.24 3rd Qu.: -0.24 3rd Qu.: 2.429 3rd Qu.: 203.087   
## Max. :39770.60 Max. : 985.75 Max. :5503.750 Max. :14517.069   
##   
## lse lt ni   
## Min. : 0.00 Min. : 0.02 Min. : -737.537   
## 1st Qu.: 20.64 1st Qu.: 8.05 1st Qu.: -1.661   
## Median : 283.75 Median : 108.02 Median : 6.217   
## Mean : 6489.03 Mean : 3948.06 Mean : 499.241   
## 3rd Qu.: 3172.25 3rd Qu.: 2056.19 3rd Qu.: 125.392   
## Max. :190526.20 Max. :113297.60 Max. :17374.318   
##   
## nopi oancf opeps ppegt   
## Min. :-230.2500 Min. : -61.444 Min. : -9.8200 Min. : 0.00   
## 1st Qu.: 0.0000 1st Qu.: -0.142 1st Qu.: -0.0350 1st Qu.: 5.51   
## Median : 0.1979 Median : 20.797 Median : 0.2971 Median : 146.66   
## Mean : 47.9687 Mean : 696.038 Mean : 3.9977 Mean : 2919.87   
## 3rd Qu.: 4.8163 3rd Qu.: 282.996 3rd Qu.: 1.8725 3rd Qu.: 1576.40   
## Max. :2224.4000 Max. :24599.000 Max. :856.8325 Max. :161869.20   
##   
## re reajo rect recta   
## Min. :-7570.29 Min. :-7860.75 Min. : 0.000 Min. :-19466.259   
## 1st Qu.: -9.35 1st Qu.: -19.79 1st Qu.: 1.636 1st Qu.: -0.169   
## Median : 19.16 Median : 0.00 Median : 28.478 Median : 0.000   
## Mean : 1909.92 Mean : -78.00 Mean : 510.810 Mean : -96.126   
## 3rd Qu.: 441.34 3rd Qu.: 0.00 3rd Qu.: 312.676 3rd Qu.: 0.060   
## Max. :68884.60 Max. : 7171.53 Max. :15020.067 Max. : 1946.250   
##   
## revt siv spi sppiv   
## Min. : 0.0 Min. : 0.000 Min. :-921.2962 Min. :-6191.874   
## 1st Qu.: 22.4 1st Qu.: 0.000 1st Qu.: -15.8642 1st Qu.: -0.046   
## Median : 333.1 Median : 0.000 Median : -0.4417 Median : 0.000   
## Mean : 7618.9 Mean : 56.788 Mean : -35.2648 Mean : -32.516   
## 3rd Qu.: 3826.2 3rd Qu.: 0.512 3rd Qu.: 0.0000 3rd Qu.: 0.007   
## Max. :442511.4 Max. :4366.827 Max. :1115.5000 Max. : 27.017   
##   
## sstk teq tstk tstkn   
## Min. : 0.0000 Min. :-2208.96 Min. : 0.0 Min. : 0.000   
## 1st Qu.: 0.0006 1st Qu.: 4.19 1st Qu.: 0.0 1st Qu.: 0.000   
## Median : 1.2209 Median : 106.70 Median : 0.0 Median : 0.000   
## Mean : 36.8987 Mean : 2524.10 Mean : 889.8 Mean : 27.024   
## 3rd Qu.: 14.5968 3rd Qu.: 1095.88 3rd Qu.: 8.5 3rd Qu.: 1.282   
## Max. :1513.0000 Max. :76602.80 Max. :67539.2 Max. :1923.500   
##   
## txp txr txt wcap   
## Min. : -0.252 Min. : 0.0000 Min. : -76.388 Min. :-8236.800   
## 1st Qu.: 0.000 1st Qu.: 0.0000 1st Qu.: 0.000 1st Qu.: -0.011   
## Median : 0.049 Median : 0.0000 Median : 3.772 Median : 25.438   
## Mean : 44.423 Mean : 11.9381 Mean : 189.846 Mean : 228.503   
## 3rd Qu.: 5.603 3rd Qu.: 0.0758 3rd Qu.: 63.206 3rd Qu.: 279.322   
## Max. :1469.476 Max. :1150.7513 Max. :7749.600 Max. :12261.750   
##   
## xint restmt\_at restmt\_at\_mag restmt\_capx   
## Min. : 0.0000 Min. :0.00000 Min. : -1.4907 Min. :0.00000   
## 1st Qu.: 0.1635 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.00000   
## Median : 2.2978 Median :0.00000 Median : 0.0000 Median :0.00000   
## Mean : 95.8065 Mean :0.06322 Mean : 0.5283 Mean :0.02874   
## 3rd Qu.: 66.5683 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.00000   
## Max. :2859.7500 Max. :1.00000 Max. :182.4888 Max. :1.00000   
##   
## restmt\_capx\_mag restmt\_cogs restmt\_cogs\_mag restmt\_dltt   
## Min. :-22.71625 Min. :0.0000 Min. : -50.00 Min. :0.00000   
## 1st Qu.: 0.00000 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.00000 Median :0.0000 Median : 0.00 Median :0.00000   
## Mean : -0.06393 Mean :0.3046 Mean : 29.37 Mean :0.01724   
## 3rd Qu.: 0.00000 3rd Qu.:1.0000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. : 8.33350 Max. :1.0000 Max. :9299.36 Max. :1.00000   
##   
## restmt\_dltt\_mag restmt\_epsfi restmt\_epsfi\_mag restmt\_epspi   
## Min. :-26.9567 Min. :0.0000 Min. : -50.05 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.0000   
## Median : 0.0000 Median :0.0000 Median : 0.00 Median :0.0000   
## Mean : 0.1794 Mean :0.1293 Mean : 344.76 Mean :0.1351   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.00 3rd Qu.:0.0000   
## Max. :100.9780 Max. :1.0000 Max. :77081.67 Max. :1.0000   
##   
## restmt\_epspi\_mag restmt\_ib restmt\_ib\_mag restmt\_ni   
## Min. : -50.0 Min. :0.0000 Min. :-121.766 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.0 Median :0.0000 Median : 0.000 Median :0.00000   
## Mean : 346.9 Mean :0.1121 Mean : 6.836 Mean :0.04598   
## 3rd Qu.: 0.0 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :77081.7 Max. :1.0000 Max. :2683.890 Max. :1.00000   
##   
## restmt\_ni\_mag restmt\_nopi restmt\_nopi\_mag restmt\_pi   
## Min. : -9.801 Min. :0.0000 Min. :-1868600.0 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.0000 1st Qu.: -92.7 1st Qu.:0.0000   
## Median : 0.000 Median :1.0000 Median : 0.0 Median :0.0000   
## Mean : 8.153 Mean :0.6322 Mean : -5817.4 Mean :0.0977   
## 3rd Qu.: 0.000 3rd Qu.:1.0000 3rd Qu.: 21.5 3rd Qu.:0.0000   
## Max. :2683.890 Max. :1.0000 Max. : 68865.1 Max. :1.0000   
##   
## restmt\_pi\_mag restmt\_reuna restmt\_reuna\_mag restmt\_seq   
## Min. :-135.28 Min. :0.00000 Min. :-2461.679 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.00 Median :0.00000 Median : 0.000 Median :0.00000   
## Mean : 6.98 Mean :0.07759 Mean : 5.001 Mean :0.09483   
## 3rd Qu.: 0.00 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :2683.89 Max. :1.00000 Max. : 4181.704 Max. :1.00000   
##   
## restmt\_seq\_mag restmt\_teq restmt\_teq\_mag restmt\_txt   
## Min. : -105.4 Min. :0.00000 Min. : -105.39 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.00000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.0 Median :0.00000 Median : 0.00 Median :0.00000   
## Mean : 49.1 Mean :0.08621 Mean : 49.71 Mean :0.07184   
## 3rd Qu.: 0.0 3rd Qu.:0.00000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. :12541.8 Max. :1.00000 Max. :12541.75 Max. :1.00000   
##   
## restmt\_txt\_mag restmt\_wcap restmt\_wcap\_mag restmt\_xint   
## Min. :-88.7704 Min. :0.0000 Min. :-43.249 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.0000   
## Median : 0.0000 Median :0.0000 Median : 0.000 Median :0.0000   
## Mean : -0.7665 Mean :0.0431 Mean : 1.043 Mean :0.1178   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.0000   
## Max. : 47.3182 Max. :1.0000 Max. :412.500 Max. :1.0000   
##   
## restmt\_xint\_mag restmt\_xsga restmt\_xsga\_mag restmt\_dvpsp\_f  
## Min. :-62.7347 Min. :0.0000 Min. : -50.000 Min. :0   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0   
## Median : 0.0000 Median :0.0000 Median : 0.000 Median :0   
## Mean : -0.8803 Mean :0.1552 Mean : 4.984 Mean :0   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0   
## Max. : 0.5620 Max. :1.0000 Max. :1884.021 Max. :0   
##   
## restmt\_dvpsp\_f\_mag restmt\_dvpsx\_f restmt\_dvpsx\_f\_mag  
## Min. :0 Min. :0 Min. :0   
## 1st Qu.:0 1st Qu.:0 1st Qu.:0   
## Median :0 Median :0 Median :0   
## Mean :0 Mean :0 Mean :0   
## 3rd Qu.:0 3rd Qu.:0 3rd Qu.:0   
## Max. :0 Max. :0 Max. :0   
##

nrow(fundamentals\_final\_ds)

## [1] 348

stocks\_init\_ds <- read.csv("./data/Stocks\_DS.csv", na.strings=c(""," "))  
nrow(stocks\_init\_ds)

## [1] 4187047

names(stocks\_init\_ds)[names(stocks\_init\_ds) == "ï..gvkey"] <- "gvkey"  
stocks\_init\_limited\_cols <- subset(stocks\_init\_ds, select = c(gvkey,cshtrd,prccd,prchd,prcld,prcod,trfd))  
stocks\_init\_limited\_cols <- stocks\_init\_limited\_cols[!is.na(stocks\_init\_limited\_cols$cshtrd)&!is.na(stocks\_init\_limited\_cols$prccd)  
 &!is.na(stocks\_init\_limited\_cols$prchd)&!is.na(stocks\_init\_limited\_cols$prcld)  
 &!is.na(stocks\_init\_limited\_cols$trfd),]  
stocks\_init\_limited\_cols$prcod[is.na(stocks\_init\_limited\_cols$prcod)] <- (stocks\_init\_limited\_cols$prchd + stocks\_init\_limited\_cols$prcld)/2  
  
stocks\_grouped\_data <- stocks\_init\_limited\_cols %>%  
 group\_by(gvkey) %>%  
 summarize(  
 cshtrd\_m = mean(cshtrd),  
 prccd\_m = mean(prccd),  
 prchd\_m = mean(prchd),  
 prcld\_m = mean(prcld),  
 prcod\_m = mean(prcod),  
 trfd\_m = mean(trfd)  
 )

## `summarise()` ungrouping output (override with `.groups` argument)

#fundamental\_stocks\_data <- fundamentals\_final\_ds %>%  
# inner\_join(stocks\_grouped\_data, by = 'gvkey')  
#summary(fundamental\_stocks\_data)  
  
  
for (row in 1:nrow(fundamentals\_final\_ds)){  
 row\_item\_gvkey <- as.integer(fundamentals\_final\_ds[row, "gvkey"])  
   
 specific\_stock <- stocks\_grouped\_data %>%  
 filter(gvkey == row\_item\_gvkey)   
   
 if (nrow(specific\_stock) > 0){  
 specific\_stock <- head(specific\_stock, 1)  
 fundamentals\_final\_ds$cshtrd\_m[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- specific\_stock$cshtrd\_m  
 fundamentals\_final\_ds$prccd\_m[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- specific\_stock$prccd\_m  
 fundamentals\_final\_ds$prchd\_m[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- specific\_stock$prchd\_m  
 fundamentals\_final\_ds$prcld\_m[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- specific\_stock$prcld\_m  
 fundamentals\_final\_ds$prcod\_m[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- specific\_stock$prcod\_m  
 fundamentals\_final\_ds$trfd\_m[final\_ds\_initial\_1$gvkey == row\_item\_gvkey] <- specific\_stock$trfd\_m  
 }  
}  
summary(fundamentals\_final\_ds)

## gvkey tic aco acominc   
## Min. : 1239 0161A : 1 Min. : 0.000 Min. :-19306.57   
## 1st Qu.: 12107 0170A : 1 1st Qu.: 0.447 1st Qu.: -30.39   
## Median : 61311 0171A : 1 Median : 8.858 Median : 0.00   
## Mean : 83018 0173A : 1 Mean : 188.577 Mean : -194.14   
## 3rd Qu.:165694 0270B : 1 3rd Qu.: 94.290 3rd Qu.: 0.00   
## Max. :277487 0563B : 1 Max. :4760.750 Max. : 3495.34   
## (Other):342   
## act ao aocidergl aocipen   
## Min. : 0.00 Min. : 0.000 Min. :-2207.250 Min. :-2803.25   
## 1st Qu.: 10.27 1st Qu.: 0.145 1st Qu.: 0.000 1st Qu.: -10.48   
## Median : 115.71 Median : 8.322 Median : 0.000 Median : 0.00   
## Mean : 1918.97 Mean : 200.854 Mean : -9.098 Mean : -91.21   
## 3rd Qu.: 1225.80 3rd Qu.: 93.865 3rd Qu.: 0.000 3rd Qu.: 0.00   
## Max. :55264.80 Max. :5330.250 Max. : 119.000 Max. : 30.75   
##   
## aoloch ap aqc at   
## Min. :-667.500 Min. : 0.00 Min. : -12.45 Min. : 0.00   
## 1st Qu.: -1.851 1st Qu.: 1.17 1st Qu.: 0.00 1st Qu.: 20.64   
## Median : 0.000 Median : 18.13 Median : 0.00 Median : 283.75   
## Mean : 6.660 Mean : 660.17 Mean : 105.33 Mean : 6489.03   
## 3rd Qu.: 1.530 3rd Qu.: 241.09 3rd Qu.: 14.95 3rd Qu.: 3172.25   
## Max. : 744.000 Max. :35222.20 Max. :5559.02 Max. :190526.20   
##   
## bkvlps caps capx ceq   
## Min. :-130515.0 Min. : -701.48 Min. : 0.000 Min. :-2342.49   
## 1st Qu.: 0.1 1st Qu.: 5.25 1st Qu.: 0.343 1st Qu.: 3.36   
## Median : 3.8 Median : 37.25 Median : 12.573 Median : 105.08   
## Mean : 11681.8 Mean : 951.28 Mean : 242.490 Mean : 2388.45   
## 3rd Qu.: 12.5 3rd Qu.: 363.48 3rd Qu.: 119.642 3rd Qu.: 1033.62   
## Max. :1881687.0 Max. :62705.25 Max. :12881.200 Max. :72640.80   
##   
## ceqt ch che   
## Min. :-40530.25 Min. : 0.000 Min. : 0.000   
## 1st Qu.: -3.63 1st Qu.: 1.399 1st Qu.: 1.496   
## Median : 13.54 Median : 21.299 Median : 26.194   
## Mean : 54.96 Mean : 389.436 Mean : 487.347   
## 3rd Qu.: 189.37 3rd Qu.: 179.819 3rd Qu.: 217.474   
## Max. : 53931.40 Max. :10044.000 Max. :15547.750   
##   
## chech ci cogs cshi   
## Min. :-305.7500 Min. : -722.617 Min. : 0.0 Min. : 0.0   
## 1st Qu.: -0.1368 1st Qu.: -1.477 1st Qu.: 12.1 1st Qu.: 16.2   
## Median : 0.5806 Median : 9.139 Median : 216.7 Median : 49.8   
## Mean : 42.2654 Mean : 475.730 Mean : 5116.2 Mean : 267.3   
## 3rd Qu.: 10.6559 3rd Qu.: 130.370 3rd Qu.: 2471.9 3rd Qu.: 145.1   
## Max. :1543.0000 Max. :16365.200 Max. :325065.8 Max. :6253.5   
##   
## cstk cstkcv dd1 dlc   
## Min. : 0.000 Min. : 0.0000 Min. : 0.000 Min. : 0.000   
## 1st Qu.: 0.026 1st Qu.: 0.0010 1st Qu.: 0.000 1st Qu.: 0.302   
## Median : 0.248 Median : 0.0100 Median : 1.451 Median : 5.257   
## Mean : 191.237 Mean : 0.6068 Mean : 169.076 Mean : 374.668   
## 3rd Qu.: 21.315 3rd Qu.: 0.2500 3rd Qu.: 39.533 3rd Qu.: 99.945   
## Max. :7290.750 Max. :20.8642 Max. :5428.500 Max. :15926.126   
##   
## dltt dm dn dpact   
## Min. : 0.00 Min. : 0.000 Min. : 0.0 Min. : 0.00   
## 1st Qu.: 0.16 1st Qu.: 0.000 1st Qu.: 0.0 1st Qu.: 2.02   
## Median : 17.03 Median : 1.218 Median : 0.0 Median : 52.40   
## Mean : 1477.91 Mean : 157.728 Mean : 902.6 Mean : 1303.11   
## 3rd Qu.: 902.29 3rd Qu.: 62.483 3rd Qu.: 252.3 3rd Qu.: 768.89   
## Max. :42659.60 Max. :3900.400 Max. :42561.8 Max. :50449.80   
##   
## dpc dvt ebit epspi   
## Min. : 0.000 Min. : -0.006 Min. : -208.760 Min. :-14.0200   
## 1st Qu.: 0.319 1st Qu.: 0.000 1st Qu.: -0.369 1st Qu.: -0.0512   
## Median : 7.505 Median : 0.000 Median : 23.871 Median : 0.2362   
## Mean : 170.666 Mean : 226.759 Mean : 761.483 Mean : 3.9707   
## 3rd Qu.: 95.563 3rd Qu.: 35.368 3rd Qu.: 345.869 3rd Qu.: 1.8638   
## Max. :8059.800 Max. :6572.535 Max. :24345.400 Max. :881.6400   
##   
## fiao fincf fopo   
## Min. :-3427.000 Min. :-11533.200 Min. :-389.5000   
## 1st Qu.: -7.661 1st Qu.: -50.075 1st Qu.: 0.1661   
## Median : -0.047 Median : -0.005 Median : 2.0777   
## Mean : -45.439 Mean : -332.514 Mean : 74.1085   
## 3rd Qu.: 0.000 3rd Qu.: 4.030 3rd Qu.: 23.4436   
## Max. : 1800.250 Max. : 824.184 Max. :1979.4552   
##   
## gp icapt intan intano   
## Min. : -3.19 Min. : -23.14 Min. : 0.00 Min. : 0.00   
## 1st Qu.: 6.98 1st Qu.: 10.74 1st Qu.: 0.17 1st Qu.: 0.04   
## Median : 102.86 Median : 192.63 Median : 18.61 Median : 7.21   
## Mean : 2502.66 Mean : 4010.77 Mean : 2370.53 Mean : 878.15   
## 3rd Qu.: 1238.36 3rd Qu.: 2098.22 3rd Qu.: 715.80 3rd Qu.: 217.88   
## Max. :117445.60 Max. :119888.20 Max. :86837.75 Max. :31704.00   
##   
## invt ivncf ivst lo   
## Min. : 0.00 Min. :-13066.20 Min. : 0.000 Min. : -128.941   
## 1st Qu.: 2.19 1st Qu.: -176.92 1st Qu.: 0.000 1st Qu.: 0.000   
## Median : 37.47 Median : -19.36 Median : 0.000 Median : 5.334   
## Mean : 745.30 Mean : -314.10 Mean : 88.668 Mean : 475.282   
## 3rd Qu.: 464.24 3rd Qu.: -0.24 3rd Qu.: 2.429 3rd Qu.: 203.087   
## Max. :39770.60 Max. : 985.75 Max. :5503.750 Max. :14517.069   
##   
## lse lt ni   
## Min. : 0.00 Min. : 0.02 Min. : -737.537   
## 1st Qu.: 20.64 1st Qu.: 8.05 1st Qu.: -1.661   
## Median : 283.75 Median : 108.02 Median : 6.217   
## Mean : 6489.03 Mean : 3948.06 Mean : 499.241   
## 3rd Qu.: 3172.25 3rd Qu.: 2056.19 3rd Qu.: 125.392   
## Max. :190526.20 Max. :113297.60 Max. :17374.318   
##   
## nopi oancf opeps ppegt   
## Min. :-230.2500 Min. : -61.444 Min. : -9.8200 Min. : 0.00   
## 1st Qu.: 0.0000 1st Qu.: -0.142 1st Qu.: -0.0350 1st Qu.: 5.51   
## Median : 0.1979 Median : 20.797 Median : 0.2971 Median : 146.66   
## Mean : 47.9687 Mean : 696.038 Mean : 3.9977 Mean : 2919.87   
## 3rd Qu.: 4.8163 3rd Qu.: 282.996 3rd Qu.: 1.8725 3rd Qu.: 1576.40   
## Max. :2224.4000 Max. :24599.000 Max. :856.8325 Max. :161869.20   
##   
## re reajo rect recta   
## Min. :-7570.29 Min. :-7860.75 Min. : 0.000 Min. :-19466.259   
## 1st Qu.: -9.35 1st Qu.: -19.79 1st Qu.: 1.636 1st Qu.: -0.169   
## Median : 19.16 Median : 0.00 Median : 28.478 Median : 0.000   
## Mean : 1909.92 Mean : -78.00 Mean : 510.810 Mean : -96.126   
## 3rd Qu.: 441.34 3rd Qu.: 0.00 3rd Qu.: 312.676 3rd Qu.: 0.060   
## Max. :68884.60 Max. : 7171.53 Max. :15020.067 Max. : 1946.250   
##   
## revt siv spi sppiv   
## Min. : 0.0 Min. : 0.000 Min. :-921.2962 Min. :-6191.874   
## 1st Qu.: 22.4 1st Qu.: 0.000 1st Qu.: -15.8642 1st Qu.: -0.046   
## Median : 333.1 Median : 0.000 Median : -0.4417 Median : 0.000   
## Mean : 7618.9 Mean : 56.788 Mean : -35.2648 Mean : -32.516   
## 3rd Qu.: 3826.2 3rd Qu.: 0.512 3rd Qu.: 0.0000 3rd Qu.: 0.007   
## Max. :442511.4 Max. :4366.827 Max. :1115.5000 Max. : 27.017   
##   
## sstk teq tstk tstkn   
## Min. : 0.0000 Min. :-2208.96 Min. : 0.0 Min. : 0.000   
## 1st Qu.: 0.0006 1st Qu.: 4.19 1st Qu.: 0.0 1st Qu.: 0.000   
## Median : 1.2209 Median : 106.70 Median : 0.0 Median : 0.000   
## Mean : 36.8987 Mean : 2524.10 Mean : 889.8 Mean : 27.024   
## 3rd Qu.: 14.5968 3rd Qu.: 1095.88 3rd Qu.: 8.5 3rd Qu.: 1.282   
## Max. :1513.0000 Max. :76602.80 Max. :67539.2 Max. :1923.500   
##   
## txp txr txt wcap   
## Min. : -0.252 Min. : 0.0000 Min. : -76.388 Min. :-8236.800   
## 1st Qu.: 0.000 1st Qu.: 0.0000 1st Qu.: 0.000 1st Qu.: -0.011   
## Median : 0.049 Median : 0.0000 Median : 3.772 Median : 25.438   
## Mean : 44.423 Mean : 11.9381 Mean : 189.846 Mean : 228.503   
## 3rd Qu.: 5.603 3rd Qu.: 0.0758 3rd Qu.: 63.206 3rd Qu.: 279.322   
## Max. :1469.476 Max. :1150.7513 Max. :7749.600 Max. :12261.750   
##   
## xint restmt\_at restmt\_at\_mag restmt\_capx   
## Min. : 0.0000 Min. :0.00000 Min. : -1.4907 Min. :0.00000   
## 1st Qu.: 0.1635 1st Qu.:0.00000 1st Qu.: 0.0000 1st Qu.:0.00000   
## Median : 2.2978 Median :0.00000 Median : 0.0000 Median :0.00000   
## Mean : 95.8065 Mean :0.06322 Mean : 0.5283 Mean :0.02874   
## 3rd Qu.: 66.5683 3rd Qu.:0.00000 3rd Qu.: 0.0000 3rd Qu.:0.00000   
## Max. :2859.7500 Max. :1.00000 Max. :182.4888 Max. :1.00000   
##   
## restmt\_capx\_mag restmt\_cogs restmt\_cogs\_mag restmt\_dltt   
## Min. :-22.71625 Min. :0.0000 Min. : -50.00 Min. :0.00000   
## 1st Qu.: 0.00000 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.00000 Median :0.0000 Median : 0.00 Median :0.00000   
## Mean : -0.06393 Mean :0.3046 Mean : 29.37 Mean :0.01724   
## 3rd Qu.: 0.00000 3rd Qu.:1.0000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. : 8.33350 Max. :1.0000 Max. :9299.36 Max. :1.00000   
##   
## restmt\_dltt\_mag restmt\_epsfi restmt\_epsfi\_mag restmt\_epspi   
## Min. :-26.9567 Min. :0.0000 Min. : -50.05 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.00 1st Qu.:0.0000   
## Median : 0.0000 Median :0.0000 Median : 0.00 Median :0.0000   
## Mean : 0.1794 Mean :0.1293 Mean : 344.76 Mean :0.1351   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.00 3rd Qu.:0.0000   
## Max. :100.9780 Max. :1.0000 Max. :77081.67 Max. :1.0000   
##   
## restmt\_epspi\_mag restmt\_ib restmt\_ib\_mag restmt\_ni   
## Min. : -50.0 Min. :0.0000 Min. :-121.766 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.0 Median :0.0000 Median : 0.000 Median :0.00000   
## Mean : 346.9 Mean :0.1121 Mean : 6.836 Mean :0.04598   
## 3rd Qu.: 0.0 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :77081.7 Max. :1.0000 Max. :2683.890 Max. :1.00000   
##   
## restmt\_ni\_mag restmt\_nopi restmt\_nopi\_mag restmt\_pi   
## Min. : -9.801 Min. :0.0000 Min. :-1868600.0 Min. :0.0000   
## 1st Qu.: 0.000 1st Qu.:0.0000 1st Qu.: -92.7 1st Qu.:0.0000   
## Median : 0.000 Median :1.0000 Median : 0.0 Median :0.0000   
## Mean : 8.153 Mean :0.6322 Mean : -5817.4 Mean :0.0977   
## 3rd Qu.: 0.000 3rd Qu.:1.0000 3rd Qu.: 21.5 3rd Qu.:0.0000   
## Max. :2683.890 Max. :1.0000 Max. : 68865.1 Max. :1.0000   
##   
## restmt\_pi\_mag restmt\_reuna restmt\_reuna\_mag restmt\_seq   
## Min. :-135.28 Min. :0.00000 Min. :-2461.679 Min. :0.00000   
## 1st Qu.: 0.00 1st Qu.:0.00000 1st Qu.: 0.000 1st Qu.:0.00000   
## Median : 0.00 Median :0.00000 Median : 0.000 Median :0.00000   
## Mean : 6.98 Mean :0.07759 Mean : 5.001 Mean :0.09483   
## 3rd Qu.: 0.00 3rd Qu.:0.00000 3rd Qu.: 0.000 3rd Qu.:0.00000   
## Max. :2683.89 Max. :1.00000 Max. : 4181.704 Max. :1.00000   
##   
## restmt\_seq\_mag restmt\_teq restmt\_teq\_mag restmt\_txt   
## Min. : -105.4 Min. :0.00000 Min. : -105.39 Min. :0.00000   
## 1st Qu.: 0.0 1st Qu.:0.00000 1st Qu.: 0.00 1st Qu.:0.00000   
## Median : 0.0 Median :0.00000 Median : 0.00 Median :0.00000   
## Mean : 49.1 Mean :0.08621 Mean : 49.71 Mean :0.07184   
## 3rd Qu.: 0.0 3rd Qu.:0.00000 3rd Qu.: 0.00 3rd Qu.:0.00000   
## Max. :12541.8 Max. :1.00000 Max. :12541.75 Max. :1.00000   
##   
## restmt\_txt\_mag restmt\_wcap restmt\_wcap\_mag restmt\_xint   
## Min. :-88.7704 Min. :0.0000 Min. :-43.249 Min. :0.0000   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0.0000   
## Median : 0.0000 Median :0.0000 Median : 0.000 Median :0.0000   
## Mean : -0.7665 Mean :0.0431 Mean : 1.043 Mean :0.1178   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0.0000   
## Max. : 47.3182 Max. :1.0000 Max. :412.500 Max. :1.0000   
##   
## restmt\_xint\_mag restmt\_xsga restmt\_xsga\_mag restmt\_dvpsp\_f  
## Min. :-62.7347 Min. :0.0000 Min. : -50.000 Min. :0   
## 1st Qu.: 0.0000 1st Qu.:0.0000 1st Qu.: 0.000 1st Qu.:0   
## Median : 0.0000 Median :0.0000 Median : 0.000 Median :0   
## Mean : -0.8803 Mean :0.1552 Mean : 4.984 Mean :0   
## 3rd Qu.: 0.0000 3rd Qu.:0.0000 3rd Qu.: 0.000 3rd Qu.:0   
## Max. : 0.5620 Max. :1.0000 Max. :1884.021 Max. :0   
##   
## restmt\_dvpsp\_f\_mag restmt\_dvpsx\_f restmt\_dvpsx\_f\_mag cshtrd\_m   
## Min. :0 Min. :0 Min. :0 Min. : 0   
## 1st Qu.:0 1st Qu.:0 1st Qu.:0 1st Qu.: 18833   
## Median :0 Median :0 Median :0 Median : 116999   
## Mean :0 Mean :0 Mean :0 Mean : 907451   
## 3rd Qu.:0 3rd Qu.:0 3rd Qu.:0 3rd Qu.: 614817   
## Max. :0 Max. :0 Max. :0 Max. :13129451   
## NA's :15   
## prccd\_m prchd\_m prcld\_m   
## Min. : 0.0018 Min. : 0.0019 Min. : 0.0016   
## 1st Qu.: 1.1706 1st Qu.: 1.3154 1st Qu.: 1.1278   
## Median : 9.0173 Median : 9.2103 Median : 8.8327   
## Mean : 30.6045 Mean : 31.2905 Mean : 29.9726   
## 3rd Qu.: 32.9362 3rd Qu.: 33.1643 3rd Qu.: 32.6779   
## Max. :2217.8253 Max. :2250.8331 Max. :2183.9480   
## NA's :15 NA's :15 NA's :15   
## prcod\_m trfd\_m   
## Min. : 0.0362 Min. : 1.000   
## 1st Qu.: 3.3712 1st Qu.: 1.063   
## Median : 12.3601 Median : 1.225   
## Mean : 36.4436 Mean : 2.668   
## 3rd Qu.: 36.3218 3rd Qu.: 1.856   
## Max. :2217.8208 Max. :218.416   
## NA's :15 NA's :15

nrow(fundamentals\_final\_ds)

## [1] 348

fundamental\_stocks\_data <- fundamentals\_final\_ds[!is.na(fundamentals\_final\_ds$cshtrd\_m) &!is.na(fundamentals\_final\_ds$prccd\_m)  
 &!is.na(fundamentals\_final\_ds$prchd\_m) &!is.na(fundamentals\_final\_ds$prcld\_m)  
 &!is.na(fundamentals\_final\_ds$prcod\_m) &!is.na(fundamentals\_final\_ds$trfd\_m),]

cor\_matrix\_ds <- subset(fundamental\_stocks\_data, select = -c(gvkey,tic))  
cor\_matrix <- cor(cor\_matrix\_ds)  
cor\_matrix %>%  
 as.data.frame() %>%  
 mutate(var1 = rownames(.)) %>%  
 gather(var2, value, -var1) %>%  
 arrange(desc(value)) %>%  
 group\_by(value) %>%  
 filter(row\_number()==1)

## # A tibble: 5,673 x 3  
## # Groups: value [5,673]  
## var1 var2 value  
## <chr> <chr> <dbl>  
## 1 aco aco 1   
## 2 restmt\_epspi\_mag restmt\_epsfi\_mag 1.00   
## 3 restmt\_teq\_mag restmt\_seq\_mag 1.00   
## 4 prchd\_m prccd\_m 1.00   
## 5 prcld\_m prccd\_m 1.00   
## 6 restmt\_pi\_mag restmt\_ib\_mag 0.998  
## 7 prcld\_m prchd\_m 0.998  
## 8 opeps epspi 0.998  
## 9 restmt\_ni\_mag restmt\_ib\_mag 0.998  
## 10 restmt\_xsga\_mag restmt\_ni\_mag 0.997  
## # ... with 5,663 more rows

fundamental\_stocks\_data\_final <- fundamental\_stocks\_data  
#summary(fundamental\_stocks\_data\_final)  
nrow(fundamental\_stocks\_data\_final)

## [1] 333

securities\_init\_ds <- read.csv("./data/Securities\_DS.csv", na.strings=c(""," "))  
names(securities\_init\_ds)[names(securities\_init\_ds) == "ï..gvkey"] <- "gvkey"  
securities\_init\_ds\_1 <- subset(securities\_init\_ds, select = -c(iid,isalrt,primiss,ajexm,  
 spgim,spiim,spmim,cheqvm,curcddvm,dvpsxm,  
 sphcusip,sphiid, sphmid,sphname,sphsec,sphtic,sphvg,sph100,  
 cyear,mkvalincl,exchg,tpci,city,  
 conml,costat,ggroup,gind, gsubind,loc,naics,sic,state, curcdm,   
 navm,adrrm,rawpm,rawxm,cshoq,csfsm,  
 datadate,tic,conm,cmth  
 ))  
  
  
#summary(securities\_init\_ds\_1)

fund\_stock\_securities\_ds <- fundamental\_stocks\_data\_final   
securities\_init\_ds\_2 <- securities\_init\_ds\_1 %>%  
 filter(!is.na(trfm) & !is.na(trt1m)) %>%  
 group\_by(gvkey) %>%  
 summarise(  
 trfm\_m = mean(trfm)  
 )  
  
fund\_stock\_securities\_ds$trfm\_m <- NA  
for (row in 1:nrow(fund\_stock\_securities\_ds)){  
 row\_item\_gvkey <- as.integer(fund\_stock\_securities\_ds[row, "gvkey"])  
 specific\_security <- securities\_init\_ds\_2 %>%  
 filter(gvkey == row\_item\_gvkey)   
 if (nrow(specific\_security) > 0){  
 security\_row <- head(specific\_security, 1)  
 trfm\_m <- as.numeric(security\_row$trfm\_m)   
 fund\_stock\_securities\_ds$trfm\_m[fund\_stock\_securities\_ds$gvkey == row\_item\_gvkey] <- trfm\_m  
 }  
}  
  
  
  
securities\_init\_ds\_3 <- securities\_init\_ds\_1 %>%  
 filter(!is.na(dvrate)) %>%  
 group\_by(gvkey) %>%  
 summarise(  
 dvrate\_m = mean(dvrate)  
 )  
  
fund\_stock\_securities\_ds$dvrate\_m <- NA  
for (row in 1:nrow(fund\_stock\_securities\_ds)){  
 row\_item\_gvkey <- as.integer(fund\_stock\_securities\_ds[row, "gvkey"])  
 specific\_security <- securities\_init\_ds\_3 %>%  
 filter(gvkey == row\_item\_gvkey)   
 if (nrow(specific\_security) > 0){  
 security\_row <- head(specific\_security, 1)  
 dvrate\_m <- as.numeric(security\_row$dvrate\_m)   
 fund\_stock\_securities\_ds$dvrate\_m[fund\_stock\_securities\_ds$gvkey == row\_item\_gvkey] <- dvrate\_m  
 }  
}  
  
  
#summary(fund\_stock\_securities\_ds)

ratings\_init\_ds <- read.csv("./data/Ratings\_DS.csv", na.strings=c("", " "))  
names(ratings\_init\_ds)[names(ratings\_init\_ds) == "ï..gvkey"] <- "gvkey"  
ratings\_init\_ds$datadate <- as.Date(ratings\_init\_ds$datadate, "%m/%d/%Y")  
ratings\_init\_ds$splticrm = factor(ratings\_init\_ds$splticrm, levels=c(levels(ratings\_init\_ds$splticrm), "NR"))  
ratings\_init\_ds$splticrm[is.na(ratings\_init\_ds$splticrm)] = "NR"  
  
ratings\_init\_ds$splticrm\_num\_value <- 0  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "AAA"] <- 100  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "AA"] <- 90  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "AA-"] <- 85  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "A+"] <- 80  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "A"] <- 75  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "A-"] <- 70  
  
  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "BBB+"] <- 65  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "BBB"] <- 60  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "BBB-"] <- 55  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "BB+"] <- 50  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "BB"] <- 45  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "BB-"] <- 40  
  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "B+"] <- 35  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "B"] <- 30  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "B-"] <- 25  
  
  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "CCC+"] <- 20  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "CCC"] <- 19  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "CCC-"] <- 18  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "CC"] <- 17  
  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "D"] <- 10  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "SD"] <- 10  
ratings\_init\_ds$splticrm\_num\_value[ratings\_init\_ds$splticrm == "NR"] <- 0  
ratings\_init\_ds$splticrm\_num\_value <- factor(ratings\_init\_ds$splticrm\_num\_value)  
#levels(ratings\_init\_ds$splticrm)  
#str(ratings\_init\_ds)

fund\_stock\_securities\_rating\_ds <- fund\_stock\_securities\_ds #%>%  
 #filter(gvkey == 1078)  
fund\_stock\_securities\_rating\_ds$sp\_rating <- "NOTRATED"   
rated\_companies <- ratings\_init\_ds %>%  
 filter(splticrm != "NR")  
  
for (row in 1:nrow(fund\_stock\_securities\_rating\_ds)){  
 row\_item\_gvkey <- as.integer(fund\_stock\_securities\_rating\_ds[row, "gvkey"])  
  
 specific\_rating <- rated\_companies %>%  
 filter(gvkey == row\_item\_gvkey) %>%  
 arrange(datadate)  
 if (nrow(specific\_rating) > 0){  
 first\_row <- head(specific\_rating, 1)  
 last\_row <- tail(specific\_rating, 1)  
 start\_value <- as.integer(first\_row$splticrm\_num\_value)  
 end\_value <- as.integer(last\_row$splticrm\_num\_value)  
 if (start\_value == end\_value){  
 fund\_stock\_securities\_rating\_ds$sp\_rating[fund\_stock\_securities\_rating\_ds$gvkey == row\_item\_gvkey] <- "NoCHANGE"  
 }else if (start\_value < end\_value){  
 fund\_stock\_securities\_rating\_ds$sp\_rating[fund\_stock\_securities\_rating\_ds$gvkey == row\_item\_gvkey] <- "INCREASED"  
 }else if (start\_value > end\_value){  
 fund\_stock\_securities\_rating\_ds$sp\_rating[fund\_stock\_securities\_rating\_ds$gvkey == row\_item\_gvkey] <- "DECREASED"  
 }  
 }  
}  
fund\_stock\_securities\_rating\_ds$sp\_rating <- factor(fund\_stock\_securities\_rating\_ds$sp\_rating)  
#summary(fund\_stock\_securities\_rating\_ds)

sca\_fillings\_ds <- read.csv("./data/SCA\_Filings\_and\_Settlements.csv", na.strings=c(""," "))  
sca\_fillings\_ds$SettlementAmount = gsub("\\$", "", sca\_fillings\_ds$SettlementAmount)  
sca\_fillings\_ds$SettlementAmount = as.numeric(gsub("\\,", "", sca\_fillings\_ds$SettlementAmount))  
#summary(sca\_fillings\_ds)

fund\_stock\_securities\_rating\_ds$litigated <- 0  
fund\_stock\_securities\_rating\_ds$litigation\_settlement <- NA  
fund\_stock\_securities\_rating\_ds\_1 <- fund\_stock\_securities\_rating\_ds   
  
for (row in 1:nrow(fund\_stock\_securities\_rating\_ds\_1)){  
 row\_item\_tic <- lapply(fund\_stock\_securities\_rating\_ds\_1[row, "tic"], as.character)  
 row\_item\_gvkey <- as.integer(fund\_stock\_securities\_rating\_ds[row, "gvkey"])  
 specific\_sca\_filings <- sca\_fillings\_ds %>%  
 filter(Ticker == row\_item\_tic)   
 if (nrow(specific\_sca\_filings) > 0){  
 fund\_stock\_securities\_rating\_ds$litigated[fund\_stock\_securities\_rating\_ds$gvkey == row\_item\_gvkey] <- 1  
 specific\_sca\_filings\_max <- specific\_sca\_filings %>%  
 filter(!is.na(SettlementAmount)) %>%  
 arrange(SettlementAmount)  
   
 if (nrow(specific\_sca\_filings\_max) > 0){  
 last\_row <- tail(specific\_sca\_filings\_max, 1)  
 settlement\_amount <- as.numeric(last\_row$SettlementAmount)  
 fund\_stock\_securities\_rating\_ds$litigation\_settlement[fund\_stock\_securities\_rating\_ds$gvkey == row\_item\_gvkey] <- settlement\_amount  
 }  
 }  
}  
fund\_stock\_securities\_rating\_ds$litigated <- as.factor(fund\_stock\_securities\_rating\_ds$litigated)  
#summary(fund\_stock\_securities\_rating\_ds)

#colnames(fund\_stock\_securities\_rating\_ds)

fund\_stock\_securities\_rating\_ds\_final <- subset(fund\_stock\_securities\_rating\_ds, select = -c(aocidergl, aocipen, ceqt, cstkcv, dd1,  
 dpc,icapt, intan, intano, ivncf, ivst,  
 lo, lse, opeps, reajo, recta,  
 spi, tstkn, txp, txr,  
 restmt\_epsfi\_mag, restmt\_epsfi,  
 restmt\_pi, restmt\_pi\_mag,  
 restmt\_seq, restmt\_seq\_mag,  
 restmt\_xsga, restmt\_xsga\_mag,  
 restmt\_dvpsp\_f, restmt\_dvpsp\_f\_mag,   
 restmt\_dvpsx\_f, restmt\_dvpsx\_f\_mag  
 ))  
#summary(fund\_stock\_securities\_rating\_ds\_final)

cor\_matrix\_ds <- subset(fund\_stock\_securities\_rating\_ds\_final, select = -c(gvkey,tic, sp\_rating, litigated))  
cor\_matrix <- cor(cor\_matrix\_ds)  
cor\_matrix %>%  
 as.data.frame() %>%  
 mutate(var1 = rownames(.)) %>%  
 gather(var2, value, -var1) %>%  
 arrange(desc(value)) %>%  
 group\_by(value) %>%  
 filter(row\_number() == 1)

## # A tibble: 3,162 x 3  
## # Groups: value [3,162]  
## var1 var2 value  
## <chr> <chr> <dbl>  
## 1 aco aco 1   
## 2 prchd\_m prccd\_m 1.00   
## 3 prcld\_m prccd\_m 1.00   
## 4 prcld\_m prchd\_m 0.998  
## 5 restmt\_ni\_mag restmt\_ib\_mag 0.998  
## 6 teq ceq 0.996  
## 7 ni ci 0.994  
## 8 oancf ebit 0.988  
## 9 revt cogs 0.988  
## 10 ppegt capx 0.988  
## # ... with 3,152 more rows

# DE ==> Debt to equity ratio

# wc ==> Working capital ratio

# pe ==> Pricing to earning ratio

# ROE ==> Return on Equity

fund\_stock\_securities\_rating\_ds\_final$epspi[fund\_stock\_securities\_rating\_ds\_final$epspi == 0] <- 0.000001  
fund\_stock\_securities\_rating\_ds\_final$lt[fund\_stock\_securities\_rating\_ds\_final$lt == 0] <- 0.000001  
fund\_stock\_securities\_rating\_ds\_final$teq[fund\_stock\_securities\_rating\_ds\_final$teq == 0] <- 0.000001  
fund\_stock\_securities\_rating\_ds\_final$pe\_ratio <- fund\_stock\_securities\_rating\_ds\_final$prccd\_m/fund\_stock\_securities\_rating\_ds\_final$epspi  
fund\_stock\_securities\_rating\_ds\_final$wc\_ratio <- fund\_stock\_securities\_rating\_ds\_final$act/fund\_stock\_securities\_rating\_ds\_final$lt  
fund\_stock\_securities\_rating\_ds\_final$de\_ratio <- fund\_stock\_securities\_rating\_ds\_final$lt/fund\_stock\_securities\_rating\_ds\_final$teq  
fund\_stock\_securities\_rating\_ds\_final$roe\_ratio <- fund\_stock\_securities\_rating\_ds\_final$ni/fund\_stock\_securities\_rating\_ds\_final$teq  
#temp <- subset(fund\_stock\_securities\_rating\_ds\_final, select = c(gvkey,tic, epspi, prccd\_m,pe\_ratio, act, lt,wc\_ratio, teq,de\_ratio, ni, roe\_ratio))  
#head(temp)  
trfm\_median <- median(as.numeric(fund\_stock\_securities\_rating\_ds\_final$trfm\_m),na.rm=TRUE)  
fund\_stock\_securities\_rating\_ds\_final$trfm\_m[is.na(fund\_stock\_securities\_rating\_ds\_final$trfm\_m)] <- trfm\_median

cor\_matrix\_ds <- subset(fund\_stock\_securities\_rating\_ds\_final, select = -c(gvkey,tic, sp\_rating, litigated, prchd\_m, prcld\_m, ni, restmt\_ib\_mag, ceq, oancf, cogs, ppegt,  
 lt, ci, restmt\_dltt\_mag, invt, che, ap, at, xint, gp, act, txt, capx))  
cor\_matrix <- cor(cor\_matrix\_ds)  
cor\_matrix %>%  
 as.data.frame() %>%  
 mutate(var1 = rownames(.)) %>%  
 gather(var2, value, -var1) %>%  
 arrange(desc(value)) %>%  
 group\_by(value) %>%  
 filter(row\_number() == 1)

## # A tibble: 2,082 x 3  
## # Groups: value [2,082]  
## var1 var2 value  
## <chr> <chr> <dbl>  
## 1 aco aco 1   
## 2 prccd\_m epspi 0.945  
## 3 ebit dvt 0.945  
## 4 restmt\_teq\_mag restmt\_ni\_mag 0.934  
## 5 revt dpact 0.898  
## 6 sppiv acominc 0.896  
## 7 teq ebit 0.892  
## 8 ebit dltt 0.892  
## 9 teq dpact 0.880  
## 10 teq ao 0.879  
## # ... with 2,072 more rows

fund\_stock\_securities\_rating\_ds\_final\_10 <- subset(fund\_stock\_securities\_rating\_ds\_final, select = -c(prchd\_m, prcld\_m, ni, restmt\_ib\_mag,   
 ceq, oancf, cogs, ppegt,  
 lt, ci, restmt\_dltt\_mag, invt, che,   
 ap, at, xint, gp, act, txt, capx))  
#nrow(fund\_stock\_securities\_rating\_ds\_final)  
#summary(fund\_stock\_securities\_rating\_ds\_final)

ds\_final <- fund\_stock\_securities\_rating\_ds\_final\_10  
ds\_final <- subset(ds\_final, select = -c(dvrate\_m, litigation\_settlement))  
ds\_final$restmt\_at <- as.factor(ds\_final$restmt\_at)  
ds\_final$restmt\_capx <- as.factor(ds\_final$restmt\_capx)  
ds\_final$restmt\_cogs <- as.factor(ds\_final$restmt\_cogs)  
ds\_final$restmt\_dltt <- as.factor(ds\_final$restmt\_dltt)  
ds\_final$restmt\_epspi <- as.factor(ds\_final$restmt\_epspi)  
ds\_final$restmt\_ib <- as.factor(ds\_final$restmt\_ib)  
ds\_final$restmt\_ni <- as.factor(ds\_final$restmt\_ni)  
ds\_final$restmt\_nopi <- as.factor(ds\_final$restmt\_nopi)  
ds\_final$restmt\_reuna <- as.factor(ds\_final$restmt\_reuna)  
ds\_final$restmt\_teq <- as.factor(ds\_final$restmt\_teq)  
ds\_final$restmt\_txt <- as.factor(ds\_final$restmt\_txt)  
ds\_final$restmt\_wcap <- as.factor(ds\_final$restmt\_wcap)  
ds\_final$restmt\_xint <- as.factor(ds\_final$restmt\_xint)  
ds\_final$sp\_rating <- as.factor(ds\_final$sp\_rating)  
ds\_final$litigated <- as.factor(ds\_final$litigated)  
#summary(ds\_final)

# split the data into training and (held-out) test sets  
training\_ind <- createDataPartition(ds\_final$litigated,  
p = 0.75,  
list = FALSE,  
times = 1)  
training\_set <- ds\_final[training\_ind, ]  
test\_set <- ds\_final[-training\_ind, ]  
  
nrow(training\_set)

## [1] 250

nrow(test\_set)

## [1] 83

threshold <- 250  
#head(training\_set$litigated)  
  
threshold <- 250  
target\_enc\_train <- function(variable, level) {  
 training\_set$litigated <- as.numeric(as.vector(training\_set$litigated))  
 train\_avg\_target <- colMeans(training\_set[, "litigated"])  
 if (nrow(training\_set[training\_set[, variable]==level, ])==0) {  
 return(train\_avg\_target)  
 } else {  
 level\_num\_obs <- nrow(training\_set[training\_set[, variable]==level,])  
 level\_avg\_target <- colMeans(training\_set[training\_set[, variable]==level, "litigated"])  
 return((level\_num\_obs\*level\_avg\_target+threshold\*train\_avg\_target)/(level\_num\_obs+threshold))  
 }  
}  
  
sp\_rating\_target <- mapply(target\_enc\_train, variable = "sp\_rating", level = levels(training\_set$sp\_rating), USE.NAMES = FALSE)  
names(sp\_rating\_target) <- levels(training\_set$sp\_rating)  
training\_set$sp\_rating\_target <- 0  
for (level in levels(training\_set$sp\_rating)) {  
 training\_set[training\_set[, "sp\_rating"]==level, "sp\_rating\_target"] <- sp\_rating\_target[level]  
}  
  
test\_set$sp\_rating\_target <- 0  
for (level in levels(training\_set$sp\_rating)) {  
 test\_set[test\_set[, "sp\_rating"]==level, "sp\_rating\_target"] <- sp\_rating\_target[level]  
}  
  
  
restmt\_at\_target <- mapply(target\_enc\_train, variable = "restmt\_at", level = levels(training\_set$restmt\_at), USE.NAMES = FALSE)  
names(restmt\_at\_target) <- levels(training\_set$restmt\_at)  
training\_set$restmt\_at\_target <- 0  
for (level in levels(training\_set$restmt\_at)) {  
 training\_set[training\_set[, "restmt\_at"]==level, "restmt\_at\_target"] <- restmt\_at\_target[level]  
}  
  
test\_set$restmt\_at\_target <- 0  
for (level in levels(training\_set$restmt\_at)) {  
 test\_set[test\_set[, "restmt\_at"]==level, "restmt\_at\_target"] <- restmt\_at\_target[level]  
}  
  
restmt\_capx\_target <- mapply(target\_enc\_train, variable = "restmt\_capx", level = levels(training\_set$restmt\_capx), USE.NAMES = FALSE)  
names(restmt\_capx\_target) <- levels(training\_set$restmt\_capx)  
training\_set$restmt\_capx\_target <- 0  
for (level in levels(training\_set$restmt\_capx)) {  
 training\_set[training\_set[, "restmt\_capx"]==level, "restmt\_capx\_target"] <- restmt\_capx\_target[level]  
}  
  
test\_set$restmt\_capx\_target <- 0  
for (level in levels(training\_set$restmt\_capx)) {  
 test\_set[test\_set[, "restmt\_capx"]==level, "restmt\_capx\_target"] <- restmt\_capx\_target[level]  
}  
  
restmt\_cogs\_target <- mapply(target\_enc\_train, variable = "restmt\_cogs", level = levels(training\_set$restmt\_cogs), USE.NAMES = FALSE)  
names(restmt\_cogs\_target) <- levels(training\_set$restmt\_cogs)  
training\_set$restmt\_cogs\_target <- 0  
for (level in levels(training\_set$restmt\_cogs)) {  
 training\_set[training\_set[, "restmt\_cogs"]==level, "restmt\_cogs\_target"] <- restmt\_cogs\_target[level]  
}  
  
test\_set$restmt\_cogs\_target <- 0  
for (level in levels(training\_set$restmt\_cogs)) {  
 test\_set[test\_set[, "restmt\_cogs"]==level, "restmt\_cogs\_target"] <- restmt\_cogs\_target[level]  
}  
  
restmt\_dltt\_target <- mapply(target\_enc\_train, variable = "restmt\_dltt", level = levels(training\_set$restmt\_dltt), USE.NAMES = FALSE)  
names(restmt\_dltt\_target) <- levels(training\_set$restmt\_dltt)  
training\_set$restmt\_dltt\_target <- 0  
for (level in levels(training\_set$restmt\_dltt)) {  
 training\_set[training\_set[, "restmt\_dltt"]==level, "restmt\_dltt\_target"] <- restmt\_dltt\_target[level]  
}  
  
test\_set$restmt\_dltt\_target <- 0  
for (level in levels(training\_set$restmt\_dltt)) {  
 test\_set[test\_set[, "restmt\_dltt"]==level, "restmt\_dltt\_target"] <- restmt\_dltt\_target[level]  
}  
  
restmt\_epspi\_target <- mapply(target\_enc\_train, variable = "restmt\_epspi", level = levels(training\_set$restmt\_epspi), USE.NAMES = FALSE)  
names(restmt\_epspi\_target) <- levels(training\_set$restmt\_epspi)  
training\_set$restmt\_epspi\_target <- 0  
for (level in levels(training\_set$restmt\_epspi)) {  
 training\_set[training\_set[, "restmt\_epspi"]==level, "restmt\_epspi\_target"] <- restmt\_epspi\_target[level]  
}  
  
test\_set$restmt\_epspi\_target <- 0  
for (level in levels(training\_set$restmt\_epspi)) {  
 test\_set[test\_set[, "restmt\_epspi"]==level, "restmt\_epspi\_target"] <- restmt\_epspi\_target[level]  
}  
  
restmt\_ib\_target <- mapply(target\_enc\_train, variable = "restmt\_ib", level = levels(training\_set$restmt\_ib), USE.NAMES = FALSE)  
names(restmt\_ib\_target) <- levels(training\_set$restmt\_ib)  
training\_set$restmt\_ib\_target <- 0  
for (level in levels(training\_set$restmt\_ib)) {  
 training\_set[training\_set[, "restmt\_ib"]==level, "restmt\_ib\_target"] <- restmt\_ib\_target[level]  
}  
  
test\_set$restmt\_ib\_target <- 0  
for (level in levels(training\_set$restmt\_ib)) {  
 test\_set[test\_set[, "restmt\_ib"]==level, "restmt\_ib\_target"] <- restmt\_ib\_target[level]  
}  
  
  
restmt\_ni\_target <- mapply(target\_enc\_train, variable = "restmt\_ni", level = levels(training\_set$restmt\_ni), USE.NAMES = FALSE)  
names(restmt\_ni\_target) <- levels(training\_set$restmt\_ni)  
training\_set$restmt\_ni\_target <- 0  
for (level in levels(training\_set$restmt\_ni)) {  
 training\_set[training\_set[, "restmt\_ni"]==level, "restmt\_ni\_target"] <- restmt\_ni\_target[level]  
}  
  
test\_set$restmt\_ni\_target <- 0  
for (level in levels(training\_set$restmt\_ni)) {  
 test\_set[test\_set[, "restmt\_ni"]==level, "restmt\_ni\_target"] <- restmt\_ni\_target[level]  
}  
  
restmt\_nopi\_target <- mapply(target\_enc\_train, variable = "restmt\_nopi", level = levels(training\_set$restmt\_nopi), USE.NAMES = FALSE)  
names(restmt\_nopi\_target) <- levels(training\_set$restmt\_nopi)  
training\_set$restmt\_nopi\_target <- 0  
for (level in levels(training\_set$restmt\_nopi)) {  
 training\_set[training\_set[, "restmt\_nopi"]==level, "restmt\_nopi\_target"] <- restmt\_nopi\_target[level]  
}  
  
test\_set$restmt\_nopi\_target <- 0  
for (level in levels(training\_set$restmt\_nopi)) {  
 test\_set[test\_set[, "restmt\_nopi"]==level, "restmt\_nopi\_target"] <- restmt\_nopi\_target[level]  
}  
  
  
restmt\_reuna\_target <- mapply(target\_enc\_train, variable = "restmt\_reuna", level = levels(training\_set$restmt\_reuna), USE.NAMES = FALSE)  
names(restmt\_reuna\_target) <- levels(training\_set$restmt\_reuna)  
training\_set$restmt\_reuna\_target <- 0  
for (level in levels(training\_set$restmt\_reuna)) {  
 training\_set[training\_set[, "restmt\_reuna"]==level, "restmt\_reuna\_target"] <- restmt\_reuna\_target[level]  
}  
  
test\_set$restmt\_reuna\_target <- 0  
for (level in levels(training\_set$restmt\_reuna)) {  
 test\_set[test\_set[, "restmt\_reuna"]==level, "restmt\_reuna\_target"] <- restmt\_reuna\_target[level]  
}  
  
restmt\_teq\_target <- mapply(target\_enc\_train, variable = "restmt\_teq", level = levels(training\_set$restmt\_teq), USE.NAMES = FALSE)  
names(restmt\_teq\_target) <- levels(training\_set$restmt\_teq)  
training\_set$restmt\_teq\_target <- 0  
for (level in levels(training\_set$restmt\_teq)) {  
 training\_set[training\_set[, "restmt\_teq"]==level, "restmt\_teq\_target"] <- restmt\_teq\_target[level]  
}  
  
test\_set$restmt\_teq\_target <- 0  
for (level in levels(training\_set$restmt\_teq)) {  
 test\_set[test\_set[, "restmt\_teq"]==level, "restmt\_teq\_target"] <- restmt\_teq\_target[level]  
}  
  
restmt\_txt\_target <- mapply(target\_enc\_train, variable = "restmt\_txt", level = levels(training\_set$restmt\_txt), USE.NAMES = FALSE)  
names(restmt\_txt\_target) <- levels(training\_set$restmt\_txt)  
training\_set$restmt\_txt\_target <- 0  
for (level in levels(training\_set$restmt\_txt)) {  
 training\_set[training\_set[, "restmt\_txt"]==level, "restmt\_txt\_target"] <- restmt\_txt\_target[level]  
}  
  
test\_set$restmt\_txt\_target <- 0  
for (level in levels(training\_set$restmt\_txt)) {  
 test\_set[test\_set[, "restmt\_txt"]==level, "restmt\_txt\_target"] <- restmt\_txt\_target[level]  
}  
  
restmt\_wcap\_target <- mapply(target\_enc\_train, variable = "restmt\_wcap", level = levels(training\_set$restmt\_wcap), USE.NAMES = FALSE)  
names(restmt\_wcap\_target) <- levels(training\_set$restmt\_wcap)  
training\_set$restmt\_wcap\_target <- 0  
for (level in levels(training\_set$restmt\_wcap)) {  
 training\_set[training\_set[, "restmt\_wcap"]==level, "restmt\_wcap\_target"] <- restmt\_wcap\_target[level]  
}  
  
test\_set$restmt\_wcap\_target <- 0  
for (level in levels(training\_set$restmt\_wcap)) {  
 test\_set[test\_set[, "restmt\_wcap"]==level, "restmt\_wcap\_target"] <- restmt\_wcap\_target[level]  
}  
  
restmt\_xint\_target <- mapply(target\_enc\_train, variable = "restmt\_xint", level = levels(training\_set$restmt\_xint), USE.NAMES = FALSE)  
names(restmt\_xint\_target) <- levels(training\_set$restmt\_xint)  
training\_set$restmt\_xint\_target <- 0  
for (level in levels(training\_set$restmt\_xint)) {  
 training\_set[training\_set[, "restmt\_xint"]==level, "restmt\_xint\_target"] <- restmt\_xint\_target[level]  
}  
  
test\_set$restmt\_xint\_target <- 0  
for (level in levels(training\_set$restmt\_xint)) {  
 test\_set[test\_set[, "restmt\_xint"]==level, "restmt\_xint\_target"] <- restmt\_xint\_target[level]  
}

training\_subset\_ds\_final\_1 <- subset(training\_set, select = -c(gvkey,tic, sp\_rating,  
 restmt\_at,  
 restmt\_capx,  
 restmt\_cogs,  
 restmt\_dltt,  
 restmt\_epspi,  
 restmt\_ib,  
 restmt\_ni,  
 restmt\_nopi,  
 restmt\_reuna,  
 restmt\_teq,  
 restmt\_txt,  
 restmt\_wcap,  
 restmt\_xint))  
  
  
test\_subset\_ds\_final\_1 <- subset(test\_set, select = -c(gvkey,tic, sp\_rating,  
 restmt\_at,  
 restmt\_capx,  
 restmt\_cogs,  
 restmt\_dltt,  
 restmt\_epspi,  
 restmt\_ib,  
 restmt\_ni,  
 restmt\_nopi,  
 restmt\_reuna,  
 restmt\_teq,  
 restmt\_txt,  
 restmt\_wcap,  
 restmt\_xint))  
  
  
  
  
  
training\_subset\_ds\_final\_1 <- training\_subset\_ds\_final\_1 %>%  
 relocate(litigated, .after = last\_col())  
  
test\_subset\_ds\_final\_1 <- test\_subset\_ds\_final\_1 %>%  
 relocate(litigated, .after = last\_col())  
  
  
  
training\_subset\_ds\_final <- training\_subset\_ds\_final\_1  
test\_subset\_ds\_final <- test\_subset\_ds\_final\_1  
  
  
ncol(training\_subset\_ds\_final)

## [1] 67

summary(training\_subset\_ds\_final)

## aco acominc ao aoloch   
## Min. : 0.000 Min. :-19306.57 Min. : 0.000 Min. :-465.250   
## 1st Qu.: 0.354 1st Qu.: -27.16 1st Qu.: 0.081 1st Qu.: -1.718   
## Median : 8.418 Median : 0.00 Median : 7.787 Median : 0.000   
## Mean : 175.533 Mean : -186.69 Mean : 180.074 Mean : 4.847   
## 3rd Qu.: 93.621 3rd Qu.: 0.00 3rd Qu.: 94.202 3rd Qu.: 1.499   
## Max. :4706.135 Max. : 3495.34 Max. :5132.600 Max. : 655.000   
## aqc bkvlps caps ch   
## Min. : -12.45 Min. : -82.3 Min. : -701.475 Min. : 0.000   
## 1st Qu.: 0.00 1st Qu.: 0.1 1st Qu.: 6.589 1st Qu.: 1.211   
## Median : 0.00 Median : 3.6 Median : 43.450 Median : 18.311   
## Mean : 97.38 Mean : 8306.8 Mean : 720.357 Mean : 362.988   
## 3rd Qu.: 14.22 3rd Qu.: 12.6 3rd Qu.: 466.961 3rd Qu.: 204.962   
## Max. :5559.02 Max. :1216746.9 Max. :28658.250 Max. :7382.800   
## chech cshi cstk dlc   
## Min. :-305.7500 Min. : 0.583 Min. : 0.000 Min. : 0.000   
## 1st Qu.: -0.1546 1st Qu.: 19.236 1st Qu.: 0.036 1st Qu.: 0.272   
## Median : 0.4164 Median : 53.045 Median : 0.274 Median : 4.258   
## Mean : 39.4348 Mean : 266.290 Mean : 196.281 Mean : 310.500   
## 3rd Qu.: 10.6056 3rd Qu.: 147.925 3rd Qu.: 14.294 3rd Qu.: 101.126   
## Max. :1358.0000 Max. :6253.511 Max. :7290.750 Max. :15926.126   
## dltt dm dn dpact   
## Min. : 0.00 Min. : 0.000 Min. : 0.0 Min. : 0.00   
## 1st Qu.: 0.03 1st Qu.: 0.000 1st Qu.: 0.0 1st Qu.: 1.61   
## Median : 15.04 Median : 0.858 Median : 0.0 Median : 49.26   
## Mean : 1310.28 Mean : 149.908 Mean : 806.0 Mean : 1324.61   
## 3rd Qu.: 939.51 3rd Qu.: 50.067 3rd Qu.: 221.6 3rd Qu.: 763.33   
## Max. :42659.60 Max. :3900.400 Max. :42561.8 Max. :50449.80   
## dvt ebit epspi fiao   
## Min. : -0.006 Min. : -208.760 Min. :-14.0200 Min. :-3427.000   
## 1st Qu.: 0.000 1st Qu.: -0.344 1st Qu.: -0.0550 1st Qu.: -8.555   
## Median : 0.000 Median : 20.195 Median : 0.2442 Median : -0.025   
## Mean : 203.193 Mean : 700.909 Mean : 1.7342 Mean : -58.691   
## 3rd Qu.: 47.886 3rd Qu.: 351.478 3rd Qu.: 1.8613 3rd Qu.: 0.000   
## Max. :6572.535 Max. :24345.400 Max. :230.7025 Max. : 368.763   
## fincf fopo nopi   
## Min. :-11533.200 Min. :-378.5000 Min. : -38.5478   
## 1st Qu.: -54.344 1st Qu.: 0.1247 1st Qu.: -0.0012   
## Median : 0.001 Median : 1.8394 Median : 0.1845   
## Mean : -304.950 Mean : 80.2920 Mean : 43.2791   
## 3rd Qu.: 3.729 3rd Qu.: 23.0699 3rd Qu.: 4.7685   
## Max. : 824.184 Max. :1979.4552 Max. :2224.4000   
## re rect revt siv   
## Min. :-7570.29 Min. : 0.00 Min. : 0.0 Min. : 0.0000   
## 1st Qu.: -11.13 1st Qu.: 1.48 1st Qu.: 16.1 1st Qu.: 0.0000   
## Median : 18.93 Median : 24.00 Median : 311.6 Median : 0.0000   
## Mean : 1700.90 Mean : 498.48 Mean : 7926.1 Mean : 34.0780   
## 3rd Qu.: 428.38 3rd Qu.: 335.30 3rd Qu.: 3845.0 3rd Qu.: 0.4626   
## Max. :68884.60 Max. :15020.07 Max. :442511.4 Max. :1622.0000   
## sppiv sstk teq tstk   
## Min. :-6191.874 Min. : 0.0000 Min. :-2208.96 Min. : 0.000   
## 1st Qu.: -0.051 1st Qu.: 0.0014 1st Qu.: 3.49 1st Qu.: 0.000   
## Median : 0.000 Median : 1.0247 Median : 103.41 Median : 0.000   
## Mean : -34.579 Mean : 37.2116 Mean : 2445.19 Mean : 589.285   
## 3rd Qu.: 0.003 3rd Qu.: 13.1662 3rd Qu.: 1124.14 3rd Qu.: 8.367   
## Max. : 27.017 Max. :1057.0000 Max. :76602.80 Max. :25036.250   
## wcap restmt\_at\_mag restmt\_capx\_mag restmt\_cogs\_mag   
## Min. :-8236.800 Min. :-1.011750 Min. :-22.7162 Min. :-50.0000   
## 1st Qu.: -0.011 1st Qu.: 0.000000 1st Qu.: 0.0000 1st Qu.: 0.0000   
## Median : 23.347 Median : 0.000000 Median : 0.0000 Median : 0.0000   
## Mean : 266.289 Mean : 0.001964 Mean : -0.1053 Mean : 0.4418   
## 3rd Qu.: 297.249 3rd Qu.: 0.000000 3rd Qu.: 0.0000 3rd Qu.: 0.0000   
## Max. :12261.750 Max. : 1.275750 Max. : 8.3335 Max. :100.0000   
## restmt\_epspi\_mag restmt\_ni\_mag restmt\_nopi\_mag restmt\_reuna\_mag   
## Min. : -50.0 Min. : -6.611 Min. :-1868600.0 Min. : -85.20   
## 1st Qu.: 0.0 1st Qu.: 0.000 1st Qu.: -78.6 1st Qu.: 0.00   
## Median : 0.0 Median : 0.000 Median : 0.0 Median : 0.00   
## Mean : 422.8 Mean : 10.733 Mean : -7953.8 Mean : 16.89   
## 3rd Qu.: 0.0 3rd Qu.: 0.000 3rd Qu.: 14.5 3rd Qu.: 0.00   
## Max. :77081.7 Max. :2683.890 Max. : 68865.1 Max. :4181.70   
## restmt\_teq\_mag restmt\_txt\_mag restmt\_wcap\_mag restmt\_xint\_mag   
## Min. : -105.39 Min. :-88.7704 Min. : -3.149 Min. :-62.735   
## 1st Qu.: 0.00 1st Qu.: 0.0000 1st Qu.: 0.000 1st Qu.: 0.000   
## Median : 0.00 Median : 0.0000 Median : 0.000 Median : 0.000   
## Mean : 49.55 Mean : -0.9757 Mean : 1.635 Mean : -1.039   
## 3rd Qu.: 0.00 3rd Qu.: 0.0000 3rd Qu.: 0.000 3rd Qu.: 0.000   
## Max. :12541.75 Max. : 17.8622 Max. :412.500 Max. : 0.562   
## cshtrd\_m prccd\_m prcod\_m trfd\_m   
## Min. : 0 Min. : 0.0018 Min. : 0.0362 Min. : 1.000   
## 1st Qu.: 18102 1st Qu.: 1.1236 1st Qu.: 3.2153 1st Qu.: 1.063   
## Median : 113102 Median : 8.7208 Median : 11.3416 Median : 1.231   
## Mean : 871492 Mean : 32.5869 Mean : 40.3436 Mean : 3.013   
## 3rd Qu.: 614661 3rd Qu.: 30.9156 3rd Qu.: 34.9277 3rd Qu.: 1.844   
## Max. :13129451 Max. :2217.8253 Max. :2217.8208 Max. :218.416   
## trfm\_m pe\_ratio wc\_ratio de\_ratio   
## Min. : 1.000 Min. : -1220 Min. : 0.0000 Min. :-60.4827   
## 1st Qu.: 1.000 1st Qu.: -5 1st Qu.: 0.3720 1st Qu.: 0.2062   
## Median : 1.000 Median : 12 Median : 0.7177 Median : 0.7397   
## Mean : 2.015 Mean : 502470 Mean : 1.2751 Mean : 0.8107   
## 3rd Qu.: 1.494 3rd Qu.: 22 3rd Qu.: 1.3550 3rd Qu.: 1.4753   
## Max. :34.527 Max. :76903023 Max. :12.4471 Max. : 80.2000   
## roe\_ratio sp\_rating\_target restmt\_at\_target restmt\_capx\_target  
## Min. :-192.20000 Min. :0.1226 Min. :0.1278 Min. :0.1341   
## 1st Qu.: 0.00089 1st Qu.:0.1226 1st Qu.:0.1278 1st Qu.:0.1341   
## Median : 0.11124 Median :0.1226 Median :0.1278 Median :0.1341   
## Mean : -0.67740 Mean :0.1292 Mean :0.1292 Mean :0.1343   
## 3rd Qu.: 0.25495 3rd Qu.:0.1343 3rd Qu.:0.1278 3rd Qu.:0.1341   
## Max. : 10.15006 Max. :0.1483 Max. :0.1509 Max. :0.1395   
## restmt\_cogs\_target restmt\_dltt\_target restmt\_epspi\_target restmt\_ib\_target  
## Min. :0.1311 Min. :0.1354 Min. :0.1258 Min. :0.1250   
## 1st Qu.:0.1311 1st Qu.:0.1354 1st Qu.:0.1258 1st Qu.:0.1250   
## Median :0.1311 Median :0.1354 Median :0.1258 Median :0.1250   
## Mean :0.1344 Mean :0.1354 Mean :0.1292 Mean :0.1283   
## 3rd Qu.:0.1424 3rd Qu.:0.1354 3rd Qu.:0.1258 3rd Qu.:0.1250   
## Max. :0.1424 Max. :0.1373 Max. :0.1530 Max. :0.1547   
## restmt\_ni\_target restmt\_nopi\_target restmt\_reuna\_target restmt\_teq\_target  
## Min. :0.1263 Min. :0.1279 Min. :0.1286 Min. :0.1273   
## 1st Qu.:0.1263 1st Qu.:0.1279 1st Qu.:0.1286 1st Qu.:0.1273   
## Median :0.1263 Median :0.1429 Median :0.1286 Median :0.1273   
## Mean :0.1273 Mean :0.1372 Mean :0.1301 Mean :0.1294   
## 3rd Qu.:0.1263 3rd Qu.:0.1429 3rd Qu.:0.1286 3rd Qu.:0.1273   
## Max. :0.1544 Max. :0.1429 Max. :0.1493 Max. :0.1513   
## restmt\_txt\_target restmt\_wcap\_target restmt\_xint\_target litigated  
## Min. :0.1266 Min. :0.1324 Min. :0.1303 0:216   
## 1st Qu.:0.1266 1st Qu.:0.1324 1st Qu.:0.1303 1: 34   
## Median :0.1266 Median :0.1324 Median :0.1303   
## Mean :0.1285 Mean :0.1328 Mean :0.1323   
## 3rd Qu.:0.1266 3rd Qu.:0.1324 3rd Qu.:0.1303   
## Max. :0.1530 Max. :0.1429 Max. :0.1454

num\_var\_start\_index <- 1  
num\_var\_end\_index <- ncol(training\_subset\_ds\_final) - 1  
target\_var\_index <- ncol(training\_subset\_ds\_final)  
  
num\_var\_start\_index

## [1] 1

num\_var\_end\_index

## [1] 66

target\_var\_index

## [1] 67

test\_subset\_ds\_final[, num\_var\_start\_index:num\_var\_end\_index] <- scale(test\_subset\_ds\_final[, num\_var\_start\_index:num\_var\_end\_index],   
 center = apply(training\_subset\_ds\_final[, num\_var\_start\_index:num\_var\_end\_index], 2, mean),   
 scale = apply(training\_subset\_ds\_final[, num\_var\_start\_index:num\_var\_end\_index], 2, sd))  
training\_subset\_ds\_final[, num\_var\_start\_index:num\_var\_end\_index] <- scale(training\_subset\_ds\_final[, num\_var\_start\_index:num\_var\_end\_index])  
levels(training\_subset\_ds\_final$litigated)[levels(training\_subset\_ds\_final$litigated) == 1] <- "Yes"  
levels(training\_subset\_ds\_final$litigated)[levels(training\_subset\_ds\_final$litigated) == 0] <- "No"  
summary(training\_subset\_ds\_final)

## aco acominc ao aoloch   
## Min. :-0.3300 Min. :-14.4762 Min. :-0.3699 Min. :-4.75393   
## 1st Qu.:-0.3294 1st Qu.: 0.1208 1st Qu.:-0.3698 1st Qu.:-0.06639   
## Median :-0.3142 Median : 0.1413 Median :-0.3539 Median :-0.04901   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.00000   
## 3rd Qu.:-0.1540 3rd Qu.: 0.1413 3rd Qu.:-0.1764 3rd Qu.:-0.03386   
## Max. : 8.5182 Max. : 2.7878 Max. :10.1746 Max. : 6.57477   
## aqc bkvlps caps ch   
## Min. :-0.2704 Min. :-0.08967 Min. :-0.6157 Min. :-0.3744   
## 1st Qu.:-0.2398 1st Qu.:-0.08879 1st Qu.:-0.3091 1st Qu.:-0.3732   
## Median :-0.2398 Median :-0.08875 Median :-0.2931 Median :-0.3555   
## Mean : 0.0000 Mean : 0.00000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.:-0.2047 3rd Qu.:-0.08865 3rd Qu.:-0.1097 3rd Qu.:-0.1630   
## Max. :13.4481 Max. :12.91671 Max. :12.0989 Max. : 7.2411   
## chech cshi cstk dlc   
## Min. :-2.2327 Min. :-0.3969 Min. :-0.2394 Min. :-0.2438   
## 1st Qu.:-0.2561 1st Qu.:-0.3691 1st Qu.:-0.2393 1st Qu.:-0.2435   
## Median :-0.2524 Median :-0.3185 Median :-0.2390 Median :-0.2404   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.:-0.1865 3rd Qu.:-0.1768 3rd Qu.:-0.2219 3rd Qu.:-0.1644   
## Max. : 8.5286 Max. : 8.9438 Max. : 8.6522 Max. :12.2588   
## dltt dm dn dpact   
## Min. :-0.34979 Min. :-0.3245 Min. :-0.2358 Min. :-0.3115   
## 1st Qu.:-0.34978 1st Qu.:-0.3245 1st Qu.:-0.2358 1st Qu.:-0.3111   
## Median :-0.34578 Median :-0.3226 Median :-0.2358 Median :-0.2999   
## Mean : 0.00000 Mean : 0.0000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.:-0.09898 3rd Qu.:-0.2161 3rd Qu.:-0.1710 3rd Qu.:-0.1320   
## Max. :11.03852 Max. : 8.1174 Max. :12.2173 Max. :11.5514   
## dvt ebit epspi fiao   
## Min. :-0.2891 Min. :-0.4083 Min. :-1.073529 Min. :-11.8223   
## 1st Qu.:-0.2891 1st Qu.:-0.3148 1st Qu.:-0.121922 1st Qu.: 0.1760   
## Median :-0.2891 Median :-0.3055 Median :-0.101530 Median : 0.2059   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.000000 Mean : 0.0000   
## 3rd Qu.:-0.2210 3rd Qu.:-0.1568 3rd Qu.: 0.008656 3rd Qu.: 0.2060   
## Max. : 9.0634 Max. :10.6127 Max. :15.602429 Max. : 1.5003   
## fincf fopo nopi re   
## Min. :-9.1497 Min. :-1.6655 Min. :-0.4232 Min. :-1.5004   
## 1st Qu.: 0.2042 1st Qu.:-0.2910 1st Qu.:-0.2238 1st Qu.:-0.2771   
## Median : 0.2485 Median :-0.2848 Median :-0.2229 Median :-0.2722   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.: 0.2515 3rd Qu.:-0.2077 3rd Qu.:-0.1992 3rd Qu.:-0.2059   
## Max. : 0.9201 Max. : 6.8942 Max. :11.2794 Max. :10.8724   
## rect revt siv sppiv   
## Min. :-0.3543 Min. :-0.2502 Min. :-0.2109 Min. :-15.54002   
## 1st Qu.:-0.3533 1st Qu.:-0.2497 1st Qu.:-0.2109 1st Qu.: 0.08714   
## Median :-0.3373 Median :-0.2404 Median :-0.2109 Median : 0.08727   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.00000   
## 3rd Qu.:-0.1160 3rd Qu.:-0.1288 3rd Qu.:-0.2080 3rd Qu.: 0.08728   
## Max. :10.3218 Max. :13.7205 Max. : 9.8269 Max. : 0.15546   
## sstk teq tstk wcap   
## Min. :-0.3277 Min. :-0.5989 Min. :-0.2345 Min. :-6.65259   
## 1st Qu.:-0.3277 1st Qu.:-0.3142 1st Qu.:-0.2345 1st Qu.:-0.20835   
## Median :-0.3187 Median :-0.3013 Median :-0.2345 Median :-0.19007   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.00000   
## 3rd Qu.:-0.2117 3rd Qu.:-0.1700 3rd Qu.:-0.2312 3rd Qu.: 0.02422   
## Max. : 8.9801 Max. : 9.5425 Max. : 9.7295 Max. : 9.38493   
## restmt\_at\_mag restmt\_capx\_mag restmt\_cogs\_mag restmt\_epspi\_mag   
## Min. :-7.81318 Min. :-13.71602 Min. :-4.26046 Min. :-0.09321   
## 1st Qu.:-0.01514 1st Qu.: 0.06387 1st Qu.:-0.03732 1st Qu.:-0.08335   
## Median :-0.01514 Median : 0.06387 Median :-0.03732 Median :-0.08335   
## Mean : 0.00000 Mean : 0.00000 Mean : 0.00000 Mean : 0.00000   
## 3rd Qu.:-0.01514 3rd Qu.: 0.06387 3rd Qu.:-0.03732 3rd Qu.:-0.08335   
## Max. : 9.81768 Max. : 5.11904 Max. : 8.40895 Max. :15.11354   
## restmt\_ni\_mag restmt\_nopi\_mag restmt\_reuna\_mag restmt\_teq\_mag   
## Min. :-0.10218 Min. :-15.70772 Min. :-0.38575 Min. :-0.19531   
## 1st Qu.:-0.06323 1st Qu.: 0.06648 1st Qu.:-0.06382 1st Qu.:-0.06246   
## Median :-0.06323 Median : 0.06715 Median :-0.06382 Median :-0.06246   
## Mean : 0.00000 Mean : 0.00000 Mean : 0.00000 Mean : 0.00000   
## 3rd Qu.:-0.06323 3rd Qu.: 0.06727 3rd Qu.:-0.06382 3rd Qu.:-0.06246   
## Max. :15.74804 Max. : 0.64851 Max. :15.73665 Max. :15.74736   
## restmt\_txt\_mag restmt\_wcap\_mag restmt\_xint\_mag cshtrd\_m   
## Min. :-10.4681 Min. :-0.18338 Min. :-11.0797 Min. :-0.4395   
## 1st Qu.: 0.1163 1st Qu.:-0.06268 1st Qu.: 0.1866 1st Qu.:-0.4303   
## Median : 0.1163 Median :-0.06268 Median : 0.1866 Median :-0.3824   
## Mean : 0.0000 Mean : 0.00000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.: 0.1163 3rd Qu.:-0.06268 3rd Qu.: 0.1866 3rd Qu.:-0.1295   
## Max. : 2.2461 Max. :15.74706 Max. : 0.2875 Max. : 6.1812   
## prccd\_m prcod\_m trfd\_m trfm\_m   
## Min. :-0.21984 Min. :-0.23136 Min. :-0.13470 Min. :-0.3013   
## 1st Qu.:-0.21227 1st Qu.:-0.21311 1st Qu.:-0.13046 1st Qu.:-0.3013   
## Median :-0.16102 Median :-0.16647 Median :-0.11926 Median :-0.3013   
## Mean : 0.00000 Mean : 0.00000 Mean : 0.00000 Mean : 0.0000   
## 3rd Qu.:-0.01128 3rd Qu.:-0.03109 3rd Qu.:-0.07823 3rd Qu.:-0.1547   
## Max. :14.74326 Max. :12.49833 Max. :14.41506 Max. : 9.6518   
## pe\_ratio wc\_ratio de\_ratio roe\_ratio   
## Min. :-0.08923 Min. :-0.75168 Min. :-8.88781 Min. :-15.46568   
## 1st Qu.:-0.08902 1st Qu.:-0.53238 1st Qu.:-0.08766 1st Qu.: 0.05477   
## Median :-0.08901 Median :-0.32862 Median :-0.01030 Median : 0.06368   
## Mean : 0.00000 Mean : 0.00000 Mean : 0.00000 Mean : 0.00000   
## 3rd Qu.:-0.08901 3rd Qu.: 0.04709 3rd Qu.: 0.09636 3rd Qu.: 0.07529   
## Max. :13.53480 Max. : 6.58569 Max. :11.51178 Max. : 0.87433   
## sp\_rating\_target restmt\_at\_target restmt\_capx\_target restmt\_cogs\_target  
## Min. :-0.6293 Min. :-0.2521 Min. :-0.1815 Min. :-0.6409   
## 1st Qu.:-0.6293 1st Qu.:-0.2521 1st Qu.:-0.1815 1st Qu.:-0.6409   
## Median :-0.6293 Median :-0.2521 Median :-0.1815 Median :-0.6409   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.: 0.4867 3rd Qu.:-0.2521 3rd Qu.:-0.1815 3rd Qu.: 1.5540   
## Max. : 1.8185 Max. : 3.9502 Max. : 5.4890 Max. : 1.5540   
## restmt\_dltt\_target restmt\_epspi\_target restmt\_ib\_target restmt\_ni\_target   
## Min. :-0.1426 Min. :-0.3755 Min. :-0.3544 Min. :-0.1929   
## 1st Qu.:-0.1426 1st Qu.:-0.3755 1st Qu.:-0.3544 1st Qu.:-0.1929   
## Median :-0.1426 Median :-0.3755 Median :-0.3544 Median :-0.1929   
## Mean : 0.0000 Mean : 0.0000 Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.:-0.1426 3rd Qu.:-0.3755 3rd Qu.:-0.3544 3rd Qu.:-0.1929   
## Max. : 6.9860 Max. : 2.6526 Max. : 2.8101 Max. : 5.1644   
## restmt\_nopi\_target restmt\_reuna\_target restmt\_teq\_target restmt\_txt\_target  
## Min. :-1.2857 Min. :-0.278 Min. :-0.3022 Min. :-0.278   
## 1st Qu.:-1.2857 1st Qu.:-0.278 1st Qu.:-0.3022 1st Qu.:-0.278   
## Median : 0.7747 Median :-0.278 Median :-0.3022 Median :-0.278   
## Mean : 0.0000 Mean : 0.000 Mean : 0.0000 Mean : 0.000   
## 3rd Qu.: 0.7747 3rd Qu.:-0.278 3rd Qu.:-0.3022 3rd Qu.:-0.278   
## Max. : 0.7747 Max. : 3.583 Max. : 3.2956 Max. : 3.583   
## restmt\_wcap\_target restmt\_xint\_target litigated  
## Min. :-0.1929 Min. :-0.3824 No :216   
## 1st Qu.:-0.1929 1st Qu.:-0.3824 Yes: 34   
## Median :-0.1929 Median :-0.3824   
## Mean : 0.0000 Mean : 0.0000   
## 3rd Qu.:-0.1929 3rd Qu.:-0.3824   
## Max. : 5.1644 Max. : 2.6049

training\_subset\_ds\_final\_orig <- training\_subset\_ds\_final

training\_subset\_ds\_final <- training\_subset\_ds\_final\_orig  
table(training\_subset\_ds\_final$litigated)

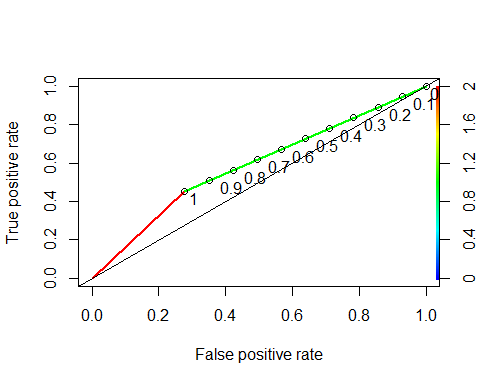
##   
## No Yes   
## 216 34

training\_subset\_ds\_final\_no <- training\_subset\_ds\_final %>%  
 filter(litigated == 'No')  
no\_count <- nrow(training\_subset\_ds\_final\_no)  
training\_subset\_ds\_final\_yes <- training\_subset\_ds\_final %>%  
 filter(litigated == 'Yes')  
yes\_count <- nrow(training\_subset\_ds\_final\_yes)  
#no\_count  
#yes\_count  
training\_subset\_ds\_final <- ovun.sample(litigated ~., data = training\_subset\_ds\_final, method = "both", N = no\_count + yes\_count,  
 p = 0.35, seed = 222)$data  
  
#training\_subset\_ds\_final <- ovun.sample(litigated ~., data = training\_subset\_ds\_final, method = "over", N = no\_count\*2)$data  
#training\_subset\_ds\_final <- ovun.sample(litigated ~., data = training\_subset\_ds\_final, method = "under", N = yes\_count\*2)$data  
  
table(training\_subset\_ds\_final$litigated)

##   
## No Yes   
## 159 91

glm\_control <- trainControl(  
 method = "cv",  
 number = 10,  
 summaryFunction = twoClassSummary,  
 classProbs = TRUE   
)  
  
glm\_model <- train(litigated ~  
 .  
 ,   
 data = training\_subset\_ds\_final, method = "glm", family = "binomial", trControl = glm\_control)  
class\_probabilities <- predict(glm\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
test\_subset\_ds\_final$class\_probabilities\_litigated <- class\_probabilities$Yes

glm\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_litigated, test\_subset\_ds\_final$litigated)  
 glm\_rocr\_roc <- performance(glm\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
 plot(glm\_rocr\_roc,  
 colorize = TRUE,  
 print.cutoffs.at = seq(0, 1, by = 0.1),  
 text.adj = c(-0.5, 1),  
 lwd = 2)  
 abline(a = 0, b = 1)

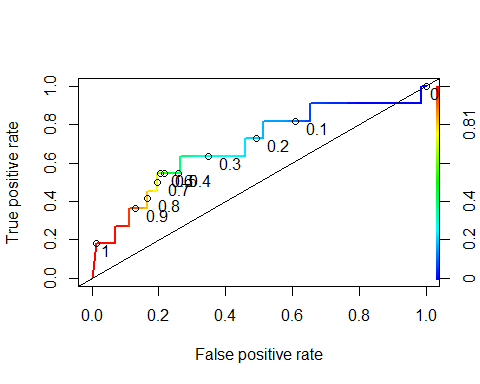


glm\_rocr\_auc <- performance(glm\_rocr\_pred, measure = "auc")  
 glm\_auc <- glm\_rocr\_auc@y.values[[1]]  
 glm\_auc

## [1] 0.5883838

glmnet\_control <- trainControl(  
 method = "cv",  
 number = 10,  
 summaryFunction = twoClassSummary,  
 classProbs = TRUE   
)  
  
glmnet\_model <- train(litigated ~ ., data = training\_subset\_ds\_final, method = "glmnet", family = "binomial", trControl = glmnet\_control)  
class\_probabilities <- predict(glmnet\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
test\_subset\_ds\_final$class\_probabilities\_litigated <- class\_probabilities$Yes

glmnet\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_litigated, test\_subset\_ds\_final$litigated)  
 glmnet\_rocr\_roc <- performance(glmnet\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
 plot(glmnet\_rocr\_roc,  
 colorize = TRUE,  
 print.cutoffs.at = seq(0, 1, by = 0.1),  
 text.adj = c(-0.5, 1),  
 lwd = 2)  
 abline(a = 0, b = 1)

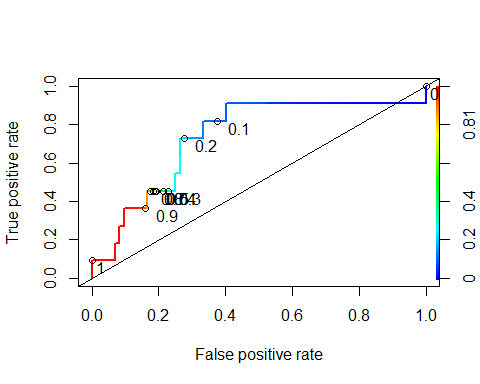


glmnet\_rocr\_auc <- performance(glmnet\_rocr\_pred, measure = "auc")  
 glmnet\_auc <- glmnet\_rocr\_auc@y.values[[1]]  
 glmnet\_auc

## [1] 0.6881313

lda\_control <- trainControl(  
 method = "cv",  
 number = 10  
)  
  
lda\_model <- train(litigated ~  
 .,   
 data = training\_subset\_ds\_final, method = "lda", family = "binomial", trControl = lda\_control)  
class\_probabilities <- predict(lda\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
test\_subset\_ds\_final$class\_probabilities\_onehot <- class\_probabilities$Yes

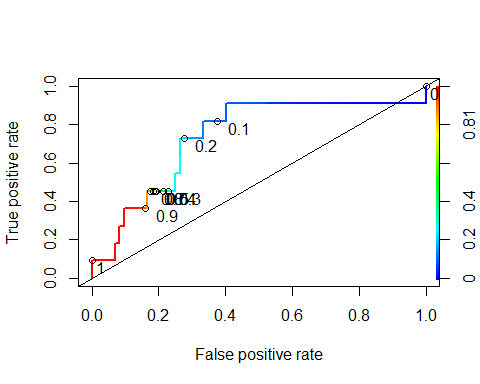
lda\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_onehot, test\_subset\_ds\_final$litigated)  
 lda\_rocr\_roc <- performance(lda\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
 plot(lda\_rocr\_roc,  
 colorize = TRUE,  
 print.cutoffs.at = seq(0, 1, by = 0.1),  
 text.adj = c(-0.5, 1),  
 lwd = 2)  
 abline(a = 0, b = 1)



lda\_rocr\_auc <- performance(lda\_rocr\_pred, measure = "auc")  
 lda\_auc <- lda\_rocr\_auc@y.values[[1]]  
 lda\_auc

## [1] 0.7335859

qda\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_onehot, test\_subset\_ds\_final$litigated)  
 qda\_rocr\_roc <- performance(qda\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
 plot(qda\_rocr\_roc,  
 colorize = TRUE,  
 print.cutoffs.at = seq(0, 1, by = 0.1),  
 text.adj = c(-0.5, 1),  
 lwd = 2)  
 abline(a = 0, b = 1)



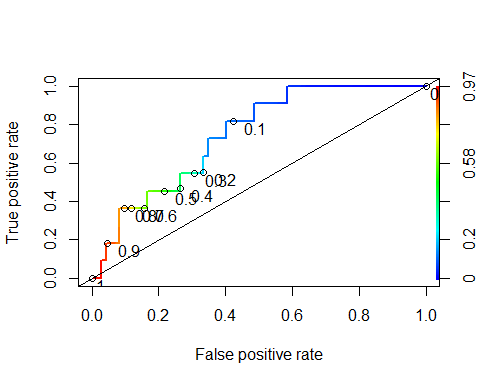
qda\_rocr\_auc <- performance(qda\_rocr\_pred, measure = "auc")  
 qda\_auc <- qda\_rocr\_auc@y.values[[1]]  
 qda\_auc

## [1] 0.7335859

gbm\_control <- trainControl(method = "repeatedcv", number = 10, repeats = 10)  
gbm\_model <- train(litigated~.,   
 data=training\_subset\_ds\_final,   
 method = "gbm",  
 trControl = gbm\_control,  
 verbose = FALSE)

class\_probabilities <- predict(gbm\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
#class\_probabilities  
test\_subset\_ds\_final$class\_probabilities\_litigated <- class\_probabilities$Yes  
#test\_subset\_ds\_final$class\_probabilities\_litigated  
#class\_probabilities  
#test\_subset\_ds\_final$class\_probabilities\_litigated   
#test\_subset\_ds\_final$litigated

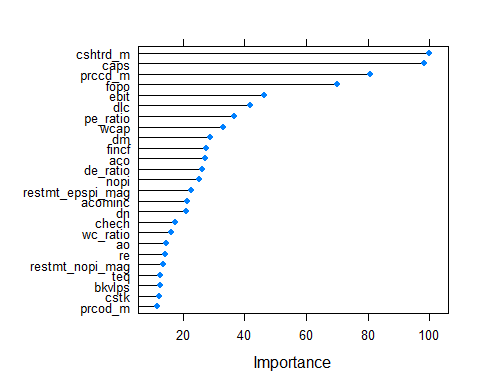
gbm\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_litigated, test\_subset\_ds\_final$litigated)  
gbm\_rocr\_roc <- performance(gbm\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
plot(gbm\_rocr\_roc,  
colorize = TRUE,  
print.cutoffs.at = seq(0, 1, by = 0.1),  
text.adj = c(-0.5, 1),  
lwd = 2)  
abline(a = 0, b = 1)



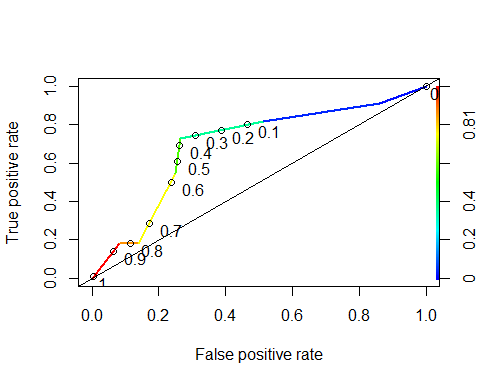
gbm\_rocr\_auc <- performance(gbm\_rocr\_pred, measure = "auc")  
gbm\_auc <- gbm\_rocr\_auc@y.values[[1]]  
gbm\_auc

## [1] 0.7436869

gbm\_varImp <- varImp(gbm\_model, type = 2)  
plot(gbm\_varImp, top = 25)



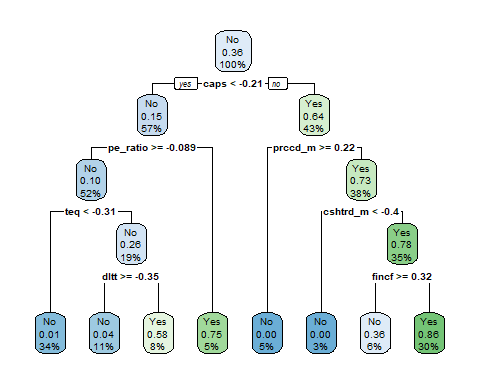
tree\_model <- rpart(litigated ~ ., data = training\_subset\_ds\_final, method = "class")  
class\_probabilities <- predict(tree\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
test\_subset\_ds\_final$class\_probabilities\_litigated <- 1 - class\_probabilities[1: nrow(test\_subset\_ds\_final)]  
tree\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_litigated, test\_subset\_ds\_final$litigated)  
tree\_rocr\_roc <- performance(tree\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
plot(tree\_rocr\_roc,  
colorize = TRUE,  
print.cutoffs.at = seq(0, 1, by = 0.1),  
text.adj = c(-0.5, 1),  
lwd = 2)  
abline(a = 0, b = 1)



tree\_rocr\_auc <- performance(tree\_rocr\_pred, measure = "auc")  
tree\_auc <- tree\_rocr\_auc@y.values[[1]]  
tree\_auc

## [1] 0.6925505

rpart.plot(tree\_model)

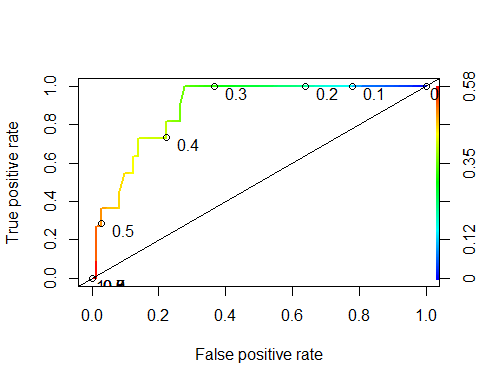


rf\_x <- training\_subset\_ds\_final[,num\_var\_start\_index:num\_var\_end\_index]  
rf\_y <- training\_subset\_ds\_final[,target\_var\_index]  
recommended\_mtry <- sqrt(ncol(rf\_x))  
rfGrid <- expand.grid(mtry=recommended\_mtry)

rfControl <- trainControl(method='repeatedcv', number=10, repeats=3)  
rf\_model <- train(litigated~.,   
 data=training\_subset\_ds\_final,   
 method='rf',   
 metric='Accuracy',   
 tuneGrid=rfGrid,   
 trControl=rfControl)

class\_probabilities <- predict(rf\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
test\_subset\_ds\_final$class\_probabilities\_litigated <- class\_probabilities$Yes

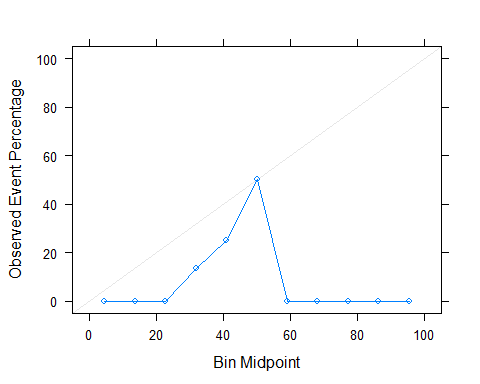
rf\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_litigated, test\_subset\_ds\_final$litigated)  
rf\_rocr\_roc <- performance(rf\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
plot(rf\_rocr\_roc,  
colorize = TRUE,  
print.cutoffs.at = seq(0, 1, by = 0.1),  
text.adj = c(-0.5, 1),  
lwd = 2)  
abline(a = 0, b = 1)



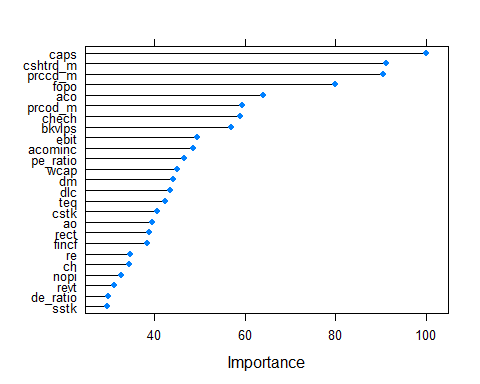
rf\_rocr\_auc <- performance(rf\_rocr\_pred, measure = "auc")  
rf\_auc <- rf\_rocr\_auc@y.values[[1]]  
rf\_auc

## [1] 0.885101

calibration\_curve <- calibration(litigated ~ class\_probabilities\_litigated,  
 data = test\_subset\_ds\_final,  
 class = 1)  
plot(calibration\_curve)



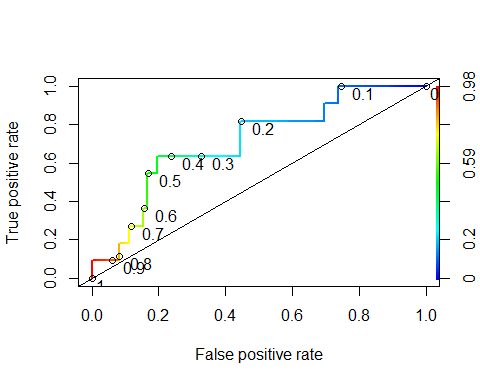
rf\_varImp <- varImp(rf\_model, type = 2)  
plot(rf\_varImp, top = 25)



rf\_varImp

## rf variable importance  
##   
## only 20 most important variables shown (out of 66)  
##   
## Overall  
## caps 100.00  
## cshtrd\_m 91.06  
## prccd\_m 90.60  
## fopo 79.81  
## aco 63.93  
## prcod\_m 59.34  
## chech 58.98  
## bkvlps 56.96  
## ebit 49.52  
## acominc 48.61  
## pe\_ratio 46.50  
## wcap 45.05  
## dm 44.15  
## dlc 43.49  
## teq 42.32  
## cstk 40.72  
## ao 39.47  
## rect 38.78  
## fincf 38.38  
## re 34.76

nnGrid <- expand.grid(size = 8:10, decay = 0.2)  
nnControl <- trainControl(method = "repeatedcv",  
 repeats = 5,  
 number=10,  
 classProbs = TRUE)  
  
nn\_model <- train(litigated~.,   
 data=training\_subset\_ds\_final,  
 method = "nnet",  
 tuneGrid = nnGrid,  
 trControl = nnControl,  
 importance = TRUE,  
 trace = FALSE,  
 MaxNWts = 1500)  
  
class\_probabilities <- predict(nn\_model, newdata = test\_subset\_ds\_final[, -1\*c(target\_var\_index:target\_var\_index)], type = "prob")  
test\_subset\_ds\_final$class\_probabilities\_litigated <- class\_probabilities$Yes  
  
nn\_rocr\_pred <- prediction(test\_subset\_ds\_final$class\_probabilities\_litigated, test\_subset\_ds\_final$litigated)  
nn\_rocr\_roc <- performance(nn\_rocr\_pred, measure = "tpr", x.measure = "fpr")  
plot(nn\_rocr\_roc,  
colorize = TRUE,  
print.cutoffs.at = seq(0, 1, by = 0.1),  
text.adj = c(-0.5, 1),  
lwd = 2)  
abline(a = 0, b = 1)



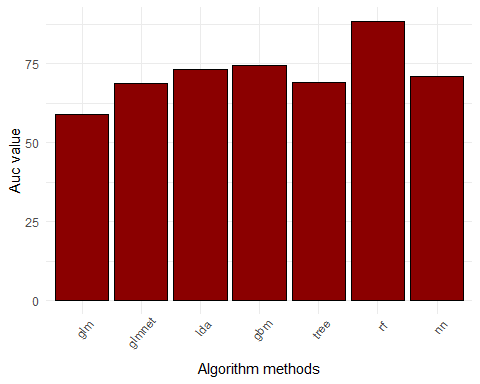
nn\_rocr\_auc <- performance(nn\_rocr\_pred, measure = "auc")  
nn\_auc <- nn\_rocr\_auc@y.values[[1]]  
nn\_auc

## [1] 0.709596

auc\_df <- data.frame("algorithm\_method" = c("glm"), "auc" = c(glm\_auc) \* 100)  
  
auc\_df\_temp <- data.frame("algorithm\_method" = c("glmnet"), "auc" = c(glmnet\_auc) \* 100)  
auc\_df <- rbind(auc\_df,auc\_df\_temp)  
  
auc\_df\_temp <- data.frame("algorithm\_method" = c("lda"), "auc" = c(lda\_auc) \* 100)  
auc\_df <- rbind(auc\_df,auc\_df\_temp)  
  
auc\_df\_temp <- data.frame("algorithm\_method" = c("gbm"), "auc" = c(gbm\_auc) \* 100)  
auc\_df <- rbind(auc\_df,auc\_df\_temp)  
  
auc\_df\_temp <- data.frame("algorithm\_method" = c("tree"), "auc" = c(tree\_auc) \* 100)  
auc\_df <- rbind(auc\_df,auc\_df\_temp)  
  
auc\_df\_temp <- data.frame("algorithm\_method" = c("rf"), "auc" = c(rf\_auc) \* 100)  
auc\_df <- rbind(auc\_df,auc\_df\_temp)  
  
auc\_df\_temp <- data.frame("algorithm\_method" = c("nn"), "auc" = c(nn\_auc) \* 100)  
auc\_df <- rbind(auc\_df,auc\_df\_temp)  
  
auc\_df

## algorithm\_method auc  
## 1 glm 58.83838  
## 2 glmnet 68.81313  
## 3 lda 73.35859  
## 4 gbm 74.36869  
## 5 tree 69.25505  
## 6 rf 88.51010  
## 7 nn 70.95960

ggplot(data=auc\_df, aes(x=algorithm\_method, y=auc)) +  
 geom\_bar(colour="black", stat="identity", fill = "darkred") +  
 ylab("Auc value") +  
 xlab("Algorithm methods") +  
 theme\_minimal() +  
 theme(axis.text.x = element\_text(angle =50, hjust=0.75))



nrow(training\_subset\_ds\_final)

## [1] 250

nrow(test\_subset\_ds\_final)

## [1] 83