project.R

Rishabh Rawat

2022-06-17

```
library("quantmod")
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
## Warning: package 'zoo' was built under R version 4.1.3
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: TTR
```

```
## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo
```

```
library(tidyverse)
```

```
## Warning: replacing previous import 'lifecycle::last_warnings' by
## 'rlang::last_warnings' when loading 'pillar'
```

```
## Warning: replacing previous import 'lifecycle::last_warnings' by
## 'rlang::last_warnings' when loading 'tibble'
```

```
## Warning: replacing previous import 'lifecycle::last_warnings' by
## 'rlang::last_warnings' when loading 'hms'
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.
3.1 --
```

```
## v ggplot2 3.3.5     v purrr   0.3.4
## v tibble  3.1.4     v dplyr   1.0.7
## v tidyr   1.1.3     v stringr 1.4.0
## v readr   2.0.1     v forcats 0.5.1
```

```
## Warning: package 'dplyr' was built under R version 4.1.2
```

```
## Warning: package 'stringr' was built under R version 4.1.2
```

```
## -- Conflicts ---------------------------------------- tidyverse_conflict
s() --
## x dplyr::filter() masks stats::filter()
## x dplyr::first()  masks xts::first()
## x dplyr::lag()    masks stats::lag()
## x dplyr::last()   masks xts::last()

library(highcharter)

## Warning: package 'highcharter' was built under R version 4.1.3

library(tibbletime)

## Warning: package 'tibbletime' was built under R version 4.1.3

##
## Attaching package: 'tibbletime'

## The following object is masked from 'package:stats':
##
##     filter

library(tidyquant)

## Warning: package 'tidyquant' was built under R version 4.1.2

## Loading required package: lubridate

##
## Attaching package: 'lubridate'

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

## Loading required package: PerformanceAnalytics

##
## Attaching package: 'PerformanceAnalytics'

## The following object is masked from 'package:graphics':
##
##     legend

## == Need to Learn tidyquant? ============================================
======
## Business Science offers a 1-hour course - Learning Lab #9: Performance Ana
lysis & Portfolio Optimization with tidyquant!
## </> Learn more at: https://university.business-science.io/p/learning-labs-
pro </>

a2003 <- c("MMM",
       "AA",
```

```
       "MO",
       "AXP",
       "T",
       "BA",
       "CAT",
       "C",
       "KO",
       "DD",
       "XOM",
       "GE",
       "HPQ",
       "HD",
       "HON",
       "INTC",
       "IBM",
       "IP",
       "JNJ",
       "JPM",
       "MCD",
       "MRK",
       "MSFT",
       "PG",
       "RTX",
       "WMT",
       "DIS",
       "AIG",
       "PFE","VZ")
getSymbols(a2003,from="2003-01-27",to="2022-03-31",periodicity="monthly")

## pausing 1 second between requests for more than 5 symbols

## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
```

```
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols
## pausing 1 second between requests for more than 5 symbols

##  [1] "MMM"  "AA"   "MO"   "AXP"  "T"    "BA"   "CAT"  "C"    "KO"   "DD"
## [11] "XOM"  "GE"   "HPQ"  "HD"   "HON"  "INTC" "IBM"  "IP"   "JNJ"  "JPM"
## [21] "MCD"  "MRK"  "MSFT" "PG"   "RTX"  "WMT"  "DIS"  "AIG"  "PFE"  "VZ"

df <- data.frame()
df <- merge(MMM$MMM.Adjusted,AA$AA.Adjusted,AXP$AXP.Adjusted,MO$MO.Adjusted,T
$T.Adjusted,
                    BA$BA.Adjusted,
                    CAT$CAT.Adjusted,
                    C$C.Adjusted,
                    KO$KO.Adjusted,
                    DD$DD.Adjusted,
                    XOM$XOM.Adjusted,
                    GE$GE.Adjusted,
                    PFE$PFE.Adjusted,
            AIG$AIG.Adjusted,
            VZ$VZ.Adjusted,
                    HPQ$HPQ.Adjusted,
                    HD$HD.Adjusted,
                    HON$HON.Adjusted,
                    INTC$INTC.Adjusted,
                    IBM$IBM.Adjusted,
                    IP$IP.Adjusted,
                    JNJ$JNJ.Adjusted,
                    JPM$JPM.Adjusted,
                    MCD$MCD.Adjusted,
                    MRK$MRK.Adjusted,
                    MSFT$MSFT.Adjusted,
                    PG$PG.Adjusted,
                    RTX$RTX.Adjusted,
                    WMT$WMT.Adjusted,
                    DIS$DIS.Adjusted
                    )
df <- as.xts(df)
head(df)

##            MMM.Adjusted AA.Adjusted AXP.Adjusted MO.Adjusted T.Adjusted
## 2003-02-01     37.52176    38.38676     22.21862    3.044877   3.841699
## 2003-03-01     39.12036    36.57348     21.98704    2.360272   3.705023
## 2003-04-01     37.91996    43.27296     25.05053    2.467034   4.314523
## 2003-05-01     38.04932    46.75222     27.63059    3.312370   4.798956
## 2003-06-01     39.01082    48.44298     27.73008    3.644410   4.815921
## 2003-07-01     42.40438    52.75534     29.29535    3.256493   4.403127
```

```
##            BA.Adjusted CAT.Adjusted C.Adjusted KO.Adjusted DD.Adjusted
## 2003-02-01    18.58487     14.36076   222.9224    11.35232    21.05902
## 2003-03-01    16.99147     15.03297   230.3443    11.42570    21.29814
## 2003-04-01    18.49671     16.07183   262.4387    11.47013    25.47774
## 2003-05-01    20.79524     16.04087   274.2735    12.93797    24.82205
## 2003-06-01    23.40470     17.12050   287.6410    13.17645    24.16637
## 2003-07-01    22.58635     20.75315   301.0820    12.82818    27.85051
##            XOM.Adjusted GE.Adjusted PFE.Adjusted AIG.Adjusted VZ.Adjusted
## 2003-02-01     18.10444    107.4467     13.69531     631.9258    12.57669
## 2003-03-01     18.72555    114.8347     14.31073     633.9771    12.85675
## 2003-04-01     18.85950    132.6228     14.12244     743.6870    13.59506
## 2003-05-01     19.50243    129.2453     14.24644     742.7888    13.91744
## 2003-06-01     19.37698    129.1553     15.75493     708.1388    14.50576
## 2003-07-01     19.19892    128.9115     15.39047     824.5644    12.86949
##            HPQ.Adjusted HD.Adjusted HON.Adjusted INTC.Adjusted IBM.Adjuste
d
## 2003-02-01     4.844218    15.12271     13.94282     10.480903     44.8579
6
## 2003-03-01     4.752527    15.70956     13.11716      9.904209     45.2219
8
## 2003-04-01     5.007330    18.19060     14.49274     11.193947     48.9525
2
## 2003-05-01     5.990366    21.01004     16.08940     12.666194     50.7630
3
## 2003-06-01     6.543321    21.41744     16.61275     12.673428     47.6558
6
## 2003-07-01     6.528268    20.21311     17.49752     15.158174     46.9337
8
##            IP.Adjusted JNJ.Adjusted JPM.Adjusted MCD.Adjusted MRK.Adjusted
## 2003-02-01    16.74755     30.79117     13.26269     8.061604     23.27538
## 2003-03-01    16.27215     34.11288     13.86500     8.565084     24.17110
## 2003-04-01    17.21093     33.22279     17.16313    10.128839     25.85164
## 2003-05-01    17.65384     32.03794     19.48917    11.094336     24.69636
## 2003-06-01    17.32139     30.60833     20.27206    13.066791     26.90473
## 2003-07-01    18.96482     30.66162     20.78805    13.629505     24.72113
##            MSFT.Adjusted PG.Adjusted RTX.Adjusted WMT.Adjusted DIS.Adjuste
d
## 2003-02-01      14.89675    24.22861     12.01714     32.57618     13.5994
6
## 2003-03-01      15.26624    26.35667     11.89959     35.26714     13.5675
7
## 2003-04-01      16.12383    26.59344     12.72955     38.24088     14.8749
0
## 2003-05-01      15.51847    27.30096     14.05584     35.72182     15.6640
9
## 2003-06-01      16.16796    26.51601     14.64597     36.44156     15.7438
1
## 2003-07-01      16.65351    26.12650     15.55578     38.02465     17.4736
3
```

```
dim(df)
```

```
## [1] 230  30
```

```
#write.csv(df,"datanew.csv")

# dflog <- dailyReturn(df,type="log")
# head(dflog)
# write.csv(as.data.frame(df),"dow2003.csv")
# x <- read.csv("dow2003.csv")

dow <- getSymbols("^DJI",from="2003-01-27",to="2022-03-31",periodicity= "mont
hly",auto.assign = F)



myBBands <- function (price,n,sd){
  mavg <- SMA(price,n)
  sdev <- rep(0,n)
  N <- nrow(price)
  for (i in (n+1):N){
    sdev[i]<- sd(price[(i-n+1):i])
  }
  up <- mavg + sd*sdev
  dn <- mavg - sd*sdev
  pctB <- (price - dn)/(up - dn)
  output <- cbind(dn, mavg, up, pctB)
  colnames(output) <- c("dn", "mavg", "up", "pctB")
  return(output)
}
head(df)
```

```
##            MMM.Adjusted AA.Adjusted AXP.Adjusted MO.Adjusted T.Adjusted
## 2003-02-01     37.52176    38.38676     22.21862    3.044877   3.841699
## 2003-03-01     39.12036    36.57348     21.98704    2.360272   3.705023
## 2003-04-01     37.91996    43.27296     25.05053    2.467034   4.314523
## 2003-05-01     38.04932    46.75222     27.63059    3.312370   4.798956
## 2003-06-01     39.01082    48.44298     27.73008    3.644410   4.815921
## 2003-07-01     42.40438    52.75534     29.29535    3.256493   4.403127
##            BA.Adjusted CAT.Adjusted C.Adjusted KO.Adjusted DD.Adjusted
## 2003-02-01    18.58487     14.36076   222.9224    11.35232    21.05902
## 2003-03-01    16.99147     15.03297   230.3443    11.42570    21.29814
## 2003-04-01    18.49671     16.07183   262.4387    11.47013    25.47774
## 2003-05-01    20.79524     16.04087   274.2735    12.93797    24.82205
## 2003-06-01    23.40470     17.12050   287.6410    13.17645    24.16637
## 2003-07-01    22.58635     20.75315   301.0820    12.82818    27.85051
##            XOM.Adjusted GE.Adjusted PFE.Adjusted AIG.Adjusted VZ.Adjusted
## 2003-02-01     18.10444    107.4467     13.69531     631.9258    12.57669
## 2003-03-01     18.72555    114.8347     14.31073     633.9771    12.85675
## 2003-04-01     18.85950    132.6228     14.12244     743.6870    13.59506
```

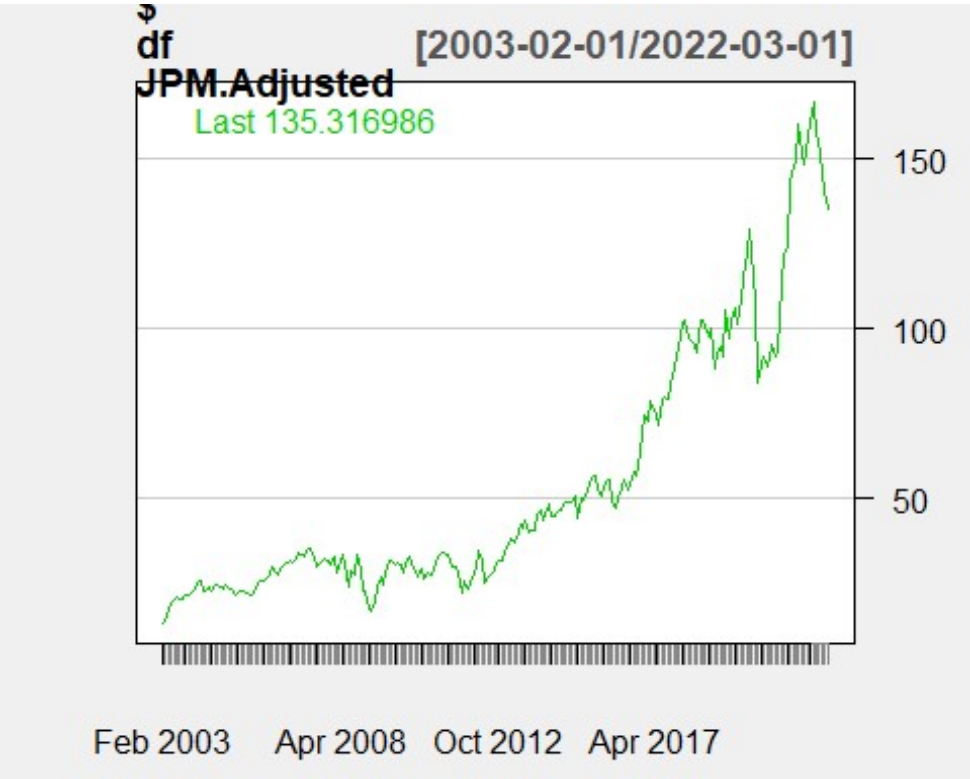
```
## 2003-05-01     19.50243    129.2453     14.24644     742.7888    13.91744
## 2003-06-01     19.37698    129.1553     15.75493     708.1388    14.50576
## 2003-07-01     19.19892    128.9115     15.39047     824.5644    12.86949
##            HPQ.Adjusted HD.Adjusted HON.Adjusted INTC.Adjusted IBM.Adjuste
d
## 2003-02-01     4.844218    15.12271     13.94282     10.480903     44.8579
6
## 2003-03-01     4.752527    15.70956     13.11716      9.904209     45.2219
8
## 2003-04-01     5.007330    18.19060     14.49274     11.193947     48.9525
2
## 2003-05-01     5.990366    21.01004     16.08940     12.666194     50.7630
3
## 2003-06-01     6.543321    21.41744     16.61275     12.673428     47.6558
6
## 2003-07-01     6.528268    20.21311     17.49752     15.158174     46.9337
8
##            IP.Adjusted JNJ.Adjusted JPM.Adjusted MCD.Adjusted MRK.Adjusted
## 2003-02-01    16.74755     30.79117     13.26269     8.061604     23.27538
## 2003-03-01    16.27215     34.11288     13.86500     8.565084     24.17110
## 2003-04-01    17.21093     33.22279     17.16313    10.128839     25.85164
## 2003-05-01    17.65384     32.03794     19.48917    11.094336     24.69636
## 2003-06-01    17.32139     30.60833     20.27206    13.066791     26.90473
## 2003-07-01    18.96482     30.66162     20.78805    13.629505     24.72113
##            MSFT.Adjusted PG.Adjusted RTX.Adjusted WMT.Adjusted DIS.Adjuste
d
## 2003-02-01      14.89675    24.22861     12.01714     32.57618     13.5994
6
## 2003-03-01      15.26624    26.35667     11.89959     35.26714     13.5675
7
## 2003-04-01      16.12383    26.59344     12.72955     38.24088     14.8749
0
## 2003-05-01      15.51847    27.30096     14.05584     35.72182     15.6640
9
## 2003-06-01      16.16796    26.51601     14.64597     36.44156     15.7438
1
## 2003-07-01      16.65351    26.12650     15.55578     38.02465     17.4736
3
```

```
# a2003 <- c("MMM","AA","MO","AXP","T","BA","CAT",  "C","KO","DD",  "XOM","GE",
#            "HPQ","HD","HON","INTC","IBM","IP","JNJ","JPM","MCD","MRK","MSFT
",
#            "PG","RTX","WMT","DIS","AIG","PFE","VZ")
```

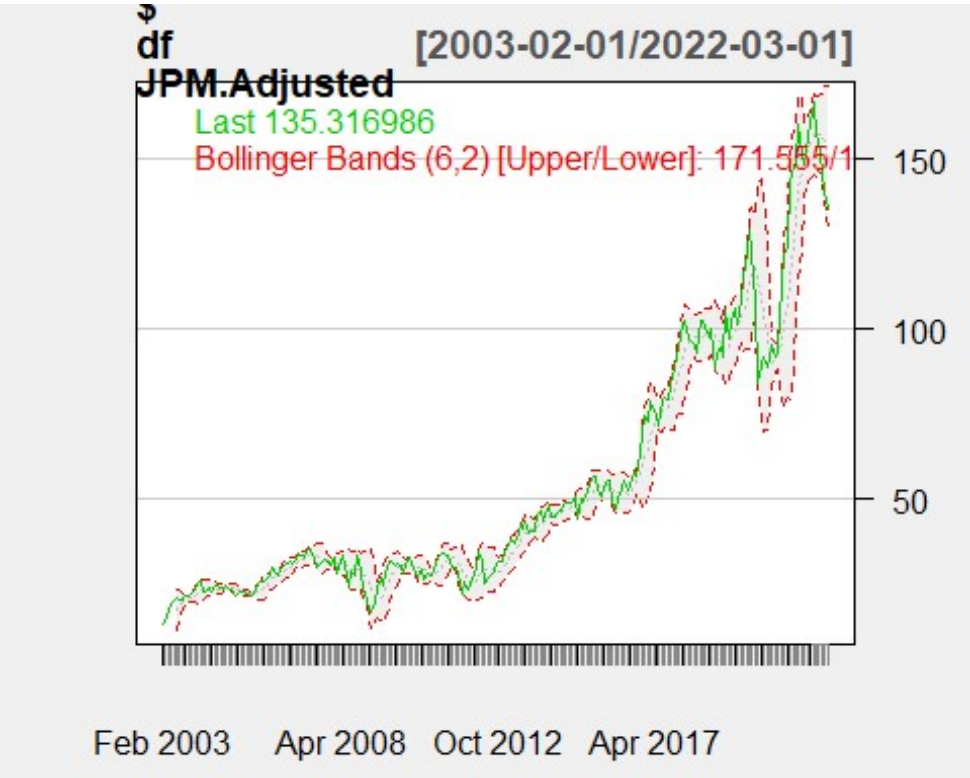
```
bbmmm <-myBBands(df$MMM.Adjusted,n=6,sd=2)
bbaa <-myBBands(df$AA.Adjusted,n=6,sd=2)
bbmo <-myBBands(df$MO.Adjusted,n=6,sd=2)
bbaxp <-myBBands(df$AXP.Adjusted,n=6,sd=2)
```

```
bbt<-myBBands(df$T.Adjusted,n=6,sd=2)

bbba<-myBBands(df$BA.Adjusted,n=6,sd=2)
bbcat <-myBBands(df$CAT.Adjusted,n=6,sd=2)
bbc <-myBBands(df$C.Adjusted,n=6,sd=2)
bbko <-myBBands(df$KO.Adjusted,n=6,sd=2)
bbdd <-myBBands(df$DD.Adjusted,n=6,sd=2)

bbxom <-myBBands(df$XOM.Adjusted,n=6,sd=2)
bbge <-myBBands(df$GE.Adjusted,n=6,sd=2)
bbhpq <-myBBands(df$HPQ.Adjusted,n=6,sd=2)
bbhon <-myBBands(df$HON.Adjusted,n=6,sd=2)
bbhd <-myBBands(df$HD.Adjusted,n=6,sd=2)

bbintc <-myBBands(df$INTC.Adjusted,n=6,sd=2)
bbibm <-myBBands(df$IBM.Adjusted,n=6,sd=2)
bbip <-myBBands(df$IP.Adjusted,n=6,sd=2)
bbjnj <-myBBands(df$JNJ.Adjusted,n=6,sd=2)
bbjpm <-myBBands(df$JPM.Adjusted,n=6,sd=2)

bbmcd <-myBBands(df$MCD.Adjusted,n=6,sd=2)
bbmrk <-myBBands(df$MRK.Adjusted,n=6,sd=2)
bbmsft <-myBBands(df$MSFT.Adjusted,n=6,sd=2)
bbpg <-myBBands(df$PG.Adjusted,n=6,sd=2)
bbrtx <-myBBands(df$RTX.Adjusted,n=6,sd=2)

bbwmt <-myBBands(df$WMT.Adjusted,n=6,sd=2)
bbdis <-myBBands(df$DIS.Adjusted,n=6,sd=2)
bbaig <-myBBands(df$AIG.Adjusted,n=6,sd=2)
bbpfe <-myBBands(df$PFE.Adjusted,n=6,sd=2)
bbvz <-myBBands(df$VZ.Adjusted,n=6,sd=2)


bbdf <- data.frame(bbmmm$pctB,bbaa$pctB,bbmo$pctB,bbaxp$pctB,bbt$pctB,
                       bbxom$pctB,bbge$pctB,bbhpq$pctB,bbhon$pctB,bbhd$pctB,
                       bbba$pctB,bbcat$pctB,bbc$pctB,bbko$pctB,bbdd$pctB,
                       bbintc$pctB,bbibm$pctB,bbip$pctB,bbjpm$pctB,bbjnj$pctB,
                       bbmcd$pctB,bbmrk$pctB,bbmsft$pctB,bbpg$pctB,bbrtx$pctB,
                       bbwmt$pctB,bbdis$pctB,bbaig$pctB,bbpfe$pctB,bbvz$pctB)




names(bbdf) <- c("MMM","AA","MO","AXP","T", "XOM","GE",
                                  "HPQ","HON","HD","BA","CAT", "C","KO","DD","
INTC","IBM","IP","JPM","JNJ","MCD","MRK","MSFT",
                                "PG","RTX","WMT","DIS","AIG","PFE","VZ")

tail(bbdf)
```

```
##                   MMM        AA        MO        AXP           T       XOM
## 2021-10-01 0.22486778 0.6822068 0.1941180 0.85489189 0.06371672 0.8615714
## 2021-11-01 0.18085373 0.6566352 0.1825642 0.04334929 0.07140934 0.5364772
## 2021-12-01 0.42603969 0.9575042 0.6508383 0.44225172 0.38736127 0.6805909
## 2022-01-01 0.22722426 0.7537255 0.8707211 0.84503850 0.57054933 0.9541799
## 2022-02-01 0.03850961 0.9425374 0.8117392 0.89474183 0.42134589 0.8485158
## 2022-03-01 0.21581442 0.9000806 0.7571096 0.69479687 0.47434974 0.8219245
##                    GE       HPQ        HON        HD          BA       CAT
## 2021-10-01 0.41198985 0.7856299 0.34770607 0.9951884 0.16460925 0.3843805
## 2021-11-01 0.02563464 0.9676186 0.13053507 0.9147484 0.14862483 0.2479000
## 2021-12-01 0.16927045 0.8792263 0.32947987 0.8323514 0.26856045 0.6785795
## 2022-01-01 0.26924760 0.7372257 0.31311440 0.5044886 0.31157713 0.5236476
## 2022-02-01 0.37717807 0.5563163 0.08790054 0.1823447 0.50168159 0.2008258
## 2022-03-01 0.25688212 0.6238384 0.31491501 0.1589302 0.09355107 0.9284560
##                     C        KO        DD       INTC        IBM         IP
## 2021-10-01 0.37018539 0.7171240 0.2822811 0.05940411 0.0207260 0.10651729
## 2021-11-01 0.08047219 0.2581361 0.5773664 0.20540009 0.1530149 0.09837531
## 2021-12-01 0.11144306 0.8652752 0.9101035 0.51414689 0.7193941 0.28472201
## 2022-01-01 0.41730538 0.8422388 0.6554640 0.28558776 0.6979940 0.41074117
## 2022-02-01 0.19128365 0.7883329 0.6561885 0.24537499 0.4002559 0.17872886
## 2022-03-01 0.11365120 0.7025651 0.4121226 0.63155812 0.6770152 0.49991899
##                   JPM       JNJ       MCD       MRK      MSFT        PG
## 2021-10-01 0.84790261 0.3003778 0.8220026 0.9808239 0.9012442 0.7392038
## 2021-11-01 0.49903979 0.1482106 0.7046917 0.3697693 0.7935929 0.7875063
## 2021-12-01 0.44825040 0.7275684 0.9900630 0.4515551 0.7579001 0.9996560
## 2022-01-01 0.09224073 0.7448422 0.7195392 0.6664593 0.4520761 0.7799623
## 2022-02-01 0.13242825 0.5145249 0.3850147 0.4226761 0.3156784 0.6355552
## 2022-03-01 0.17517258 0.8334016 0.4322580 0.6265505 0.3278001 0.5032676
##                   RTX       WMT        DIS       AIG       PFE         VZ
## 2021-10-01 0.86634599 0.8687381 0.20223359 0.8581523 0.6411637 0.08494569
## 2021-11-01 0.09435328 0.3432547 0.02412968 0.5089036 0.9512815 0.06298793
## 2021-12-01 0.59931760 0.5464723 0.29751548 0.6696876 0.9103730 0.36856304
## 2022-01-01 0.82696679 0.3029195 0.21459603 0.7179939 0.6237303 0.61275959
## 2022-02-01 0.95908157 0.1844066 0.36255761 0.8465057 0.4055441 0.80831133
## 2022-03-01 0.74926887 0.7784909 0.22331184 0.8076772 0.5398274 0.36927995

#write.csv(bbdf,"bollinger.csv")


chartSeries(df$JPM.Adjusted,theme=chartTheme('white'))
```




```
addBBands(n=6,sd=2)
```




```
head(bbdf,10)
```

```
##                  MMM         AA         MO        AXP          T        XOM
## 2003-02-01        NA         NA         NA         NA         NA         NA
## 2003-03-01        NA         NA         NA         NA         NA         NA
## 2003-04-01        NA         NA         NA         NA         NA         NA
## 2003-05-01        NA         NA         NA         NA         NA         NA
## 2003-06-01        NA         NA         NA         NA         NA         NA
## 2003-07-01       Inf        Inf        Inf        Inf        Inf        Inf
## 2003-08-01 0.8517642 0.7792233 0.6379567 0.7541968 0.4534662 0.9373507
## 2003-09-01 0.6673209 0.5457127 0.6776284 0.7237597 0.2897481 0.6708322
## 2003-10-01 0.9188442 0.9217224 0.8835903 0.8418580 0.5753655 0.6063511
## 2003-11-01 0.8007150 0.8503802 0.9241473 0.6464705 0.5927453 0.4654312
##                  GE        HPQ        HON         HD         BA        CAT
## 2003-02-01        NA         NA         NA         NA         NA         NA
## 2003-03-01        NA         NA         NA         NA         NA         NA
## 2003-04-01        NA         NA         NA         NA         NA         NA
## 2003-05-01        NA         NA         NA         NA         NA         NA
## 2003-06-01        NA         NA         NA         NA         NA         NA
## 2003-07-01       Inf        Inf        Inf        Inf        Inf        Inf
## 2003-08-01 0.7152741 0.6033110 0.7687292 0.6442770 0.8309859 0.8732943
## 2003-09-01 0.8267271 0.4729416 0.4802469 0.5547135 0.6177082 0.7116270
## 2003-10-01 0.5774554 0.8753508 0.9006126 0.9886447 0.8336464 0.7397599
## 2003-11-01 0.4065699 0.6840659 0.6974522 0.7991095 0.7574802 0.7583378
##                   C         KO         DD       INTC        IBM         IP
## 2003-02-01        NA         NA         NA         NA         NA         NA
## 2003-03-01        NA         NA         NA         NA         NA         NA
## 2003-04-01        NA         NA         NA         NA         NA         NA
## 2003-05-01        NA         NA         NA         NA         NA         NA
## 2003-06-01        NA         NA         NA         NA         NA         NA
## 2003-07-01       Inf        Inf        Inf        Inf       -Inf        Inf
## 2003-08-01 0.6810224 0.5128510 0.7230852 0.8899216 0.4410307 0.8642195
## 2003-09-01 0.7984529 0.3945671 0.4647973 0.7450829 0.8238035 0.6746933
## 2003-10-01 0.8580381 0.7913642 0.8910670 0.8703895 0.7891420 0.6495882
## 2003-11-01 0.7783930 0.7399906 0.7631902 0.7836738 0.7876878 0.3305242
##                  JPM        JNJ        MCD        MRK       MSFT         PG
## 2003-02-01        NA         NA         NA         NA         NA         NA
## 2003-03-01        NA         NA         NA         NA         NA         NA
## 2003-04-01        NA         NA         NA         NA         NA         NA
## 2003-05-01        NA         NA         NA         NA         NA         NA
## 2003-06-01        NA         NA         NA         NA         NA         NA
## 2003-07-01       Inf       -Inf        Inf       -Inf        Inf       -Inf
## 2003-08-01 0.6685824 0.1770187 0.7029587 0.1153939 0.7752099 0.2690371
## 2003-09-01 0.6408374 0.2616620 0.7302061 0.3608015 0.8940077 0.8828106
## 2003-10-01 0.8740996 0.3986266 0.8027584 0.1395666 0.4889283 0.9346439
## 2003-11-01 0.7816431 0.2713559 0.8536402 0.1533857 0.3233258 0.7503432
##                  RTX        WMT        DIS        AIG        PFE         VZ
## 2003-02-01        NA         NA         NA         NA         NA         NA
## 2003-03-01        NA         NA         NA         NA         NA         NA
## 2003-04-01        NA         NA         NA         NA         NA         NA
## 2003-05-01        NA         NA         NA         NA         NA         NA
## 2003-06-01        NA         NA         NA         NA         NA         NA
```

```
## 2003-07-01       Inf       Inf       Inf       Inf       Inf      -Inf
## 2003-08-01 0.8362097 0.8909218 0.6381644 0.6135929 0.2426572 0.3616576
## 2003-09-01 0.6935842 0.5330301 0.5142217 0.4157284 0.3482482 0.1236165
## 2003-10-01 0.8562121 0.7723915 0.8801806 0.6341992 0.4973782 0.3143644
## 2003-11-01 0.7946251 0.4063172 0.8133493 0.4002307 0.7099163 0.3417630

minrank <- data.frame(bbdf, t(apply(bbdf, 1, rank, ties.method='max')))
head(minrank)

##             MMM  AA  MO AXP   T XOM  GE HPQ HON  HD  BA CAT   C  KO  DD INT
C
## 2003-02-01  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   N
A
## 2003-03-01  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   N
A
## 2003-04-01  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   N
A
## 2003-05-01  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   N
A
## 2003-06-01  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA  NA   N
A
## 2003-07-01 Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf Inf  In
f
##              IBM  IP JPM  JNJ MCD  MRK MSFT   PG RTX WMT DIS AIG PFE   VZ M
MM.1
## 2003-02-01   NA  NA  NA   NA  NA   NA   NA   NA  NA  NA  NA  NA  NA   NA
1
## 2003-03-01   NA  NA  NA   NA  NA   NA   NA   NA  NA  NA  NA  NA  NA   NA
1
## 2003-04-01   NA  NA  NA   NA  NA   NA   NA   NA  NA  NA  NA  NA  NA   NA
1
## 2003-05-01   NA  NA  NA   NA  NA   NA   NA   NA  NA  NA  NA  NA  NA   NA
1
## 2003-06-01   NA  NA  NA   NA  NA   NA   NA   NA  NA  NA  NA  NA  NA   NA
1
## 2003-07-01 -Inf Inf Inf -Inf Inf -Inf  Inf -Inf Inf Inf Inf Inf Inf -Inf
30
##             AA.1 MO.1 AXP.1 T.1 XOM.1 GE.1 HPQ.1 HON.1 HD.1 BA.1 CAT.1 C.1
KO.1
## 2003-02-01    2    3     4   5     6    7     8     9   10   11    12  13
14
## 2003-03-01    2    3     4   5     6    7     8     9   10   11    12  13
14
## 2003-04-01    2    3     4   5     6    7     8     9   10   11    12  13
14
## 2003-05-01    2    3     4   5     6    7     8     9   10   11    12  13
14
## 2003-06-01    2    3     4   5     6    7     8     9   10   11    12  13
14
## 2003-07-01   30   30    30  30    30   30    30    30   30   30    30  30
```

```
30
##            DD.1 INTC.1 IBM.1 IP.1 JPM.1 JNJ.1 MCD.1 MRK.1 MSFT.1 PG.1 RTX.
1
## 2003-02-01   15     16    17   18    19    20    21    22     23   24    2
5
## 2003-03-01   15     16    17   18    19    20    21    22     23   24    2
5
## 2003-04-01   15     16    17   18    19    20    21    22     23   24    2
5
## 2003-05-01   15     16    17   18    19    20    21    22     23   24    2
5
## 2003-06-01   15     16    17   18    19    20    21    22     23   24    2
5
## 2003-07-01   30     30     5   30    30     5    30     5     30    5    3
0
##            WMT.1 DIS.1 AIG.1 PFE.1 VZ.1
## 2003-02-01    26    27    28    29   30
## 2003-03-01    26    27    28    29   30
## 2003-04-01    26    27    28    29   30
## 2003-05-01    26    27    28    29   30
## 2003-06-01    26    27    28    29   30
## 2003-07-01    30    30    30    30    5

tail(minrank)

##                   MMM        AA        MO        AXP           T       XOM
## 2021-10-01 0.22486778 0.6822068 0.1941180 0.85489189 0.06371672 0.8615714
## 2021-11-01 0.18085373 0.6566352 0.1825642 0.04334929 0.07140934 0.5364772
## 2021-12-01 0.42603969 0.9575042 0.6508383 0.44225172 0.38736127 0.6805909
## 2022-01-01 0.22722426 0.7537255 0.8707211 0.84503850 0.57054933 0.9541799
## 2022-02-01 0.03850961 0.9425374 0.8117392 0.89474183 0.42134589 0.8485158
## 2022-03-01 0.21581442 0.9000806 0.7571096 0.69479687 0.47434974 0.8219245
##                    GE       HPQ        HON        HD          BA        CAT
## 2021-10-01 0.41198985 0.7856299 0.34770607 0.9951884 0.16460925 0.3843805
## 2021-11-01 0.02563464 0.9676186 0.13053507 0.9147484 0.14862483 0.2479000
## 2021-12-01 0.16927045 0.8792263 0.32947987 0.8323514 0.26856045 0.6785795
## 2022-01-01 0.26924760 0.7372257 0.31311440 0.5044886 0.31157713 0.5236476
## 2022-02-01 0.37717807 0.5563163 0.08790054 0.1823447 0.50168159 0.2008258
## 2022-03-01 0.25688212 0.6238384 0.31491501 0.1589302 0.09355107 0.9284560
##                     C         KO        DD       INTC        IBM         IP
## 2021-10-01 0.37018539 0.7171240 0.2822811 0.05940411 0.0207260 0.10651729
## 2021-11-01 0.08047219 0.2581361 0.5773664 0.20540009 0.1530149 0.09837531
## 2021-12-01 0.11144306 0.8652752 0.9101035 0.51414689 0.7193941 0.28472201
## 2022-01-01 0.41730538 0.8422388 0.6554640 0.28558776 0.6979940 0.41074117
## 2022-02-01 0.19128365 0.7883329 0.6561885 0.24537499 0.4002559 0.17872886
## 2022-03-01 0.11365120 0.7025651 0.4121226 0.63155812 0.6770152 0.49991899
##                   JPM       JNJ       MCD       MRK      MSFT        PG
## 2021-10-01 0.84790261 0.3003778 0.8220026 0.9808239 0.9012442 0.7392038
## 2021-11-01 0.49903979 0.1482106 0.7046917 0.3697693 0.7935929 0.7875063
## 2021-12-01 0.44825040 0.7275684 0.9900630 0.4515551 0.7579001 0.9996560
```

```
## 2022-01-01 0.09224073 0.7448422 0.7195392 0.6664593 0.4520761 0.7799623
## 2022-02-01 0.13242825 0.5145249 0.3850147 0.4226761 0.3156784 0.6355552
## 2022-03-01 0.17517258 0.8334016 0.4322580 0.6265505 0.3278001 0.5032676
##                  RTX       WMT        DIS       AIG       PFE         VZ
MMM.1
## 2021-10-01 0.86634599 0.8687381 0.20223359 0.8581523 0.6411637 0.08494569
9
## 2021-11-01 0.09435328 0.3432547 0.02412968 0.5089036 0.9512815 0.06298793
13
## 2021-12-01 0.59931760 0.5464723 0.29751548 0.6696876 0.9103730 0.36856304
9
## 2022-01-01 0.82696679 0.3029195 0.21459603 0.7179939 0.6237303 0.61275959
3
## 2022-02-01 0.95908157 0.1844066 0.36255761 0.8465057 0.4055441 0.80831133
1
## 2022-03-01 0.74926887 0.7784909 0.22331184 0.8076772 0.5398274 0.36927995
5
##            AA.1 MO.1 AXP.1 T.1 XOM.1 GE.1 HPQ.1 HON.1 HD.1 BA.1 CAT.1 C.1
KO.1
## 2021-10-01   17    7    23   3    25   15    20    12   30    6    14  13
18
## 2021-11-01   24   14     3   5    22    2    30     9   28   11    16   6
17
## 2021-12-01   28   16    10   8    19    2    25     6   23    3    18   1
24
## 2022-01-01   24   29    28  14    30    4    22     8   12    7    13  10
27
## 2022-02-01   29   25    28  16    27   12    20     2    5   18     8   7
23
## 2022-03-01   29   24    21  13    27    7    17     8    3    1    30   2
22
##            DD.1 INTC.1 IBM.1 IP.1 JPM.1 JNJ.1 MCD.1 MRK.1 MSFT.1 PG.1 RTX.
1
## 2021-10-01   10      2     1    5    22    11    21    29     28   19    2
6
## 2021-11-01   23     15    12    8    20    10    25    19     27   26
7
## 2021-12-01   26     13    20    4    11    21    29    12     22   30    1
5
## 2022-01-01   17      5    19    9     1    23    21    18     11   25    2
6
## 2022-02-01   22      9    14    4     3    19    13    17     10   21    3
0
## 2022-03-01   11     19    20   14     4    28    12    18      9   15    2
3
##            WMT.1 DIS.1 AIG.1 PFE.1 VZ.1
## 2021-10-01    27     8    24    16    4
## 2021-11-01    18     1    21    29    4
## 2021-12-01    14     5    17    27    7
## 2022-01-01     6     2    20    16   15
```

```
## 2022-02-01     6    11    26    15   24
## 2022-03-01    25     6    26    16   10

rank <- minrank[7:230,31:60]
head(rank,6)

##            MMM.1 AA.1 MO.1 AXP.1 T.1 XOM.1 GE.1 HPQ.1 HON.1 HD.1 BA.1 CAT.
1 C.1
## 2003-08-01    25   22   11    19   7    30   17     9    20   13   23    2
7  15
## 2003-09-01    17   13   20    23   3    18   28     9    10   14   15    2
2  26
## 2003-10-01    27   28   24    17   6     8    7    22    26   30   16    1
1  19
## 2003-11-01    26   28   30    11  10     9    8    12    13   25   17    1
8  20
## 2003-12-01    16   24   13    21  29    30   27    11    22    3   18    2
5  12
## 2004-01-01     4    5   16    29  12    19   30    21    24    3   13
7  17
##            KO.1 DD.1 INTC.1 IBM.1 IP.1 JPM.1 JNJ.1 MCD.1 MRK.1 MSFT.1 PG.1
## 2003-08-01    8   18     28     6   26    14     2    16     1     21    4
## 2003-09-01    6    8     25    27   19    16     2    24     5     30   29
## 2003-10-01   14   25     20    13   10    21     3    15     1      4   29
## 2003-11-01   15   19     22    23    4    21     2    29     1      3   16
## 2003-12-01   26   20      4     9   28    19    14     5     2      7   10
## 2004-01-01    8   18      2    26    9    27    28    14     6     10   11
##            RTX.1 WMT.1 DIS.1 AIG.1 PFE.1 VZ.1
## 2003-08-01    24    29    12    10     3    5
## 2003-09-01    21    12    11     7     4    1
## 2003-10-01    18    12    23     9     5    2
## 2003-11-01    24     7    27     6    14    5
## 2003-12-01    23     1     6    17    15    8
## 2004-01-01    20     1    15    25    22   23

tail(rank)

##            MMM.1 AA.1 MO.1 AXP.1 T.1 XOM.1 GE.1 HPQ.1 HON.1 HD.1 BA.1 CAT.
1 C.1
## 2021-10-01     9   17    7    23   3    25   15    20    12   30    6    1
4  13
## 2021-11-01    13   24   14     3   5    22    2    30     9   28   11    1
6   6
## 2021-12-01     9   28   16    10   8    19    2    25     6   23    3    1
8   1
## 2022-01-01     3   24   29    28  14    30    4    22     8   12    7    1
3  10
## 2022-02-01     1   29   25    28  16    27   12    20     2    5   18
8   7
## 2022-03-01     5   29   24    21  13    27    7    17     8    3    1    3
0   2
```

```
##            KO.1 DD.1 INTC.1 IBM.1 IP.1 JPM.1 JNJ.1 MCD.1 MRK.1 MSFT.1 PG.1
## 2021-10-01   18   10      2     1    5    22    11    21    29     28   19
## 2021-11-01   17   23     15    12    8    20    10    25    19     27   26
## 2021-12-01   24   26     13    20    4    11    21    29    12     22   30
## 2022-01-01   27   17      5    19    9     1    23    21    18     11   25
## 2022-02-01   23   22      9    14    4     3    19    13    17     10   21
## 2022-03-01   22   11     19    20   14     4    28    12    18      9   15
##            RTX.1 WMT.1 DIS.1 AIG.1 PFE.1 VZ.1
## 2021-10-01    26    27     8    24    16    4
## 2021-11-01     7    18     1    21    29    4
## 2021-12-01    15    14     5    17    27    7
## 2022-01-01    26     6     2    20    16   15
## 2022-02-01    30     6    11    26    15   24
## 2022-03-01    23    25     6    26    16   10
```

```
#write.csv(minrank,"rtest.csv", row.names = FALSE)
```

```
head(dow,7)
```

```
##            DJI.Open DJI.High DJI.Low DJI.Close DJI.Volume DJI.Adjusted
## 2003-02-01  8053.74  8152.53 7628.99   7891.08 4418320000      7891.08
## 2003-03-01  7890.24  8522.18 7416.64   7992.13 5616290000      7992.13
## 2003-04-01  7992.83  8559.77 7979.69   8480.09 5128590000      8480.09
## 2003-05-01  8478.48  8868.33 8340.23   8850.26 4686280000      8850.26
## 2003-06-01  8851.45  9352.77 8851.45   8985.44 4987850000      8985.44
## 2003-07-01  8983.66  9361.40 8871.20   9233.80 4911390000      9233.80
## 2003-08-01  9232.68  9499.97 8997.11   9415.82 3853760000      9415.82
```

```
tail(dow)
```

```
##            DJI.Open DJI.High  DJI.Low DJI.Close DJI.Volume DJI.Adjusted
## 2021-10-01 33930.70 35892.92 33785.54  35819.56 6709650000     35819.56
## 2021-11-01 35833.65 36565.73 34424.44  34483.72 7201370000     34483.72
## 2021-12-01 34678.94 36679.44 34006.98  36338.30 8304570000     36338.30
## 2022-01-01 36321.59 36952.65 33150.33  35131.86 8811950000     35131.86
## 2022-02-01 35151.47 35824.28 32272.64  33892.60 7256540000     33892.60
## 2022-03-01 33813.48 35372.26 32578.73  34678.35 9154390000     34678.35
```

```
34678.35-9415.82
```

```
## [1] 25262.53
```

```
(25262.53/9415.82)*100
```

```
## [1] 268.2988
```

```
po <- read.csv("winlose.csv")
#r <- lm(dow~.,data=po)


#write.csv(dow,"dow.csv")
#summary(r)
```

```
jpm1 <- getSymbols("JPM",from="2003-01-27",to="2022-03-31",periodicity= "monthly",auto.assign = F)
head(jpm1,8)
```

```
##            JPM.Open JPM.High JPM.Low JPM.Close JPM.Volume JPM.Adjusted
## 2003-02-01    23.50    23.87   20.86     22.68  168216300     13.26268
## 2003-03-01    23.15    24.90   20.13     23.71  224183400     13.86501
## 2003-04-01    24.15    29.69   23.75     29.35  241402800     17.16313
## 2003-05-01    29.35    33.07   28.69     32.86  204510000     19.48917
## 2003-06-01    33.35    36.52   33.32     34.18  210944900     20.27206
## 2003-07-01    33.84    38.26   33.05     35.05  198713700     20.78805
## 2003-08-01    35.08    35.43   32.40     34.22  183969800     20.49969
## 2003-09-01    34.42    35.87   33.16     34.33  173570000     20.56560
```

```
head(bbjpm,10)
```

```
##                  dn     mavg       up      pctB
## 2003-02-01       NA       NA       NA        NA
## 2003-03-01       NA       NA       NA        NA
## 2003-04-01       NA       NA       NA        NA
## 2003-05-01       NA       NA       NA        NA
## 2003-06-01       NA       NA       NA        NA
## 2003-07-01 17.47335 17.47335 17.47335       Inf
## 2003-08-01 13.28102 18.67952 24.07801 0.6685824
## 2003-09-01 17.06507 19.79629 22.52750 0.6408374
## 2003-10-01 19.20229 20.52012 21.83794 0.8740996
## 2003-11-01 19.82570 20.84064 21.85559 0.7816431
```

```
tail(bbjpm)
```

```
##                  dn     mavg       up       pctB
## 2021-10-01 143.9411 157.3212 170.7012 0.84790261
## 2021-11-01 143.6607 156.7471 169.8335 0.49903979
## 2021-12-01 145.3364 157.5081 169.6798 0.44825040
## 2022-01-01 144.2188 157.2768 170.3348 0.09224073
## 2022-02-01 135.7731 154.5893 173.4055 0.13242825
## 2022-03-01 127.1918 150.3838 173.5758 0.17517258
```

```
tail(JPM$JPM.Adjusted,7)
```

```
##            JPM.Adjusted
## 2021-09-01     160.5500
## 2021-10-01     166.6310
## 2021-11-01     156.7219
## 2021-12-01     156.2483
## 2022-01-01     146.6277
## 2022-02-01     140.7567
## 2022-03-01     135.3170
```

```
qq <-c(13.262,13.865,17.163,19.49,20.272,20.786)
sd(qq)
```

```
## [1] 3.277955
```

```
qq <- c(21.5,20.5,20.499,20.78,20.27,19.48)
sd(qq)*2
```

```
## [1] 1.318047
```

```
sd(JPM$JPM.Adjusted[1:6])
```

```
## [1] 3.278098
```

```
head(rank)
```

```
##            MMM.1 AA.1 MO.1 AXP.1 T.1 XOM.1 GE.1 HPQ.1 HON.1 HD.1 BA.1 CAT.
1 C.1
## 2003-08-01    25   22   11    19   7    30   17     9    20   13   23    2
7  15
## 2003-09-01    17   13   20    23   3    18   28     9    10   14   15    2
2  26
## 2003-10-01    27   28   24    17   6     8    7    22    26   30   16    1
1  19
## 2003-11-01    26   28   30    11  10     9    8    12    13   25   17    1
8  20
## 2003-12-01    16   24   13    21  29    30   27    11    22    3   18    2
5  12
## 2004-01-01     4    5   16    29  12    19   30    21    24    3   13
7  17
##            KO.1 DD.1 INTC.1 IBM.1 IP.1 JPM.1 JNJ.1 MCD.1 MRK.1 MSFT.1 PG.1
## 2003-08-01    8   18     28     6   26    14     2    16     1     21    4
## 2003-09-01    6    8     25    27   19    16     2    24     5     30   29
## 2003-10-01   14   25     20    13   10    21     3    15     1      4   29
## 2003-11-01   15   19     22    23    4    21     2    29     1      3   16
## 2003-12-01   26   20      4     9   28    19    14     5     2      7   10
## 2004-01-01    8   18      2    26    9    27    28    14     6     10   11
##            RTX.1 WMT.1 DIS.1 AIG.1 PFE.1 VZ.1
## 2003-08-01    24    29    12    10     3    5
## 2003-09-01    21    12    11     7     4    1
## 2003-10-01    18    12    23     9     5    2
## 2003-11-01    24     7    27     6    14    5
## 2003-12-01    23     1     6    17    15    8
## 2004-01-01    20     1    15    25    22   23
```