Untitled

Justin

2019撟4<9c><88>8

rm(list=ls())  
#  
con = gzcon(url('http://www.systematicportfolio.com/sit.gz', 'rb'))  
source(con)  
close(con)  
  
load.packages('quantmod')

## Warning: package 'quantmod' was built under R version 3.5.3

## Warning: package 'xts' was built under R version 3.5.3

## Warning: package 'zoo' was built under R version 3.5.3

##   
## Attaching package: 'zoo'

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

## Warning: package 'TTR' was built under R version 3.5.3

##   
## Attaching package: 'TTR'

## The following object is masked \_by\_ '.GlobalEnv':  
##   
## DVI

## Version 0.4-0 included new data defaults. See ?getSymbols.

etf4.all<-readRDS("C:/hw08/etf4\_xts\_all")  
head(etf4.all)

## 0050 0056 006205 00646  
## 2009-01-05 34.30 14.00 NA NA  
## 2009-01-06 34.21 14.02 NA NA  
## 2009-01-07 34.59 14.28 NA NA  
## 2009-01-08 33.21 13.86 NA NA  
## 2009-01-09 32.32 13.61 NA NA  
## 2009-01-10 31.91 13.55 NA NA

str(etf4.all)

## An 'xts' object on 2009-01-05/2018-12-28 containing:  
## Data: num [1:2474, 1:4] 34.3 34.2 34.6 33.2 32.3 ...  
## - attr(\*, "dimnames")=List of 2  
## ..$ : NULL  
## ..$ : chr [1:4] "0050" "0056" "006205" "00646"  
## Indexed by objects of class: [Date] TZ: UTC  
## xts Attributes:   
## NULL

etf4.all.1<-etf4.all[complete.cases(etf4.all),]  
head(etf4.all.1)

## 0050 0056 006205 00646  
## 2015-12-14 59.35 21.06 30.98 19.54  
## 2015-12-15 59.59 21.25 31.66 19.70  
## 2015-12-16 60.11 21.50 31.67 19.80  
## 2015-12-17 60.78 21.76 32.06 20.05  
## 2015-12-18 60.78 21.97 32.23 19.87  
## 2015-12-21 60.31 21.99 32.62 19.64

tail(etf4.all.1)

## 0050 0056 006205 00646  
## 2018-12-22 74.75 24.15 25.08 22.93  
## 2018-12-24 74.67 24.16 25.25 22.72  
## 2018-12-25 73.57 23.90 24.90 22.51  
## 2018-12-26 73.87 23.83 25.16 22.13  
## 2018-12-27 74.81 23.96 25.30 22.95  
## 2018-12-28 75.21 23.92 25.24 23.16

#0050  
data1<-new.env()  
data1$prices<-etf4.all.1$`0050`  
prices<-data1$prices  
prices

## 0050  
## 2015-12-14 59.35  
## 2015-12-15 59.59  
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## 2015-12-28 61.55  
## 2015-12-29 61.00  
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## 2015-12-31 60.75  
## 2016-01-04 59.62  
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head(sma50, 51)

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class(data1$dates)

## [1] "Date"

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#data1$execution.price = data1$prices = etf4.all.1$`0050`  
data1$weight[] = 1  
buy.hold.0050 <- bt.run.share(data1, clean.signal=F, trade.summary = TRUE)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## 8.1 2.3 -5.4

names(buy.hold.0050)

## [1] "weight" "type" "share" "capital"   
## [5] "ret" "best" "worst" "equity"   
## [9] "cagr" "dates.index" "trade.summary"

buy.hold.0050 <-bt.run(data1)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## 8.1 2.3 -5.4

# sma 200 for 0050  
prices<-data1$prices  
sma200<-SMA(prices, 200)  
head(sma200, 201)

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## 2016-05-11 NA  
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## 2016-09-26 NA  
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## 2016-09-30 NA  
## 2016-10-03 NA  
## 2016-10-04 NA  
## 2016-10-05 NA  
## 2016-10-06 NA  
## 2016-10-07 NA  
## 2016-10-11 64.26940  
## 2016-10-12 64.33245

data1$weight[] <- iif(prices >= sma200, 1, 0)  
sma200.0050 <- bt.run(data1, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## 2.2 1.6 -4

sma200.0050$trade.summary

## $stats  
## All Long Short  
## ntrades 9.000000e+00 9.000000e+00 NA  
## avg.pnl 8.075529e-03 8.075529e-03 NA  
## len 4.588889e+01 4.588889e+01 NA  
## win.prob 2.222222e-01 2.222222e-01 NA  
## win.avg.pnl 5.594124e-02 5.594124e-02 NA  
## win.len 1.710000e+02 1.710000e+02 NA  
## loss.prob 7.777778e-01 7.777778e-01 NA  
## loss.avg.pnl -5.600389e-03 -5.600389e-03 NA  
## loss.len 1.014286e+01 1.014286e+01 NA  
## expectancy 8.075529e-05 8.075529e-05 NA  
## profitfactor 2.853947e+00 2.853947e+00 NA  
##   
## $trades  
## symbol weight entry.date exit.date nhold entry.price  
## [1,] "prices" "100" "2016-10-11" "2018-02-06" "483" "71.85"   
## [2,] "prices" "100" "2018-02-23" "2018-03-01" " 6" "81.82"   
## [3,] "prices" "100" "2018-03-07" "2018-03-23" " 16" "82.05"   
## [4,] "prices" "100" "2018-03-27" "2018-03-28" " 1" "83.16"   
## [5,] "prices" "100" "2018-03-30" "2018-04-02" " 3" "82.91"   
## [6,] "prices" "100" "2018-04-11" "2018-04-12" " 1" "82.93"   
## [7,] "prices" "100" "2018-06-06" "2018-06-11" " 5" "83.06"   
## [8,] "prices" "100" "2018-06-13" "2018-06-14" " 1" "82.75"   
## [9,] "prices" "100" "2018-07-13" "2018-10-08" " 87" "83.12"   
## exit.price return   
## [1,] "79.88" "11.18"  
## [2,] "81.62" "-0.24"  
## [3,] "82.06" " 0.01"  
## [4,] "82.46" "-0.84"  
## [5,] "82.36" "-0.66"  
## [6,] "82.53" "-0.48"  
## [7,] "82.59" "-0.57"  
## [8,] "82.07" "-0.82"  
## [9,] "82.87" "-0.30"

# sma 50 for 0050  
sma50<-SMA(prices, 50)  
head(sma50, 51)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
## 2015-12-18 NA  
## 2015-12-21 NA  
## 2015-12-22 NA  
## 2015-12-23 NA  
## 2015-12-24 NA  
## 2015-12-25 NA  
## 2015-12-28 NA  
## 2015-12-29 NA  
## 2015-12-30 NA  
## 2015-12-31 NA  
## 2016-01-04 NA  
## 2016-01-05 NA  
## 2016-01-06 NA  
## 2016-01-07 NA  
## 2016-01-08 NA  
## 2016-01-11 NA  
## 2016-01-12 NA  
## 2016-01-13 NA  
## 2016-01-14 NA  
## 2016-01-15 NA  
## 2016-01-18 NA  
## 2016-01-19 NA  
## 2016-01-20 NA  
## 2016-01-21 NA  
## 2016-01-22 NA  
## 2016-01-25 NA  
## 2016-01-26 NA  
## 2016-01-27 NA  
## 2016-01-28 NA  
## 2016-01-29 NA  
## 2016-01-30 NA  
## 2016-02-01 NA  
## 2016-02-02 NA  
## 2016-02-03 NA  
## 2016-02-15 NA  
## 2016-02-16 NA  
## 2016-02-17 NA  
## 2016-02-18 NA  
## 2016-02-19 NA  
## 2016-02-22 NA  
## 2016-02-23 NA  
## 2016-02-24 NA  
## 2016-02-25 NA  
## 2016-02-26 NA  
## 2016-03-01 NA  
## 2016-03-02 59.2194  
## 2016-03-03 59.2900

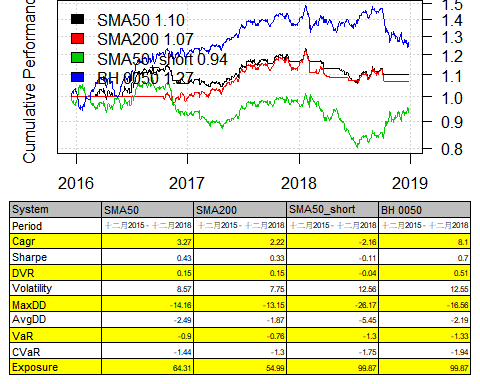
data1$weight[] <- iif(prices >= sma50, 1, 0)  
sma50.0050 <- bt.run(data1, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## 3.3 2.2 -2.4

# sma 50 for 005, short allowed  
data1$weight[] <- iif(prices >= sma50, 1, -1)  
sma50.0050.short <- bt.run(data1, trade.summary=T)

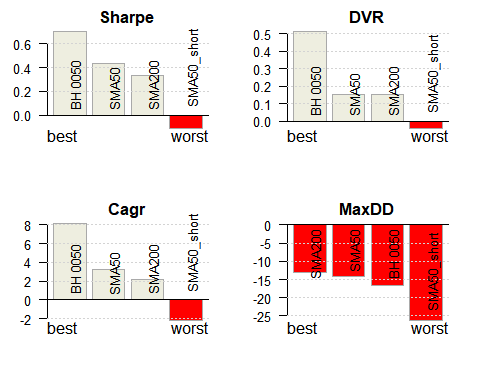
## Latest weights :  
## prices  
## 2018-12-28 -100  
##   
## Performance summary :  
## CAGR Best Worst   
## -2.2 5.4 -2.4

# summary of investment  
models<-list("SMA50"= sma50.0050,   
 "SMA200"= sma200.0050,   
 "SMA50\_short" = sma50.0050.short,   
 "BH 0050" = buy.hold.0050)  
strategy.performance.snapshoot(models, T)



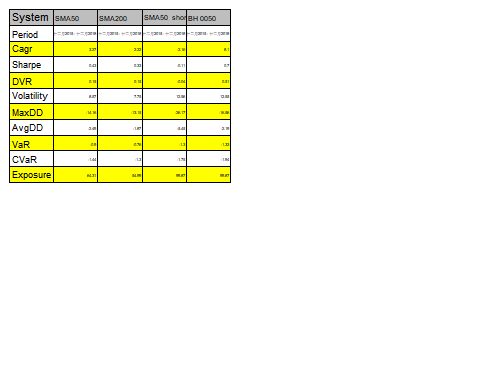
## NULL

strategy.performance.snapshoot(models, control=list(comparison=T), sort.performance=T)



plotbt.strategy.sidebyside(models, return.table=T)

## SMA50 SMA200   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "3.27" "2.22"   
## Sharpe "0.43" "0.33"   
## DVR "0.15" "0.15"   
## Volatility "8.57" "7.75"   
## MaxDD "-14.16" "-13.15"   
## AvgDD "-2.49" "-1.87"   
## VaR "-0.9" "-0.76"   
## CVaR "-1.44" "-1.3"   
## Exposure "64.31" "54.99"   
## SMA50\_short BH 0050   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "-2.16" "8.1"   
## Sharpe "-0.11" "0.7"   
## DVR "-0.04" "0.51"   
## Volatility "12.56" "12.55"   
## MaxDD "-26.17" "-16.56"   
## AvgDD "-5.45" "-2.19"   
## VaR "-1.3" "-1.33"   
## CVaR "-1.75" "-1.94"   
## Exposure "99.87" "99.87"



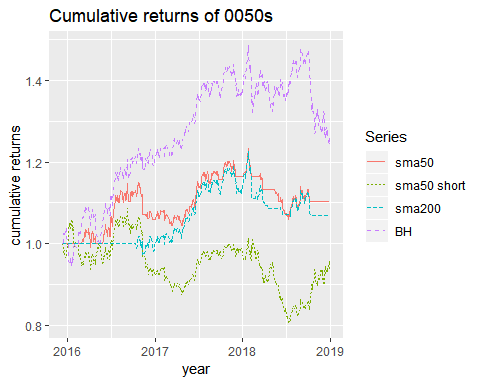
# You can plot in ggplot2  
library(ggplot2)  
all.0050<-merge.xts(sma50.0050$equity,   
 sma50.0050.short$equity,   
 sma200.0050$equity,   
 buy.hold.0050$equity)  
colnames(all.0050)<-c("sma50", "sma50 short", "sma200", "BH")  
head(all.0050)

## sma50 sma50 short sma200 BH  
## 2015-12-14 1 1.0000000 1 1.000000  
## 2015-12-15 1 0.9959562 1 1.004044  
## 2015-12-16 1 0.9872652 1 1.012805  
## 2015-12-17 1 0.9762609 1 1.024094  
## 2015-12-18 1 0.9762609 1 1.024094  
## 2015-12-21 1 0.9838101 1 1.016175

all.0050.long<-fortify(all.0050, melt=T)  
head(all.0050.long)

## Index Series Value  
## 1 2015-12-14 sma50 1  
## 2 2015-12-15 sma50 1  
## 3 2015-12-16 sma50 1  
## 4 2015-12-17 sma50 1  
## 5 2015-12-18 sma50 1  
## 6 2015-12-21 sma50 1

#  
title = "Cumulative returns of 0050s"  
p = ggplot(all.0050.long, aes(x = Index, y = Value)) +  
 geom\_line(aes(linetype = Series, color = Series)) +  
 #geom\_point(aes(shape = Series))+  
 xlab("year") + ylab("cumulative returns")+  
 ggtitle(title)  
p



#0056  
data2<-new.env()  
data2$prices<-etf4.all.1$`0056`  
prices<-data2$prices  
prices

## 0056  
## 2015-12-14 21.06  
## 2015-12-15 21.25  
## 2015-12-16 21.50  
## 2015-12-17 21.76  
## 2015-12-18 21.97  
## 2015-12-21 21.99  
## 2015-12-22 21.98  
## 2015-12-23 22.12  
## 2015-12-24 22.09  
## 2015-12-25 21.94  
## 2015-12-28 22.04  
## 2015-12-29 21.95  
## 2015-12-30 21.94  
## 2015-12-31 21.81  
## 2016-01-04 21.51  
## 2016-01-05 21.42  
## 2016-01-06 21.15  
## 2016-01-07 20.91  
## 2016-01-08 20.95  
## 2016-01-11 20.64  
## 2016-01-12 20.73  
## 2016-01-13 20.73  
## 2016-01-14 20.49  
## 2016-01-15 20.55  
## 2016-01-18 20.40  
## 2016-01-19 20.67  
## 2016-01-20 20.57  
## 2016-01-21 20.44  
## 2016-01-22 20.42  
## 2016-01-25 20.72  
## 2016-01-26 20.73  
## 2016-01-27 20.83  
## 2016-01-28 20.94  
## 2016-01-29 21.24  
## 2016-01-30 21.48  
## 2016-02-01 21.54  
## 2016-02-02 21.70  
## 2016-02-03 21.60  
## 2016-02-15 21.54  
## 2016-02-16 21.74  
## 2016-02-17 21.91  
## 2016-02-18 22.10  
## 2016-02-19 22.21  
## 2016-02-22 22.23  
## 2016-02-23 22.22  
## 2016-02-24 22.22  
## 2016-02-25 22.26  
## 2016-02-26 22.39  
## 2016-03-01 22.58  
## 2016-03-02 22.77  
## 2016-03-03 22.79  
## 2016-03-04 22.79  
## 2016-03-07 22.87  
## 2016-03-08 22.58  
## 2016-03-09 22.55  
## 2016-03-10 22.68  
## 2016-03-11 22.75  
## 2016-03-14 22.86  
## 2016-03-15 22.57  
## 2016-03-16 22.52  
## 2016-03-17 22.68  
## 2016-03-18 22.74  
## 2016-03-21 22.74  
## 2016-03-22 22.68  
## 2016-03-23 22.59  
## 2016-03-24 22.41  
## 2016-03-25 22.43  
## 2016-03-28 22.41  
## 2016-03-29 22.24  
## 2016-03-30 22.33  
## 2016-03-31 22.44  
## 2016-04-01 22.31  
## 2016-04-06 22.05  
## 2016-04-07 21.95  
## 2016-04-08 21.95  
## 2016-04-11 21.96  
## 2016-04-12 22.01  
## 2016-04-13 22.10  
## 2016-04-14 22.24  
## 2016-04-15 22.26  
## 2016-04-18 22.23  
## 2016-04-19 22.23  
## 2016-04-20 21.93  
## 2016-04-21 21.85  
## 2016-04-22 21.78  
## 2016-04-25 21.84  
## 2016-04-26 21.99  
## 2016-04-27 21.99  
## 2016-04-28 21.82  
## 2016-04-29 21.58  
## 2016-05-03 21.36  
## 2016-05-04 21.05  
## 2016-05-05 20.86  
## 2016-05-06 20.77  
## 2016-05-09 20.78  
## 2016-05-10 20.77  
## 2016-05-11 20.89  
## 2016-05-12 20.83  
## 2016-05-13 20.59  
## 2016-05-16 20.75  
## 2016-05-17 20.83  
## 2016-05-18 20.85  
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## 2016-05-20 20.80  
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## 2016-05-25 21.45  
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## 2016-05-30 21.82  
## 2016-05-31 21.86  
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## 2016-06-02 22.09  
## 2016-06-03 22.04  
## 2016-06-04 22.04  
## 2016-06-06 22.02  
## 2016-06-07 22.21  
## 2016-06-08 22.39  
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## 2016-06-30 22.57  
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## 2016-07-06 22.67  
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## 2016-08-02 24.57  
## 2016-08-03 24.45  
## 2016-08-04 24.47  
## 2016-08-05 24.58  
## 2016-08-08 24.63  
## 2016-08-09 24.70  
## 2016-08-10 24.64  
## 2016-08-11 24.53  
## 2016-08-12 24.57  
## 2016-08-15 24.59  
## 2016-08-16 24.61  
## 2016-08-17 24.54  
## 2016-08-18 24.69  
## 2016-08-19 24.80  
## 2016-08-22 24.38  
## 2016-08-23 24.37  
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## 2016-08-25 24.61  
## 2016-08-26 24.72  
## 2016-08-29 24.58  
## 2016-08-30 24.72  
## 2016-08-31 24.70  
## 2016-09-01 24.41  
## 2016-09-02 24.35  
## 2016-09-05 24.61  
## 2016-09-06 24.82  
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## 2016-09-08 25.06  
## 2016-09-09 24.94  
## 2016-09-10 24.61  
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## 2016-09-13 24.49  
## 2016-09-14 24.34  
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## 2016-09-20 24.78  
## 2016-09-21 24.87  
## 2016-09-22 25.02  
## 2016-09-23 25.02  
## 2016-09-26 24.89  
## 2016-09-29 25.07  
## 2016-09-30 25.04  
## 2016-10-03 25.04  
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## 2016-12-21 23.02  
## 2016-12-22 22.93  
## 2016-12-23 22.84  
## 2016-12-26 22.83  
## 2016-12-27 22.88  
## 2016-12-28 22.96  
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## 2017-03-31 24.76  
## 2017-04-05 24.89  
## 2017-04-06 24.86  
## 2017-04-07 24.76  
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## 2017-04-11 24.65  
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sma50<-SMA(prices, 50)  
head(sma50, 51)

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## 2016-03-03 21.5132

# buy and hold for 0056  
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names(data2)

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data2$dates

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## 2018-12-26 NA  
## 2018-12-27 NA  
## 2018-12-28 NA

data2$execution.price = prices  
  
data2$weight[] = 1  
buy.hold.0056 <- bt.run.share(data2, clean.signal=F, trade.summary = TRUE)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## 4.3 2.2 -6

buy.hold.0056 <-bt.run(data2)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## 4.3 2.2 -6

# sma 200 for 0056  
prices<-data2$prices  
sma200<-SMA(prices, 200)  
head(sma200, 201)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
## 2015-12-18 NA  
## 2015-12-21 NA  
## 2015-12-22 NA  
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## 2016-10-03 NA  
## 2016-10-04 NA  
## 2016-10-05 NA  
## 2016-10-06 NA  
## 2016-10-07 NA  
## 2016-10-11 22.6871  
## 2016-10-12 22.7065

data2$weight[] <- iif(prices >= sma200, 1, 0)  
sma200.0056 <- bt.run(data2, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## -3.1 1.5 -5.6

# sma 50 for 0056  
sma50<-SMA(prices, 50)  
head(sma50, 51)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
## 2015-12-18 NA  
## 2015-12-21 NA  
## 2015-12-22 NA  
## 2015-12-23 NA  
## 2015-12-24 NA  
## 2015-12-25 NA  
## 2015-12-28 NA  
## 2015-12-29 NA  
## 2015-12-30 NA  
## 2015-12-31 NA  
## 2016-01-04 NA  
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## 2016-01-30 NA  
## 2016-02-01 NA  
## 2016-02-02 NA  
## 2016-02-03 NA  
## 2016-02-15 NA  
## 2016-02-16 NA  
## 2016-02-17 NA  
## 2016-02-18 NA  
## 2016-02-19 NA  
## 2016-02-22 NA  
## 2016-02-23 NA  
## 2016-02-24 NA  
## 2016-02-25 NA  
## 2016-02-26 NA  
## 2016-03-01 NA  
## 2016-03-02 21.4786  
## 2016-03-03 21.5132

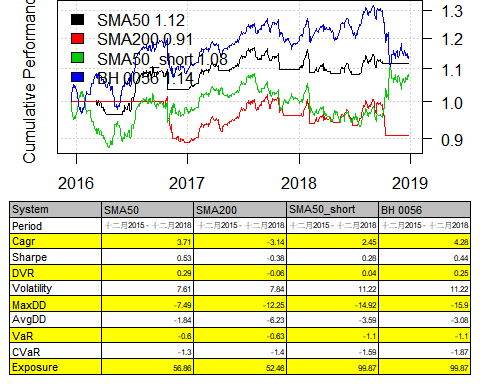
data2$weight[] <- iif(prices >= sma50, 1, 0)  
sma50.0056 <- bt.run(data2, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## 3.7 2.2 -5.6

# sma 50 for 0056, short allowed  
data2$weight[] <- iif(prices >= sma50, 1, -1)  
sma50.0056.short <- bt.run(data2, trade.summary=T)

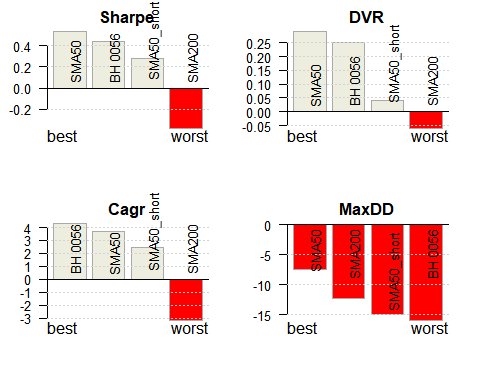
## Latest weights :  
## prices  
## 2018-12-28 -100  
##   
## Performance summary :  
## CAGR Best Worst   
## 2.5 6 -5.6

# summary of investment  
models<-list("SMA50"= sma50.0056,   
 "SMA200"= sma200.0056,  
 "SMA50\_short" = sma50.0056.short,   
 "BH 0056" = buy.hold.0056)  
strategy.performance.snapshoot(models, T)



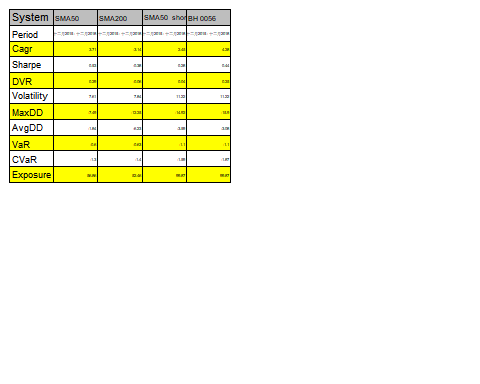
## NULL

strategy.performance.snapshoot(models, control=list(comparison=T), sort.performance=T)



plotbt.strategy.sidebyside(models, return.table=T)

## SMA50 SMA200   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "3.71" "-3.14"   
## Sharpe "0.53" "-0.38"   
## DVR "0.29" "-0.06"   
## Volatility "7.61" "7.84"   
## MaxDD "-7.49" "-12.25"   
## AvgDD "-1.84" "-6.23"   
## VaR "-0.6" "-0.63"   
## CVaR "-1.3" "-1.4"   
## Exposure "56.86" "52.46"   
## SMA50\_short BH 0056   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "2.45" "4.28"   
## Sharpe "0.28" "0.44"   
## DVR "0.04" "0.25"   
## Volatility "11.22" "11.22"   
## MaxDD "-14.92" "-15.9"   
## AvgDD "-3.59" "-3.08"   
## VaR "-1.1" "-1.1"   
## CVaR "-1.59" "-1.87"   
## Exposure "99.87" "99.87"



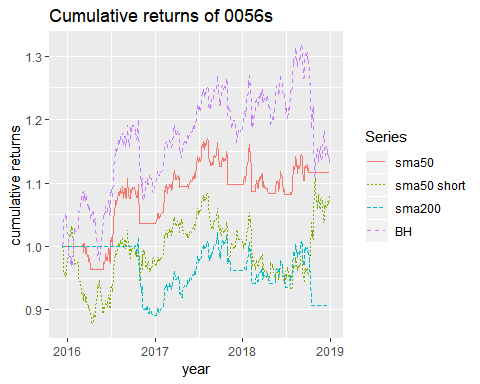
library(ggplot2)  
all.0056<-merge.xts(sma50.0056$equity,   
 sma50.0056.short$equity,   
 sma200.0056$equity,  
 buy.hold.0056$equity)  
colnames(all.0056)<-c("sma50", "sma50 short", "sma200", "BH")  
head(all.0056)

## sma50 sma50 short sma200 BH  
## 2015-12-14 1 1.0000000 1 1.000000  
## 2015-12-15 1 0.9909782 1 1.009022  
## 2015-12-16 1 0.9793196 1 1.020893  
## 2015-12-17 1 0.9674767 1 1.033238  
## 2015-12-18 1 0.9581398 1 1.043210  
## 2015-12-21 1 0.9572676 1 1.044160

all.0056.long<-fortify(all.0056, melt=T)  
head(all.0056.long)

## Index Series Value  
## 1 2015-12-14 sma50 1  
## 2 2015-12-15 sma50 1  
## 3 2015-12-16 sma50 1  
## 4 2015-12-17 sma50 1  
## 5 2015-12-18 sma50 1  
## 6 2015-12-21 sma50 1

#  
title = "Cumulative returns of 0056s"  
p = ggplot(all.0056.long, aes(x = Index, y = Value)) +  
 geom\_line(aes(linetype = Series, color = Series)) +  
 #geom\_point(aes(shape = Series))+  
 xlab("year") + ylab("cumulative returns")+  
 ggtitle(title)  
p



#006025  
data3<-new.env()  
data3$prices<-etf4.all.1$`006205`  
prices<-data3$prices  
prices

## 006205  
## 2015-12-14 30.98  
## 2015-12-15 31.66  
## 2015-12-16 31.67  
## 2015-12-17 32.06  
## 2015-12-18 32.23  
## 2015-12-21 32.62  
## 2015-12-22 33.11  
## 2015-12-23 33.35  
## 2015-12-24 33.02  
## 2015-12-25 33.02  
## 2015-12-28 32.87  
## 2015-12-29 32.14  
## 2015-12-30 31.98  
## 2015-12-31 31.97  
## 2016-01-04 31.02  
## 2016-01-05 29.94  
## 2016-01-06 29.94  
## 2016-01-07 28.41  
## 2016-01-08 28.62  
## 2016-01-11 28.47  
## 2016-01-12 27.97  
## 2016-01-13 28.21  
## 2016-01-14 27.05  
## 2016-01-15 27.49  
## 2016-01-18 27.11  
## 2016-01-19 27.74  
## 2016-01-20 27.67  
## 2016-01-21 27.62  
## 2016-01-22 27.30  
## 2016-01-25 27.60  
## 2016-01-26 27.15  
## 2016-01-27 25.88  
## 2016-01-28 25.70  
## 2016-01-29 25.65  
## 2016-01-30 26.21  
## 2016-02-01 25.69  
## 2016-02-02 25.66  
## 2016-02-03 25.47  
## 2016-02-15 25.42  
## 2016-02-16 26.47  
## 2016-02-17 26.56  
## 2016-02-18 26.94  
## 2016-02-19 26.74  
## 2016-02-22 27.07  
## 2016-02-23 27.13  
## 2016-02-24 27.00  
## 2016-02-25 26.56  
## 2016-02-26 25.90  
## 2016-03-01 25.55  
## 2016-03-02 26.09  
## 2016-03-03 26.70  
## 2016-03-04 26.77  
## 2016-03-07 27.27  
## 2016-03-08 26.68  
## 2016-03-09 26.78  
## 2016-03-10 27.03  
## 2016-03-11 26.59  
## 2016-03-14 27.11  
## 2016-03-15 26.89  
## 2016-03-16 26.99  
## 2016-03-17 27.34  
## 2016-03-18 27.74  
## 2016-03-21 28.35  
## 2016-03-22 28.37  
## 2016-03-23 28.13  
## 2016-03-24 27.86  
## 2016-03-25 27.72  
## 2016-03-28 27.93  
## 2016-03-29 27.45  
## 2016-03-30 27.49  
## 2016-03-31 27.83  
## 2016-04-01 27.52  
## 2016-04-06 27.87  
## 2016-04-07 27.87  
## 2016-04-08 27.49  
## 2016-04-11 27.83  
## 2016-04-12 27.79  
## 2016-04-13 28.28  
## 2016-04-14 28.37  
## 2016-04-15 28.31  
## 2016-04-18 28.03  
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## 2018-12-28 NA

data3$execution.price = prices  
  
data3$weight[] = 1  
buy.hold.006205 <- bt.run.share(data3, clean.signal=F, trade.summary = TRUE)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## -6.5 5 -5.6

buy.hold.006205 <-bt.run(data3)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## -6.5 5 -5.6

# sma 200 for 006025  
prices<-data3$prices  
sma200<-SMA(prices, 200)  
head(sma200, 201)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
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## 2016-10-06 NA  
## 2016-10-07 NA  
## 2016-10-11 27.4799  
## 2016-10-12 27.4596

data3$weight[] <- iif(prices >= sma200, 1, 0)  
sma200.006205 <- bt.run(data3, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## 0.5 3.2 -5.6

# sma 50 for 006025  
sma50<-SMA(prices, 50)  
head(sma50, 51)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
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## 2016-02-24 NA  
## 2016-02-25 NA  
## 2016-02-26 NA  
## 2016-03-01 NA  
## 2016-03-02 28.5936  
## 2016-03-03 28.5080

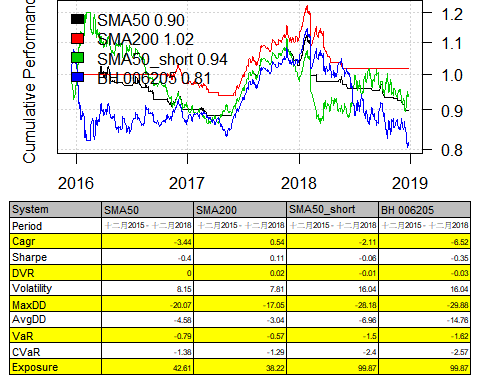
data3$weight[] <- iif(prices >= sma50, 1, 0)  
sma50.006205 <- bt.run(data3, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## -3.4 2.2 -5.6

# sma 50 for 006205, short allowed  
data3$weight[] <- iif(prices >= sma50, 1, -1)  
sma50.006205.short <- bt.run(data3, trade.summary=T)

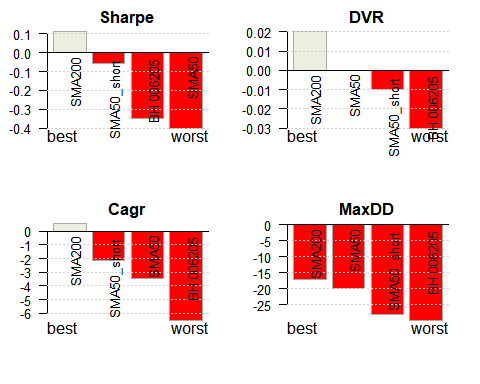
## Latest weights :  
## prices  
## 2018-12-28 -100  
##   
## Performance summary :  
## CAGR Best Worst   
## -2.1 5.1 -5.6

# summary of investment  
models<-list("SMA50"= sma50.006205,  
 "SMA200"= sma200.006205,  
 "SMA50\_short" = sma50.006205.short,   
 "BH 006205" = buy.hold.006205)  
strategy.performance.snapshoot(models, T)



## NULL

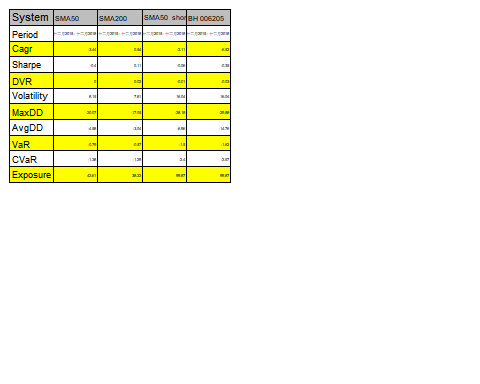
strategy.performance.snapshoot(models, control=list(comparison=T), sort.performance=T)



plotbt.strategy.sidebyside(models, return.table=T)

## SMA50 SMA200   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "-3.44" "0.54"   
## Sharpe "-0.4" "0.11"   
## DVR "0" "0.02"   
## Volatility "8.15" "7.81"   
## MaxDD "-20.07" "-17.05"   
## AvgDD "-4.58" "-3.04"   
## VaR "-0.79" "-0.57"   
## CVaR "-1.38" "-1.29"   
## Exposure "42.61" "38.22"   
## SMA50\_short BH 006205   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "-2.11" "-6.52"   
## Sharpe "-0.06" "-0.35"   
## DVR "-0.01" "-0.03"   
## Volatility "16.04" "16.04"   
## MaxDD "-28.18" "-29.88"   
## AvgDD "-6.96" "-14.76"   
## VaR "-1.5" "-1.62"   
## CVaR "-2.4" "-2.57"   
## Exposure "99.87" "99.87"

#



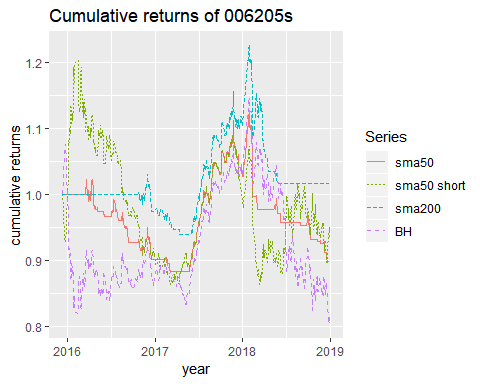
library(ggplot2)  
all.006205<-merge.xts(sma50.006205$equity,   
 sma50.006205.short$equity,   
 sma200.006205$equity,  
 buy.hold.006205$equity)  
colnames(all.006205)<-c("sma50", "sma50 short", "sma200", "BH")  
head(all.006205)

## sma50 sma50 short sma200 BH  
## 2015-12-14 1 1.0000000 1 1.000000  
## 2015-12-15 1 0.9780504 1 1.021950  
## 2015-12-16 1 0.9777414 1 1.022272  
## 2015-12-17 1 0.9657010 1 1.034861  
## 2015-12-18 1 0.9605804 1 1.040349  
## 2015-12-21 1 0.9489568 1 1.052937

all.006205.long<-fortify(all.006205, melt=T)  
head(all.006205.long)

## Index Series Value  
## 1 2015-12-14 sma50 1  
## 2 2015-12-15 sma50 1  
## 3 2015-12-16 sma50 1  
## 4 2015-12-17 sma50 1  
## 5 2015-12-18 sma50 1  
## 6 2015-12-21 sma50 1

#  
title = "Cumulative returns of 006205s"  
p = ggplot(all.006205.long, aes(x = Index, y = Value)) +  
 geom\_line(aes(linetype = Series, color = Series)) +  
 #geom\_point(aes(shape = Series))+  
 xlab("year") + ylab("cumulative returns")+  
 ggtitle(title)  
p



#00646  
data4<-new.env()  
data4$prices<-etf4.all.1$`00646`  
prices<-data4$prices  
prices

## 00646  
## 2015-12-14 19.54  
## 2015-12-15 19.70  
## 2015-12-16 19.80  
## 2015-12-17 20.05  
## 2015-12-18 19.87  
## 2015-12-21 19.64  
## 2015-12-22 19.71  
## 2015-12-23 19.80  
## 2015-12-24 20.01  
## 2015-12-25 19.98  
## 2015-12-28 19.99  
## 2015-12-29 19.99  
## 2015-12-30 20.12  
## 2015-12-31 20.07  
## 2016-01-04 19.90  
## 2016-01-05 19.78  
## 2016-01-06 19.68  
## 2016-01-07 19.50  
## 2016-01-08 19.32  
## 2016-01-11 18.92  
## 2016-01-12 19.02  
## 2016-01-13 19.29  
## 2016-01-14 18.77  
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## 2016-01-18 18.75  
## 2016-01-19 18.83  
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head(sma50, 51)

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# buy and hold for 00646  
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class(data4$dates)

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## 2018-11-07 NA  
## 2018-11-08 NA  
## 2018-11-09 NA  
## 2018-11-12 NA  
## 2018-11-13 NA  
## 2018-11-14 NA  
## 2018-11-15 NA  
## 2018-11-16 NA  
## 2018-11-19 NA  
## 2018-11-20 NA  
## 2018-11-21 NA  
## 2018-11-22 NA  
## 2018-11-23 NA  
## 2018-11-26 NA  
## 2018-11-27 NA  
## 2018-11-28 NA  
## 2018-11-29 NA  
## 2018-11-30 NA  
## 2018-12-03 NA  
## 2018-12-04 NA  
## 2018-12-05 NA  
## 2018-12-06 NA  
## 2018-12-07 NA  
## 2018-12-10 NA  
## 2018-12-11 NA  
## 2018-12-12 NA  
## 2018-12-13 NA  
## 2018-12-14 NA  
## 2018-12-17 NA  
## 2018-12-18 NA  
## 2018-12-19 NA  
## 2018-12-20 NA  
## 2018-12-21 NA  
## 2018-12-22 NA  
## 2018-12-24 NA  
## 2018-12-25 NA  
## 2018-12-26 NA  
## 2018-12-27 NA  
## 2018-12-28 NA

data4$execution.price = prices  
  
data4$weight[] = 1  
buy.hold.00646 <- bt.run.share(data4, clean.signal=F, trade.summary = TRUE)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## 5.7 3.7 -3.8

buy.hold.00646 <-bt.run(data4)

## Latest weights :  
## prices  
## 2018-12-28 100  
##   
## Performance summary :  
## CAGR Best Worst   
## 5.7 3.7 -3.8

# sma 200 for 00646  
prices<-data4$prices  
sma200<-SMA(prices, 200)  
head(sma200, 201)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
## 2015-12-18 NA  
## 2015-12-21 NA  
## 2015-12-22 NA  
## 2015-12-23 NA  
## 2015-12-24 NA  
## 2015-12-25 NA  
## 2015-12-28 NA  
## 2015-12-29 NA  
## 2015-12-30 NA  
## 2015-12-31 NA  
## 2016-01-04 NA  
## 2016-01-05 NA  
## 2016-01-06 NA  
## 2016-01-07 NA  
## 2016-01-08 NA  
## 2016-01-11 NA  
## 2016-01-12 NA  
## 2016-01-13 NA  
## 2016-01-14 NA  
## 2016-01-15 NA  
## 2016-01-18 NA  
## 2016-01-19 NA  
## 2016-01-20 NA  
## 2016-01-21 NA  
## 2016-01-22 NA  
## 2016-01-25 NA  
## 2016-01-26 NA  
## 2016-01-27 NA  
## 2016-01-28 NA  
## 2016-01-29 NA  
## 2016-01-30 NA  
## 2016-02-01 NA  
## 2016-02-02 NA  
## 2016-02-03 NA  
## 2016-02-15 NA  
## 2016-02-16 NA  
## 2016-02-17 NA  
## 2016-02-18 NA  
## 2016-02-19 NA  
## 2016-02-22 NA  
## 2016-02-23 NA  
## 2016-02-24 NA  
## 2016-02-25 NA  
## 2016-02-26 NA  
## 2016-03-01 NA  
## 2016-03-02 NA  
## 2016-03-03 NA  
## 2016-03-04 NA  
## 2016-03-07 NA  
## 2016-03-08 NA  
## 2016-03-09 NA  
## 2016-03-10 NA  
## 2016-03-11 NA  
## 2016-03-14 NA  
## 2016-03-15 NA  
## 2016-03-16 NA  
## 2016-03-17 NA  
## 2016-03-18 NA  
## 2016-03-21 NA  
## 2016-03-22 NA  
## 2016-03-23 NA  
## 2016-03-24 NA  
## 2016-03-25 NA  
## 2016-03-28 NA  
## 2016-03-29 NA  
## 2016-03-30 NA  
## 2016-03-31 NA  
## 2016-04-01 NA  
## 2016-04-06 NA  
## 2016-04-07 NA  
## 2016-04-08 NA  
## 2016-04-11 NA  
## 2016-04-12 NA  
## 2016-04-13 NA  
## 2016-04-14 NA  
## 2016-04-15 NA  
## 2016-04-18 NA  
## 2016-04-19 NA  
## 2016-04-20 NA  
## 2016-04-21 NA  
## 2016-04-22 NA  
## 2016-04-25 NA  
## 2016-04-26 NA  
## 2016-04-27 NA  
## 2016-04-28 NA  
## 2016-04-29 NA  
## 2016-05-03 NA  
## 2016-05-04 NA  
## 2016-05-05 NA  
## 2016-05-06 NA  
## 2016-05-09 NA  
## 2016-05-10 NA  
## 2016-05-11 NA  
## 2016-05-12 NA  
## 2016-05-13 NA  
## 2016-05-16 NA  
## 2016-05-17 NA  
## 2016-05-18 NA  
## 2016-05-19 NA  
## 2016-05-20 NA  
## 2016-05-23 NA  
## 2016-05-24 NA  
## 2016-05-25 NA  
## 2016-05-26 NA  
## 2016-05-27 NA  
## 2016-05-30 NA  
## 2016-05-31 NA  
## 2016-06-01 NA  
## 2016-06-02 NA  
## 2016-06-03 NA  
## 2016-06-04 NA  
## 2016-06-06 NA  
## 2016-06-07 NA  
## 2016-06-08 NA  
## 2016-06-13 NA  
## 2016-06-14 NA  
## 2016-06-15 NA  
## 2016-06-16 NA  
## 2016-06-17 NA  
## 2016-06-20 NA  
## 2016-06-21 NA  
## 2016-06-22 NA  
## 2016-06-23 NA  
## 2016-06-24 NA  
## 2016-06-27 NA  
## 2016-06-28 NA  
## 2016-06-29 NA  
## 2016-06-30 NA  
## 2016-07-01 NA  
## 2016-07-04 NA  
## 2016-07-05 NA  
## 2016-07-06 NA  
## 2016-07-07 NA  
## 2016-07-11 NA  
## 2016-07-12 NA  
## 2016-07-13 NA  
## 2016-07-14 NA  
## 2016-07-15 NA  
## 2016-07-18 NA  
## 2016-07-19 NA  
## 2016-07-20 NA  
## 2016-07-21 NA  
## 2016-07-22 NA  
## 2016-07-25 NA  
## 2016-07-26 NA  
## 2016-07-27 NA  
## 2016-07-28 NA  
## 2016-07-29 NA  
## 2016-08-01 NA  
## 2016-08-02 NA  
## 2016-08-03 NA  
## 2016-08-04 NA  
## 2016-08-05 NA  
## 2016-08-08 NA  
## 2016-08-09 NA  
## 2016-08-10 NA  
## 2016-08-11 NA  
## 2016-08-12 NA  
## 2016-08-15 NA  
## 2016-08-16 NA  
## 2016-08-17 NA  
## 2016-08-18 NA  
## 2016-08-19 NA  
## 2016-08-22 NA  
## 2016-08-23 NA  
## 2016-08-24 NA  
## 2016-08-25 NA  
## 2016-08-26 NA  
## 2016-08-29 NA  
## 2016-08-30 NA  
## 2016-08-31 NA  
## 2016-09-01 NA  
## 2016-09-02 NA  
## 2016-09-05 NA  
## 2016-09-06 NA  
## 2016-09-07 NA  
## 2016-09-08 NA  
## 2016-09-09 NA  
## 2016-09-10 NA  
## 2016-09-12 NA  
## 2016-09-13 NA  
## 2016-09-14 NA  
## 2016-09-19 NA  
## 2016-09-20 NA  
## 2016-09-21 NA  
## 2016-09-22 NA  
## 2016-09-23 NA  
## 2016-09-26 NA  
## 2016-09-29 NA  
## 2016-09-30 NA  
## 2016-10-03 NA  
## 2016-10-04 NA  
## 2016-10-05 NA  
## 2016-10-06 NA  
## 2016-10-07 NA  
## 2016-10-11 19.8460  
## 2016-10-12 19.8486

data4$weight[] <- iif(prices >= sma200, 1, 0)  
sma200.00646 <- bt.run(data4, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## 3.5 2.7 -3.8

# sma 50 for 00646  
sma50<-SMA(prices, 50)  
head(sma50, 51)

## SMA  
## 2015-12-14 NA  
## 2015-12-15 NA  
## 2015-12-16 NA  
## 2015-12-17 NA  
## 2015-12-18 NA  
## 2015-12-21 NA  
## 2015-12-22 NA  
## 2015-12-23 NA  
## 2015-12-24 NA  
## 2015-12-25 NA  
## 2015-12-28 NA  
## 2015-12-29 NA  
## 2015-12-30 NA  
## 2015-12-31 NA  
## 2016-01-04 NA  
## 2016-01-05 NA  
## 2016-01-06 NA  
## 2016-01-07 NA  
## 2016-01-08 NA  
## 2016-01-11 NA  
## 2016-01-12 NA  
## 2016-01-13 NA  
## 2016-01-14 NA  
## 2016-01-15 NA  
## 2016-01-18 NA  
## 2016-01-19 NA  
## 2016-01-20 NA  
## 2016-01-21 NA  
## 2016-01-22 NA  
## 2016-01-25 NA  
## 2016-01-26 NA  
## 2016-01-27 NA  
## 2016-01-28 NA  
## 2016-01-29 NA  
## 2016-01-30 NA  
## 2016-02-01 NA  
## 2016-02-02 NA  
## 2016-02-03 NA  
## 2016-02-15 NA  
## 2016-02-16 NA  
## 2016-02-17 NA  
## 2016-02-18 NA  
## 2016-02-19 NA  
## 2016-02-22 NA  
## 2016-02-23 NA  
## 2016-02-24 NA  
## 2016-02-25 NA  
## 2016-02-26 NA  
## 2016-03-01 NA  
## 2016-03-02 19.2538  
## 2016-03-03 19.2522

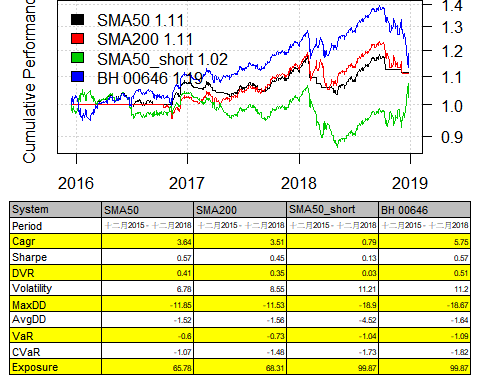
data4$weight[] <- iif(prices >= sma50, 1, 0)  
sma50.00646 <- bt.run(data4, trade.summary=T)

## Latest weights :  
## prices  
## 2018-12-28 0  
##   
## Performance summary :  
## CAGR Best Worst   
## 3.6 1.7 -3.8

# sma 50 for 00646, short allowed  
data4$weight[] <- iif(prices >= sma50, 1, -1)  
sma50.00646.short <- bt.run(data4, trade.summary=T)

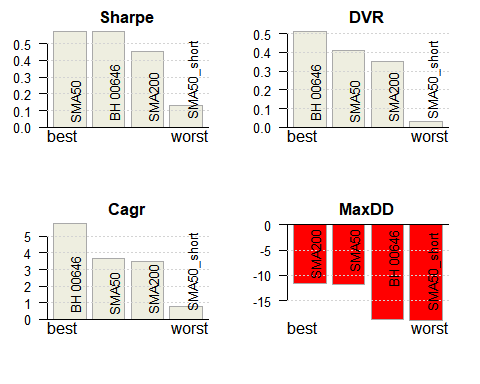
## Latest weights :  
## prices  
## 2018-12-28 -100  
##   
## Performance summary :  
## CAGR Best Worst   
## 0.8 3 -3.8

# summary of investment  
models<-list("SMA50"= sma50.00646,  
 "SMA200"= sma200.00646,  
 "SMA50\_short" = sma50.00646.short,   
 "BH 00646" = buy.hold.00646)  
strategy.performance.snapshoot(models, T)



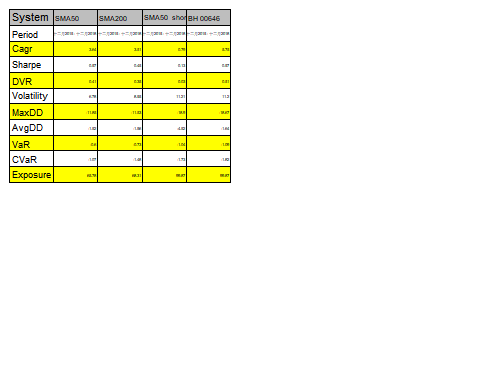
## NULL

strategy.performance.snapshoot(models, control=list(comparison=T), sort.performance=T)



plotbt.strategy.sidebyside(models, return.table=T)

## SMA50 SMA200   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "3.64" "3.51"   
## Sharpe "0.57" "0.45"   
## DVR "0.41" "0.35"   
## Volatility "6.78" "8.55"   
## MaxDD "-11.85" "-11.53"   
## AvgDD "-1.52" "-1.56"   
## VaR "-0.6" "-0.73"   
## CVaR "-1.07" "-1.48"   
## Exposure "65.78" "68.31"   
## SMA50\_short BH 00646   
## Period "十二月2015 - 十二月2018" "十二月2015 - 十二月2018"  
## Cagr "0.79" "5.75"   
## Sharpe "0.13" "0.57"   
## DVR "0.03" "0.51"   
## Volatility "11.21" "11.2"   
## MaxDD "-18.9" "-18.67"   
## AvgDD "-4.52" "-1.64"   
## VaR "-1.04" "-1.09"   
## CVaR "-1.73" "-1.82"   
## Exposure "99.87" "99.87"



library(ggplot2)  
all.00646<-merge.xts(sma50.00646$equity,   
 sma50.00646.short$equity,   
 sma200.00646$equity,  
 buy.hold.00646$equity)  
colnames(all.00646)<-c("sma50", "sma50 short", "sma200", "BH")  
head(all.00646)

## sma50 sma50 short sma200 BH  
## 2015-12-14 1 1.0000000 1 1.000000  
## 2015-12-15 1 0.9918117 1 1.008188  
## 2015-12-16 1 0.9867771 1 1.013306  
## 2015-12-17 1 0.9743178 1 1.026100  
## 2015-12-18 1 0.9830648 1 1.016888  
## 2015-12-21 1 0.9944440 1 1.005118

all.00646.long<-fortify(all.00646, melt=T)  
head(all.00646.long)

## Index Series Value  
## 1 2015-12-14 sma50 1  
## 2 2015-12-15 sma50 1  
## 3 2015-12-16 sma50 1  
## 4 2015-12-17 sma50 1  
## 5 2015-12-18 sma50 1  
## 6 2015-12-21 sma50 1

#  
title = "Cumulative returns of 00646s"  
p = ggplot(all.00646.long, aes(x = Index, y = Value)) +  
 geom\_line(aes(linetype = Series, color = Series)) +  
 #geom\_point(aes(shape = Series))+  
 xlab("year") + ylab("cumulative returns")+  
 ggtitle(title)  
p

