

Assignment 1

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Introduction

This report is written for the 1st assignment of the Financial Trading Systems course 2018 at the Bond University. During the first weeks we learned how to use the Blotter Framework in R to implement a trading strategy, backtest the strategy on a set of instruments (stock, futures, etc.) and visualize meaningful results which give insights about the strategy. Moreover, we learned how to compare the strategy to another alternative (e.g. a buy and hold strategy). The trading idea, implementation and analysis and results are summarized in the following report.

Trading Idea

Smash Day by Larry Williams

The trading idea which is used for this report is based on the Smash Day strategy introduced by Larry Williams in his book “Long Term Secrets to short term trading” 2012. The basic theoretical foundation is set by the concept of autocorrelation. There are two autocorrelation principles which can be empirically observed. The positive autocorrelation which describes the fact that if we observe an upward movement it is more likely to observe an upward movement in the future. The same is valid for a negative trend. However, the negative autocorrelation can be observed on short term time periods. We can expect a price to bounce up again after a sharp down movement and vice versa. Larry Williams’ Smash Day pattern is based on the observation of this autocorrelation behaviour. A Smash Day pattern is initialized when we observe a close which is lower than the previous day’s low. This looks like a breakout to the downside. If the very next day the price moves opposite the Smash Day and trades above the high of the Smash Day this is according to Williams a buy signal. Williams explains this buy signal with a feeling of hurt felt by the public as a result of an unfulfilled breakout. The public would want to get back on track and the price responds with a reversal. The exact opposite is true for a Sell setup. The Smash Day is set up when we observe a close above the previous day’s high. The sell signal is initiated when the price reverses immediately the next day and falls below the smash day’s low.

Own variation of the Smash Day trading strategy

In addition to the Smash Day pattern, I have incorporated another rule for the buy signal and 2 additional components for the sell signal. I want to make sure that I only enter long when we are observing a longlasting upward trend. In order to do this buy orders are only performed when the current price is above the exponential moving average of the last 200 days. After that the Smash Day pattern is checked. For the sell I incorporated two “harder” conditions before checking whether we observe a Smash Day (sell). The first is that a maximum holding period can be set in order to make sure that a position is not open for too long. The second sell case is when the price falls below the 200 day exponential moving average the position is liquidated. If both is not the case a check for the smash day pattern is performed. If we observe it, we sell the current position.

These variations are incorporated to reduce the risk of falling prices.

Implementation of the trading idea

Part A: Initialization

Step 1: General Setup

The environment has to be cleared in order to ensure a reproducible setup. Moreover, the blotter library and the INF361Course library are loaded.

```
# Clear Environment
rm(list=ls())

# Loading libraries
library(blotter)
library(INFT361Course)
```

Step 2: Setting the Variables

The variables set in the next section can be adjusted to test the strategy with different parameters. The critical variables which should be adjusted to test the strategy are: * daterange * emaPeriod * maxHoldingPeriod * instrumentlist * BuyHoldInstrument

```
# Set values:
startCapital <- 1e+6
transactionCost <- -20
daterange <- '2000::2018'
emaPeriod <- 400
maxHoldingPeriod <- 4

InstrumentDirectory <- "~/Desktop/R/DownloadedData/"
instrumentlist <- c("BAY.csv", "DBK.csv", "HEI.csv", "TKA.csv", "VOW.csv")
BuyHoldDirectory <- "~/Desktop/R/DownloadedData/"
BuyHoldInstrument <- "DAXEX.csv"

currency("EUR")
Sys.setenv(TZ="UTC")
initdate <- '1999-12-31'
startdate <- '2000-01-01'
enddate <- '2018-12-31'
portfolioname <- "Smash Day"
accountname <- portfolioname
```

Step 3: Presetup for plotting graphs

Some setup for plotting the graphs in the visualization is performed here to ensure that the Theme is available later, when it is needed and used.

```
# Settings for graph
myTheme <- chart_theme()
myTheme$col$up.col <- 'lightblue'
myTheme$col$dn.col <- 'brown'
myTheme$col$dn.border <- 'lightgray'
myTheme$col$up.border <- 'lightgray'

# Concatenate string for EMA with input parameter
addEMAStrng <- paste("add_EMA(n=", emaPeriod, ")", sep = "")
```

Step 4: Initializing the portfolio

The portfolio takes the instrumentlist which includes all the stocks we defined in Step 2.

```
# Clear portfolio and Account
suppressWarnings(rm("account.Smash Day","portfolio.Smash Day",
                    "account.buyhold","portfolio.buyhold",
                    pos=.blotter))

# Initialize Portfolio and Account
initPortf(portfolioname,
          instrumentlist,
          initDate=initdate,
          currency="EUR")

initAcct(accountname,
          portfolios=portfolioname,
          initDate=initdate,
          initEq=startCapital,
          currency="EUR")
```

Part B: Bar by bar processing

Step 1: Go through the data bar by bar

In this step the bar by bar processing is implemented. Thus, a for loop is implemented to loop through the instrumentlist. For each instrument in the list the data is loaded and the exponential moving average is added to the data. Furthermore, another for loop is used to loop through the dates bar by bar. In this step the defined strategy is applied.

```
for (instrument in instrumentlist) {
  LoadCourseFile(InstrumentDirectory, instrument, debugme = TRUE, dates = daterange)

  # Initialize the instrument
  stock(instrument, currency = "EUR")

  # Load the XTS file
  symbol <- get(instrument)

  # Calculate the Exponential Moving Average
  ema <- EMA(symbol$Close, n=emaPeriod)

  # Merge the xts file with the Exponential Moving Average
  symbol <- merge(symbol,ema)
  assign(instrument,symbol)

  # Starting to go bar by bar through using a "for loop"
  for (i in (emaPeriod + 1):(nrow(symbol) - 1)) {
    # Dates
    CurrentDate <- time(symbol[i])
    TomorrowDate <- time(symbol[i + 1])

    # Today's variables
    CloseToday <- as.numeric(symbol[i, "Close"])
    EMA_today <- as.numeric(symbol[i, "EMA"])
    LowToday <- as.numeric(symbol[i, "Low"])
    HighToday <- as.numeric(symbol[i, "High"])
```

```

# Yesterday's variables
LowYesterday <- as.numeric(symbol[i - 1, "Low"])
HighYesterday <- as.numeric(symbol[i - 1, "High"])

# Tomorrow's variables
OpenTomorrow <- as.numeric(symbol[i + 1, "Open"])
LowTomorrow <- as.numeric(symbol[i + 1, "Low"])
HighTomorrow <- as.numeric(symbol[i + 1, "High"])

# Config
Equity <- getEndEq(accountname, CurrentDate)
Position <-
  getPosQty(portfolioname, Symbol = instrument, Date = CurrentDate)

# Check whether we have a position
if (Position == 0) {
  # Start checking BUY rules

  # Check whether we have a Smash Day (Buy).
  # Smash Day (Buy) is when Today's Close is below Yesterday's Low.
  if (CloseToday < LowYesterday) {
    # Smash Day (Buy)

    # Check whether today's close is above today's EMA
    if (CloseToday > EMA_today) {

      # BUY RULE: If today was a smash day place a STOP BUY order
      # at today's high price for the next day.
      # (Buy tomorrow for 'price >= today's high')

      #####
      # Simulate STOP BUY order:
      #####

      # Option 1 to check: Check whether the open price tomorrow
      # is above today's high and add the transaction tomorrow at
      # tomorrow's open price.

      # Option 2 to check: Check whether today's high was lower
      # than tomorrow's high and add the transaction tomorrow
      # at today's high price

      # Check Option 1
      if (OpenTomorrow > HighToday) {
        # Don't trade at the day before the last day
        if (CurrentDate != time(symbol[nrow(symbol) - 1])) {
          # Calculate the buy quantity
          BuyQuantity <- as.numeric(trunc(Equity / OpenTomorrow))
          # Add transaction
          addTxn(
            portfolioname,
            Symbol = instrument,
            TxnDate = TomorrowDate ,

```

```

        TxnPrice = OpenTomorrow,
        TxnQty = BuyQuantity,
        TxnFees = transactionCost
    )
    # Store the bar at which we placed the transaction
    BuyBar <- i
}

} else {
    # Check Option 2
    if (HighToday < HighTomorrow) {
        # Don't trade at the day before the last day
        if (CurrentDate != time(symbol[nrow(symbol) - 1])) {
            # Calculate the buy quantity
            BuyQuantity <- as.numeric(trunc(Equity / HighToday))
            # Add transaction
            addTxn(
                portfolioname,
                Symbol = instrument,
                TxnDate = TomorrowDate ,
                TxnPrice = HighToday,
                TxnQty = BuyQuantity,
                TxnFees = transactionCost
            )
            # Store the bar at which we placed the transaction
            BuyBar <- i
        }
    }
}
}
} else {
    # We already have a position

    # Check the sell rules in the following order and sell at the
    # first condition which is satisfied.

    #####
    # SELL rules:
    #####

    # Rule 1: Sell if we hold the position longer than the specified
    # maximum holding period

    # Rule 2: Sell at tomorrow's opening price if the close price
    # today falls below the EMA

    # Rule 3: Sell if we meet the Smash Day (Sell) requirements.
    # Today's close must be higher than yesterday's high

    # Rule 4: If no sell rule can be applied and we reach the
    # second last day. Sell at the last day.

```

```

# Check Rule 1:
if ((i - BuyBar) > maxHoldingPeriod) {
  # Place the sell transaction at todays close price
  addTxn(
    portfolioname,
    Symbol = instrument,
    TxnDate = CurrentDate,
    TxnPrice = as.numeric(symbol[i, "Close"]),
    TxnQty = -Position,
    TxnFees = transactionCost
  )

} else {
  # Check Rule 2:
  if (as.numeric(symbol[i, "Close"]) < EMA_today) {
    # Place the sell transaction at tomorrow's open price
    addTxn(
      portfolioname,
      Symbol = instrument,
      TxnDate = time(symbol[i + 1]),
      TxnPrice = OpenTomorrow,
      TxnQty = -Position,
      TxnFees = transactionCost
    )

  } else {
    # Check Rule 3:

    # Sell Rule 3: If today is a Smash Day (Sell) place an order tomorrow at todays
    # low price.

    # Simulate this behaviour:

    # Option 1 to check: Check whether the open price tomorrow is below today's
    # low and add the transaction tomorrow at tomorrow's open price.

    # Option 2 to check: Check whether today's low was larger than tomorrow's
    # low and add the transaction tomorrow at today's low price.

    # Check for Smash Day (Sell)
    if (CloseToday > HighYesterday) {
      # Check for Option 1
      if (OpenTomorrow < LowToday) {
        # Add Sell transaction tomorrow at tomorrow's open price
        addTxn(
          portfolioname,
          Symbol = instrument,
          TxnDate = time(symbol[i + 1]),
          TxnPrice = OpenTomorrow,
          TxnQty = -Position,
          TxnFees = transactionCost
        )
      }
    }
  }
}

```

```

    } else {
      # Check for Option 2
      if (LowToday > LowTomorrow) {
        # Add Sell transaction tomorrow at today's low price
        addTxn(
          portfolioname,
          Symbol = instrument,
          TxnDate = time(symbol[i + 1]),
          TxnPrice = LowToday,
          TxnQty = -Position,
          TxnFees = transactionCost
        )
      }
    }
  } else {
    # Check Rule 4
    if (i == nrow(symbol) - 1) {
      # Add Sell transaction for the last day at the close price
      addTxn(
        portfolioname,
        Symbol = instrument,
        TxnDate = time(symbol[i + 1]),
        TxnPrice = as.numeric(symbol[i, "Close"]),
        TxnQty = -Position,
        TxnFees = transactionCost
      )
    }
  }
}
}
}

updatePortf(portfolioname, Symbols = instrument, Dates = CurrentDate)
updateAcct(accountname, Dates = CurrentDate)
updateEndEq(accountname, CurrentDate)

} # End Bar-by-bar processing
} # End for loop for multiple instruments

```

Step 2: System Check

In order to make sure that the system works as designed the plots of some chosen transactions are printed in the following. The plots for the first, third and the 5th last transaction are plotted for every instrument in the instrumentlist. The plots can be checked manually and by this it can be ensured that the transactions were performed as expected.

```

# Loop through all instruments in the instrumentlist
for (instrument in instrumentlist){
  rm(daterange_check)
  daterange_check <- c()
  transactionsInstrument <- getTxns(Portfolio=portfolioname,Symbol=instrument)

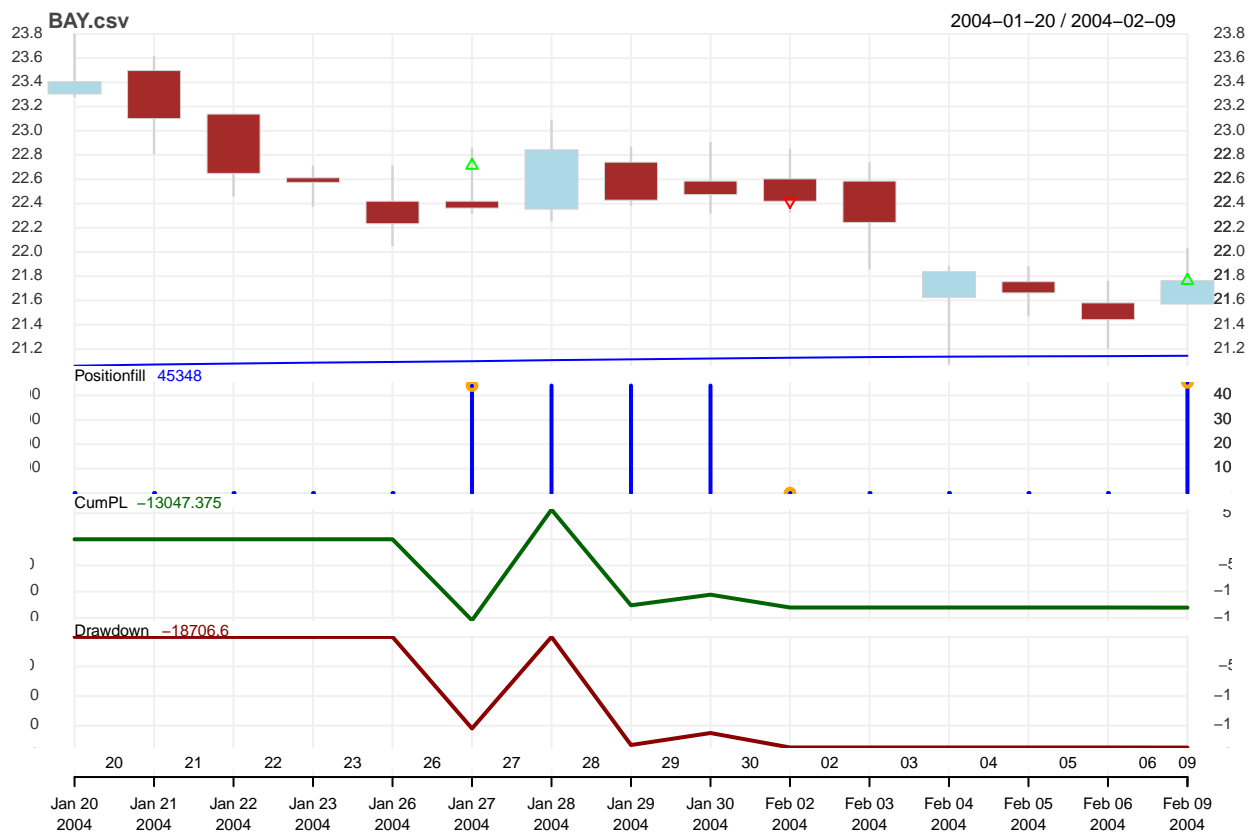
  # Create a list of transactions to check
  for (i in

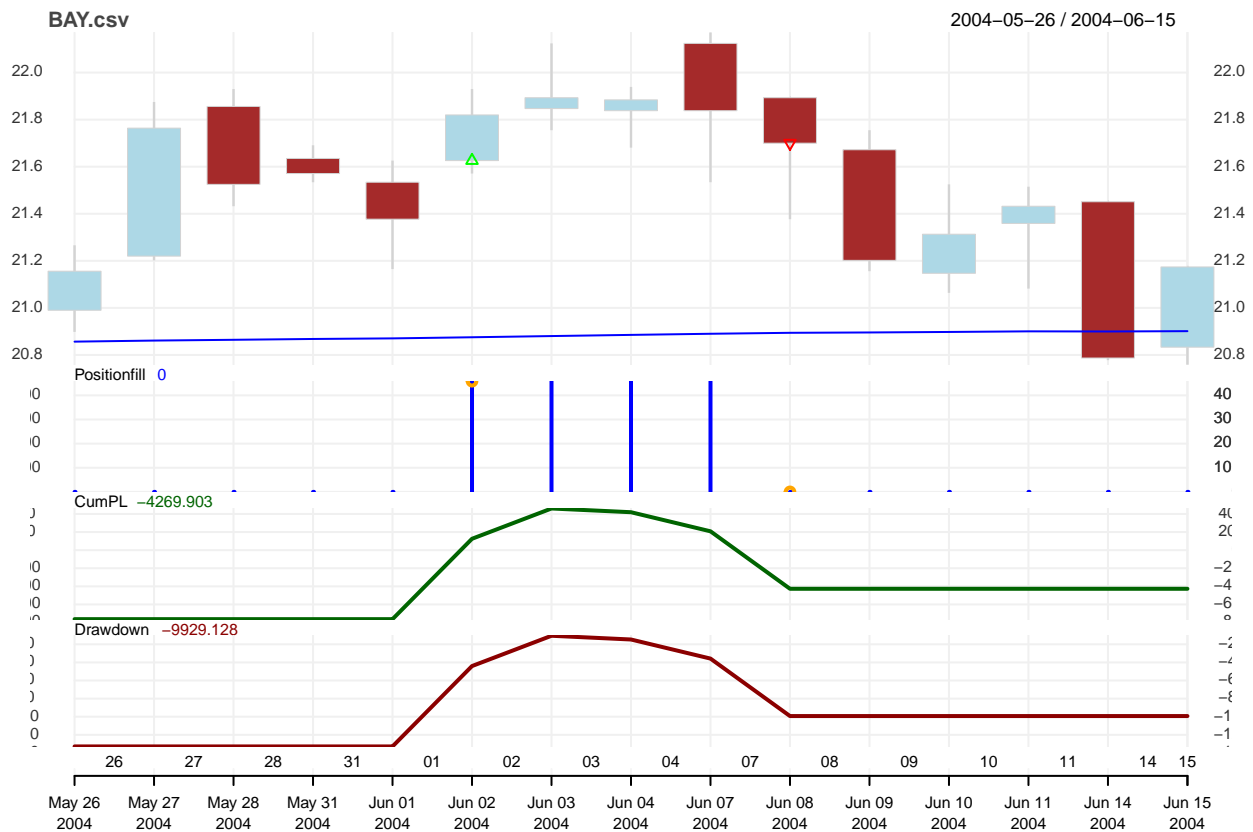
```

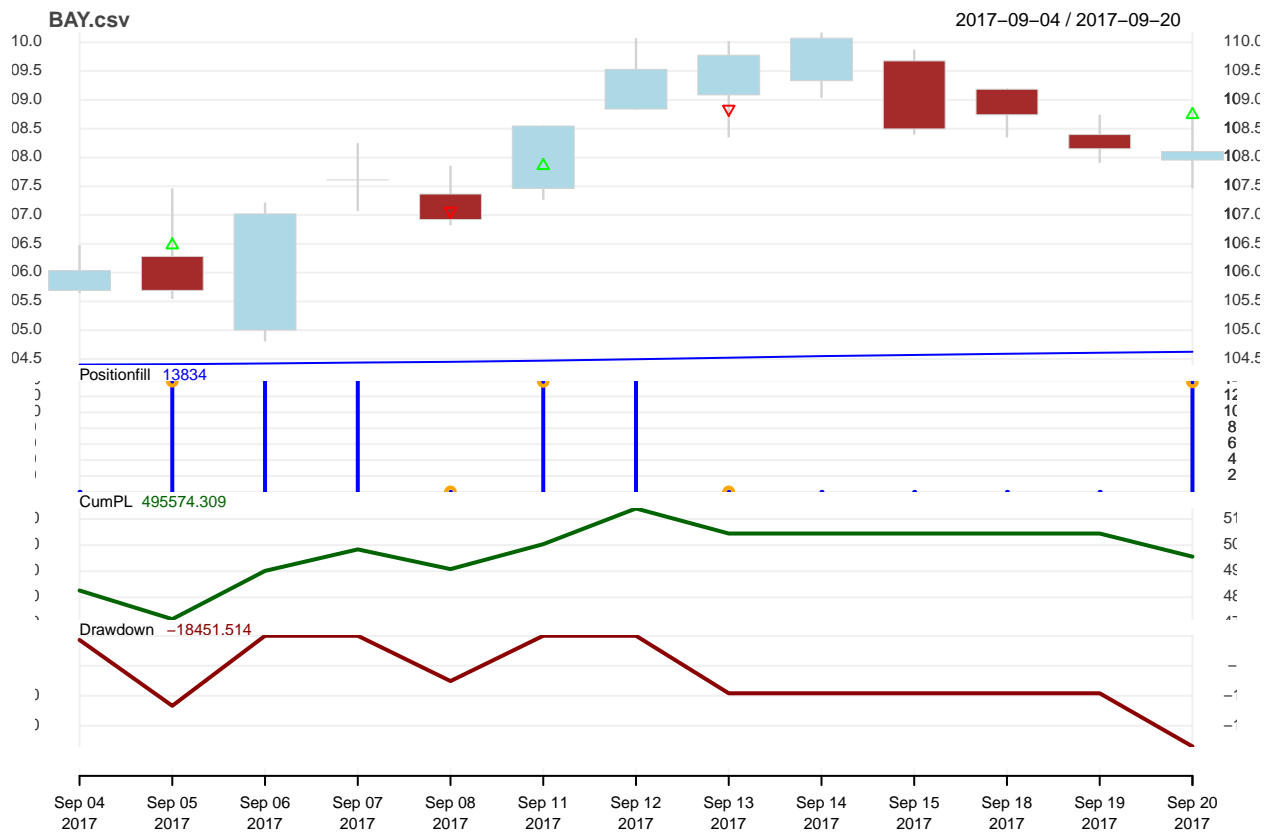
```

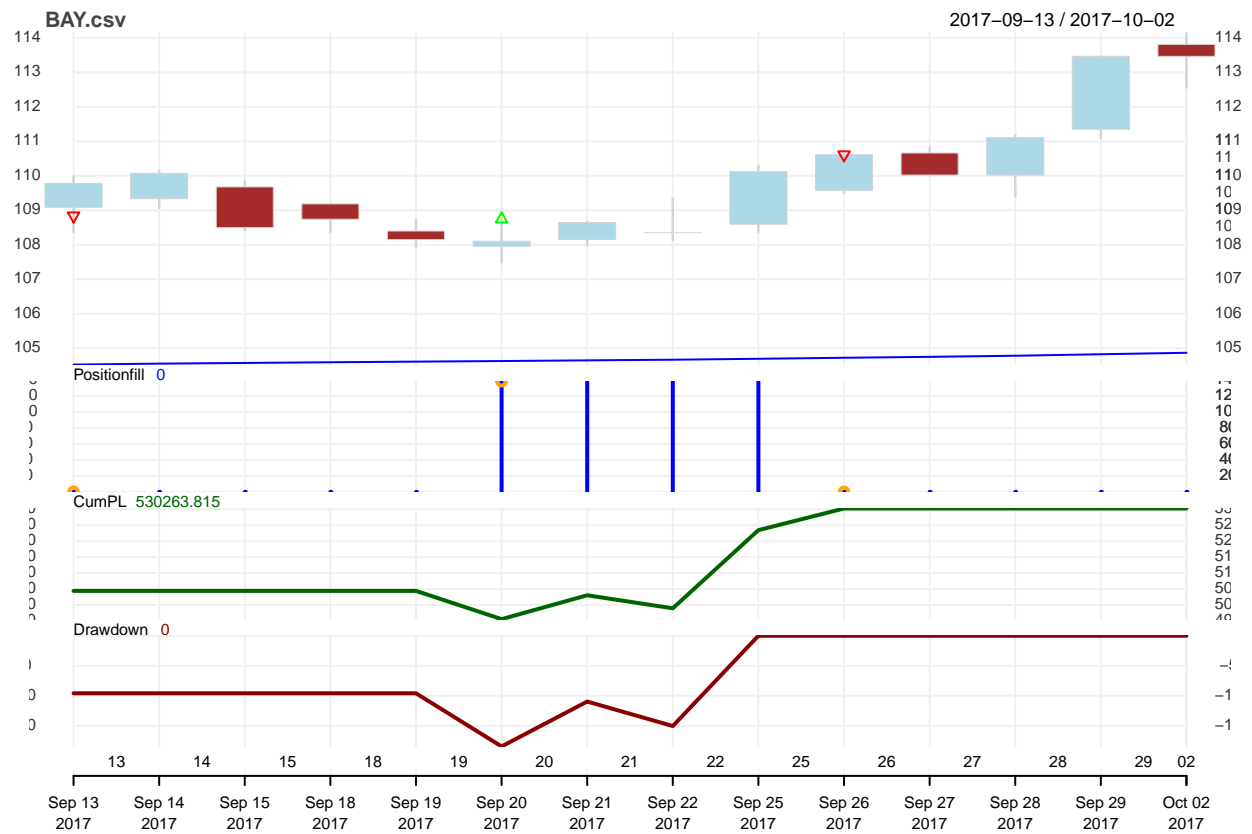
      c(2,6, (nrow(transactionsInstrument)-7),(nrow(transactionsInstrument)-5))) {
    from <- as.Date(index(transactionsInstrument[i,1]))-7
    to <- as.Date(index(transactionsInstrument[i+1,1]))+7
    daterange_check <- c(daterange_check, paste(from, ":", to, sep = ""))
  }
  # Plot the transactions and check them manually
  for (daterange_check_i in daterange_check){
    print(chart.Posn(portfolioname,
                     Symbol=instrument,
                     type='candlesticks',
                     theme=myTheme,
                     subset=daterange_check_i,
                     TA=addEMAStrng))
  }
}

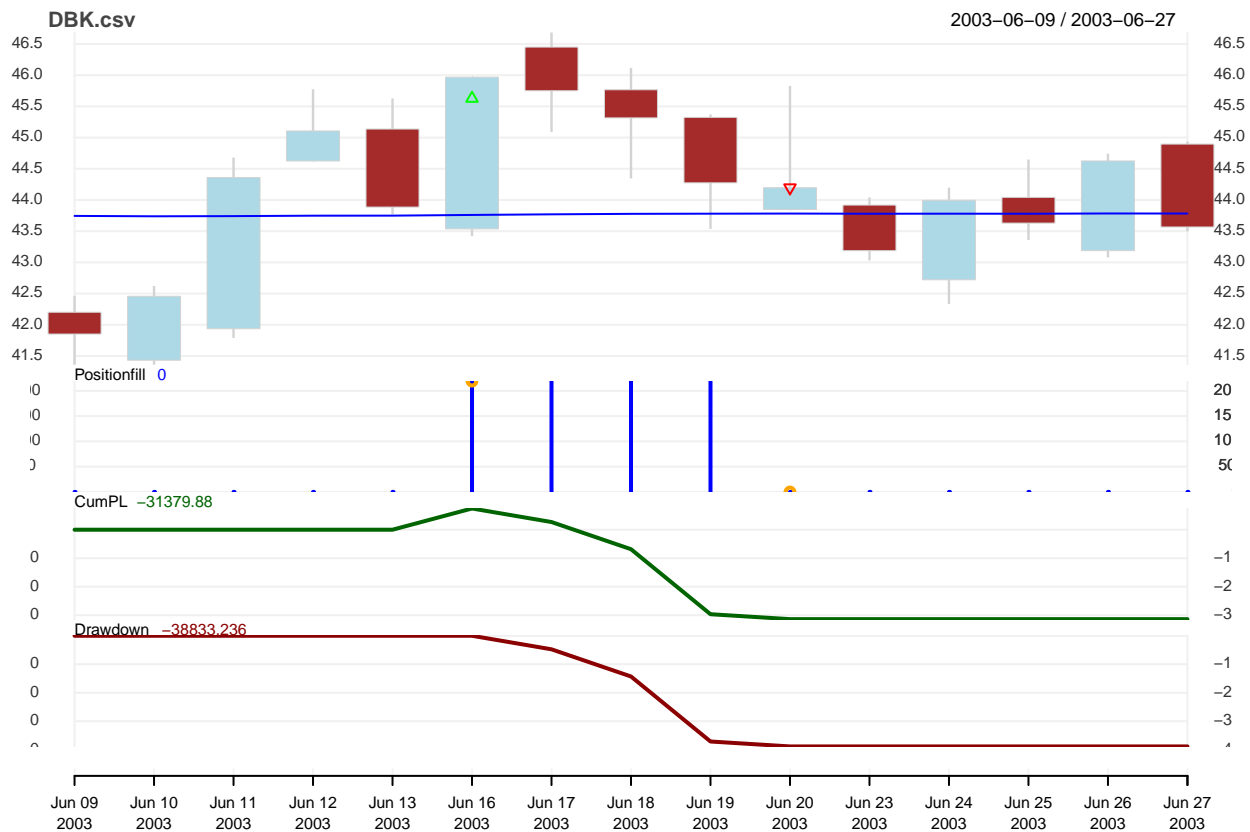
```

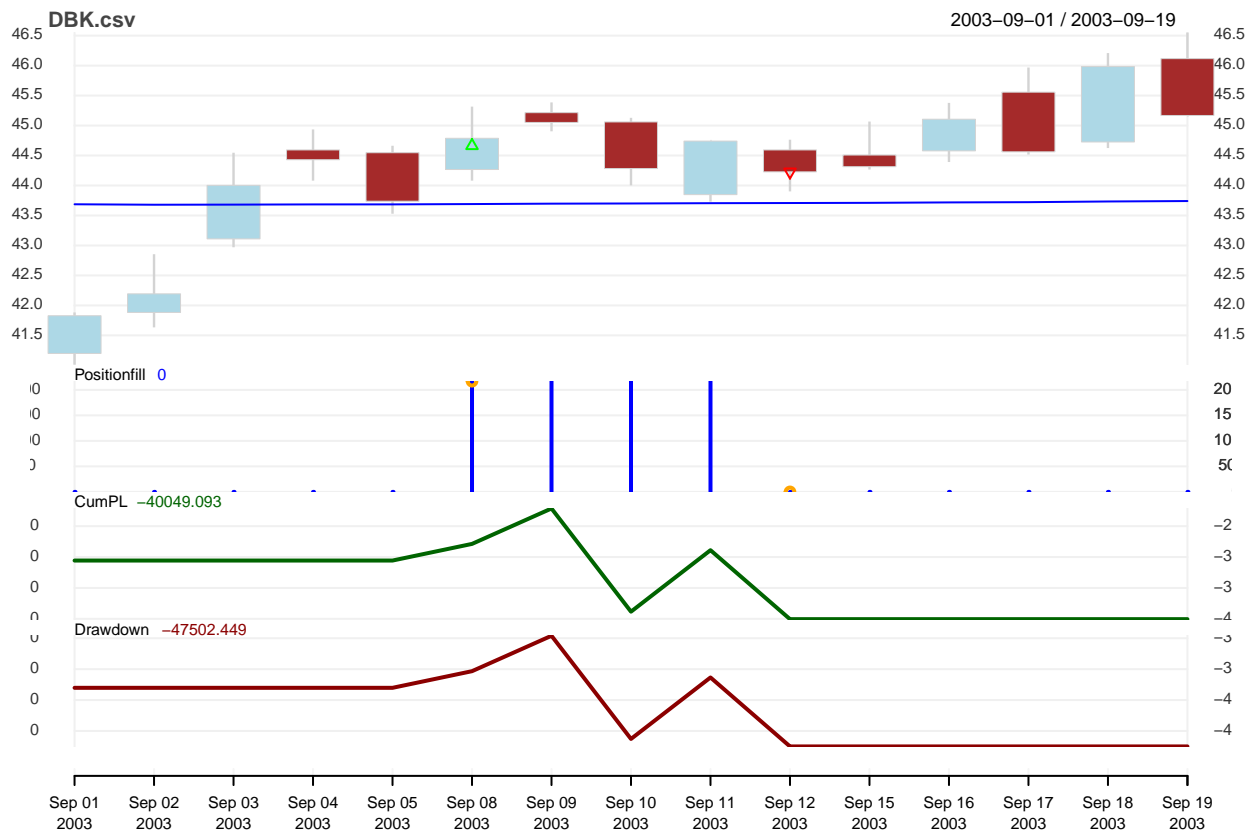


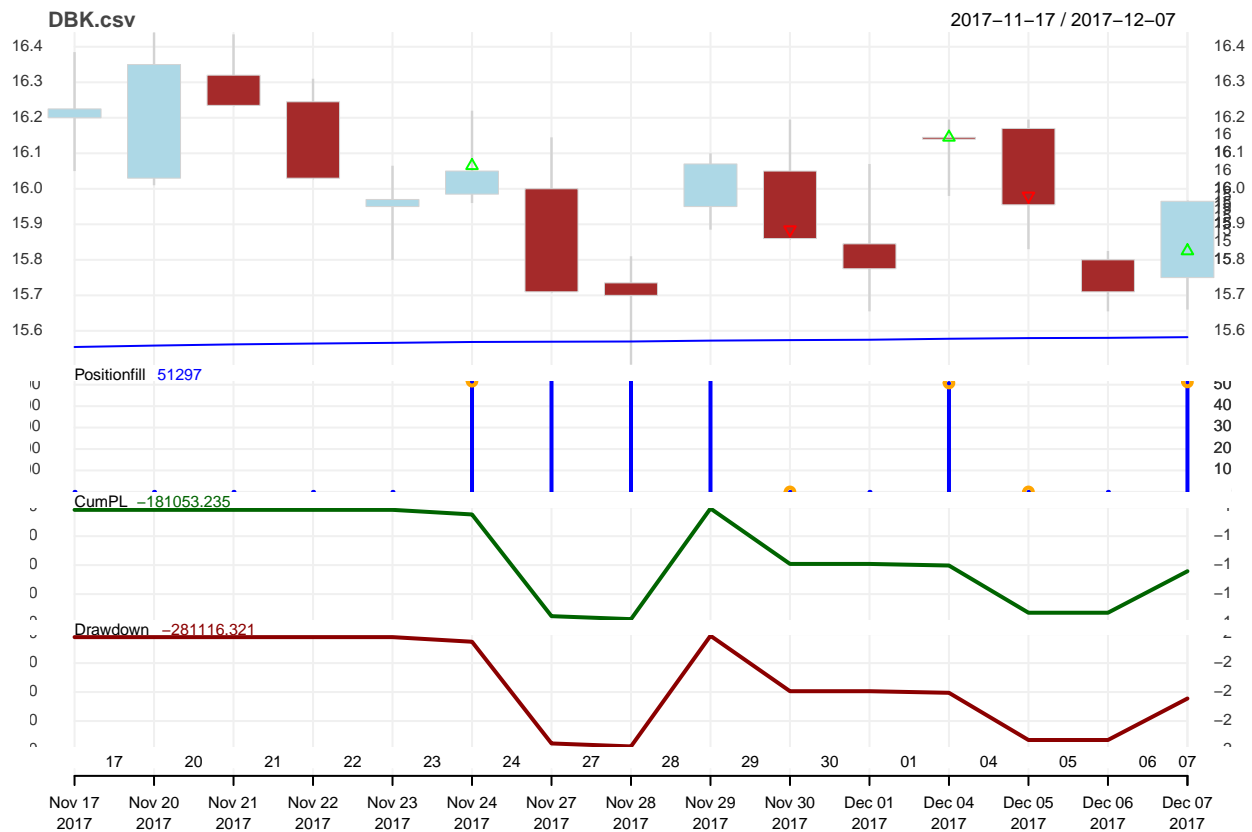


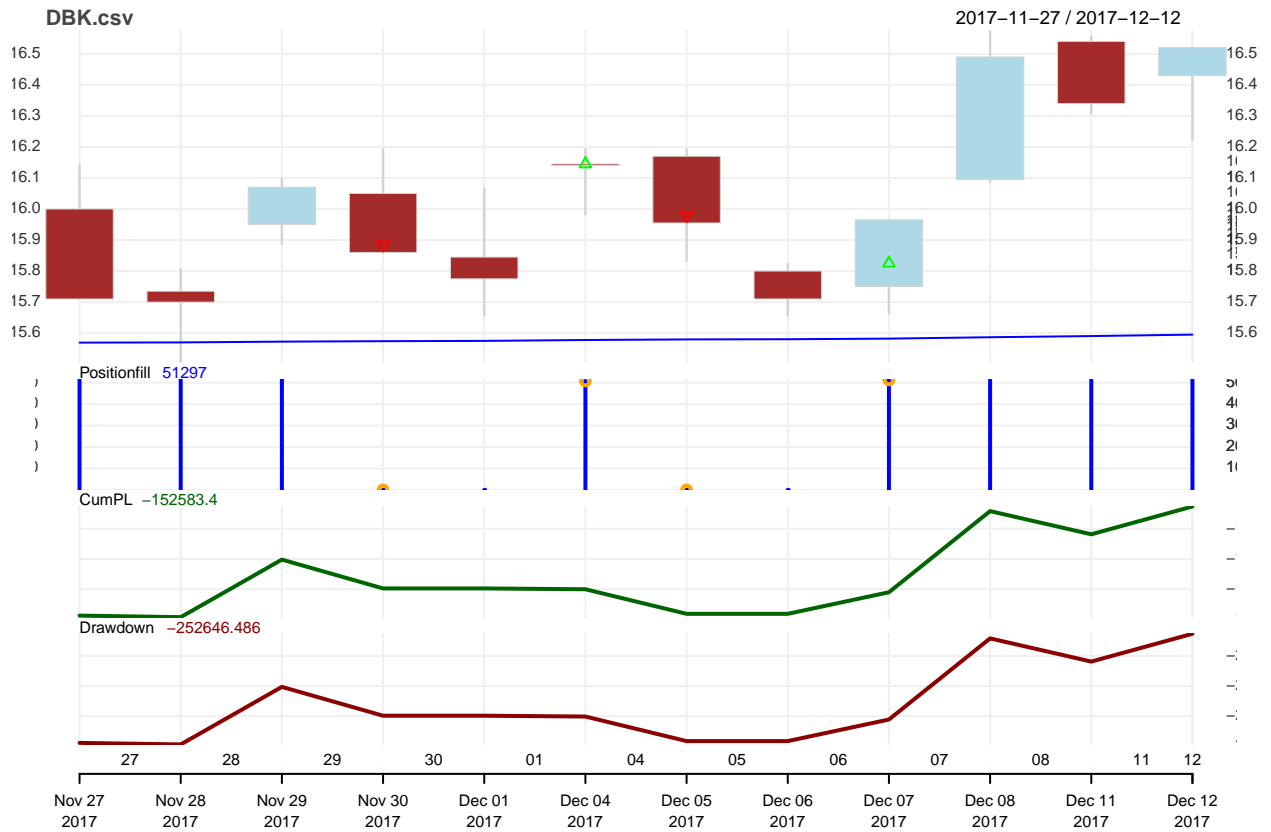


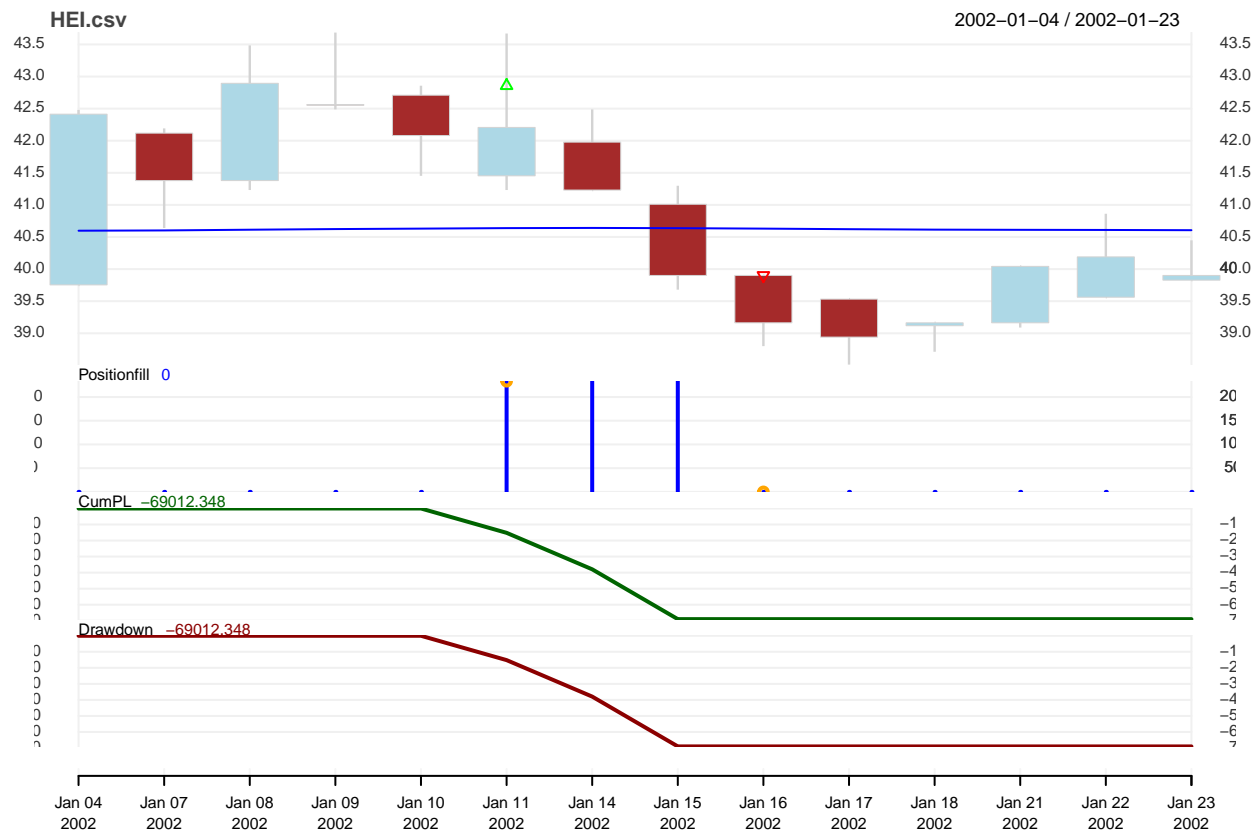


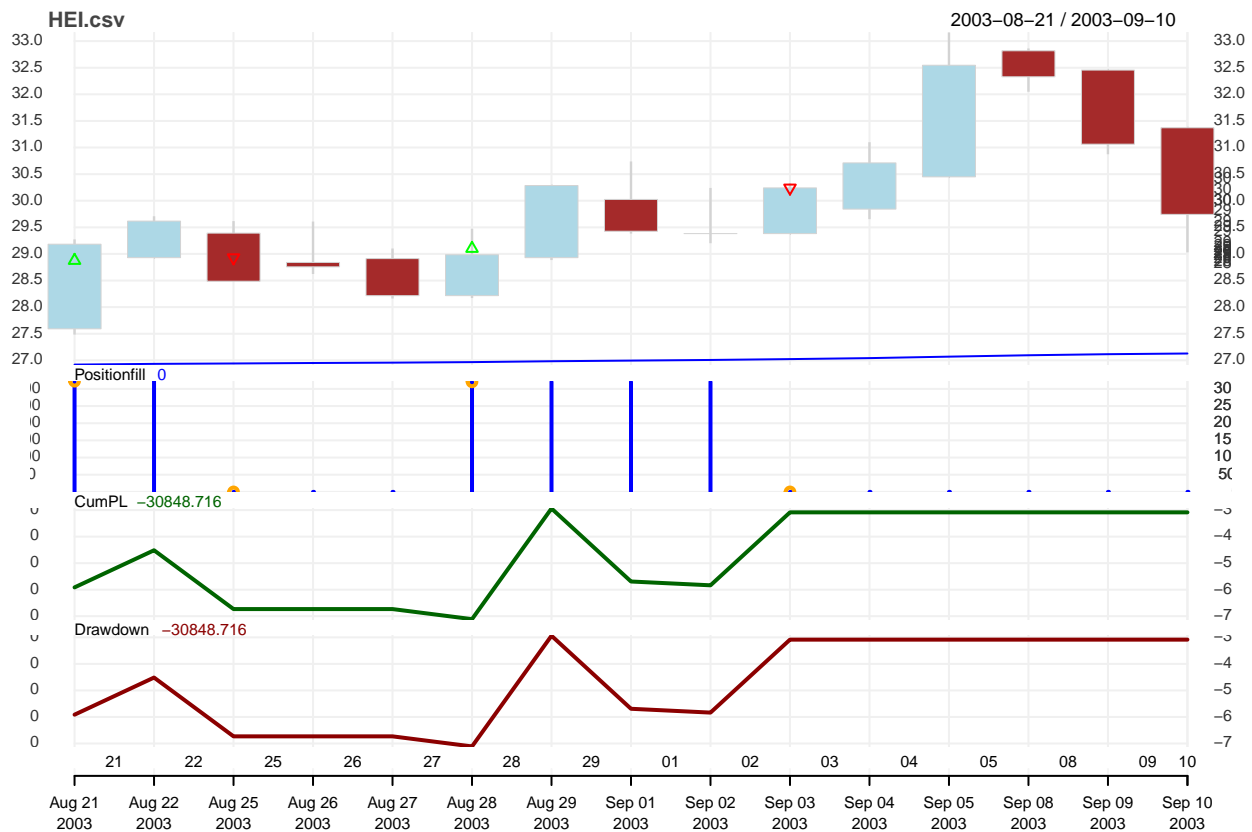


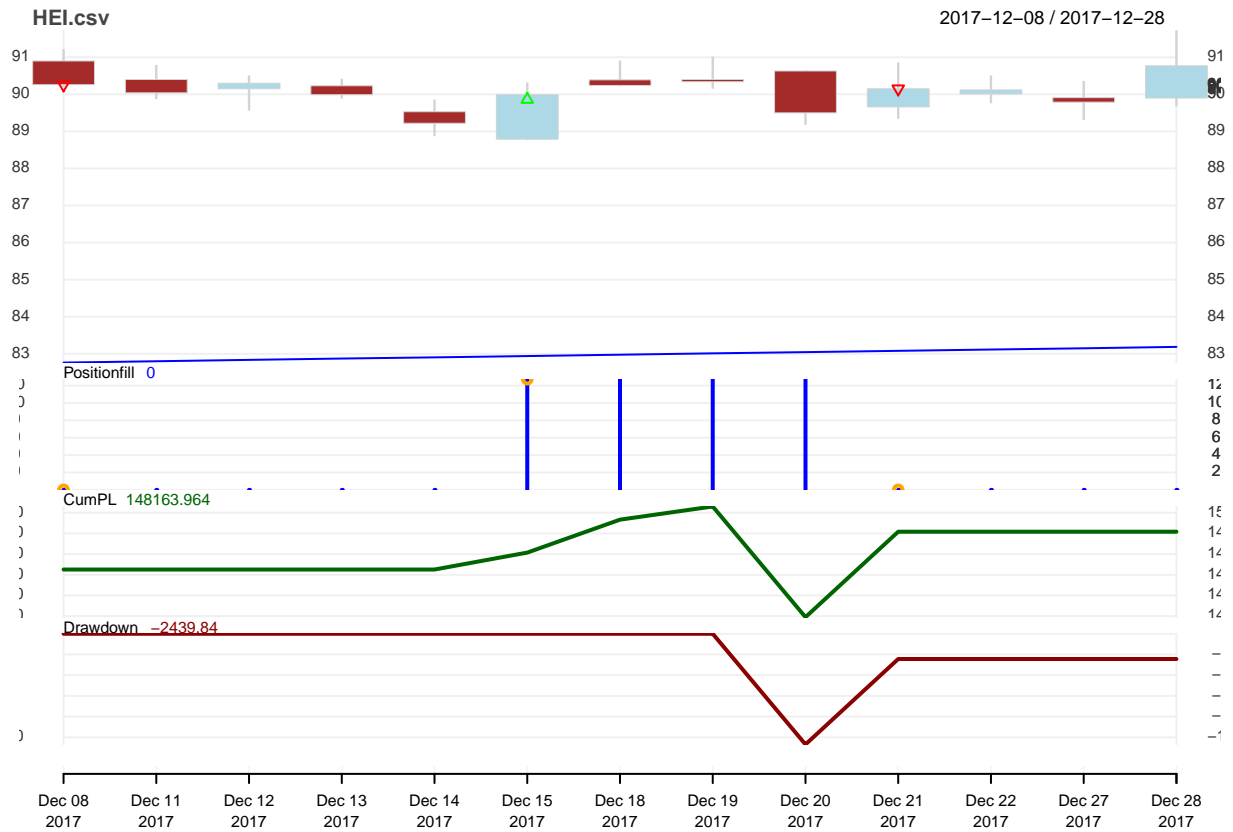


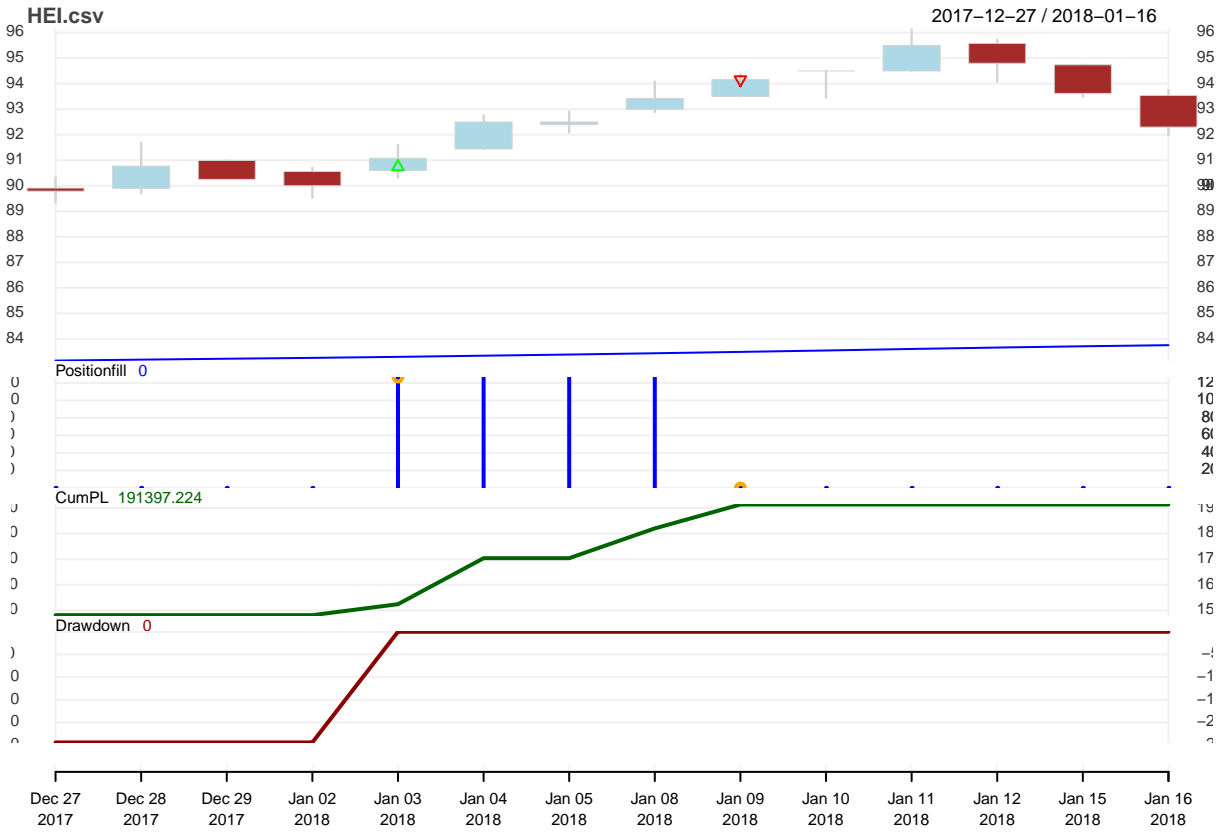


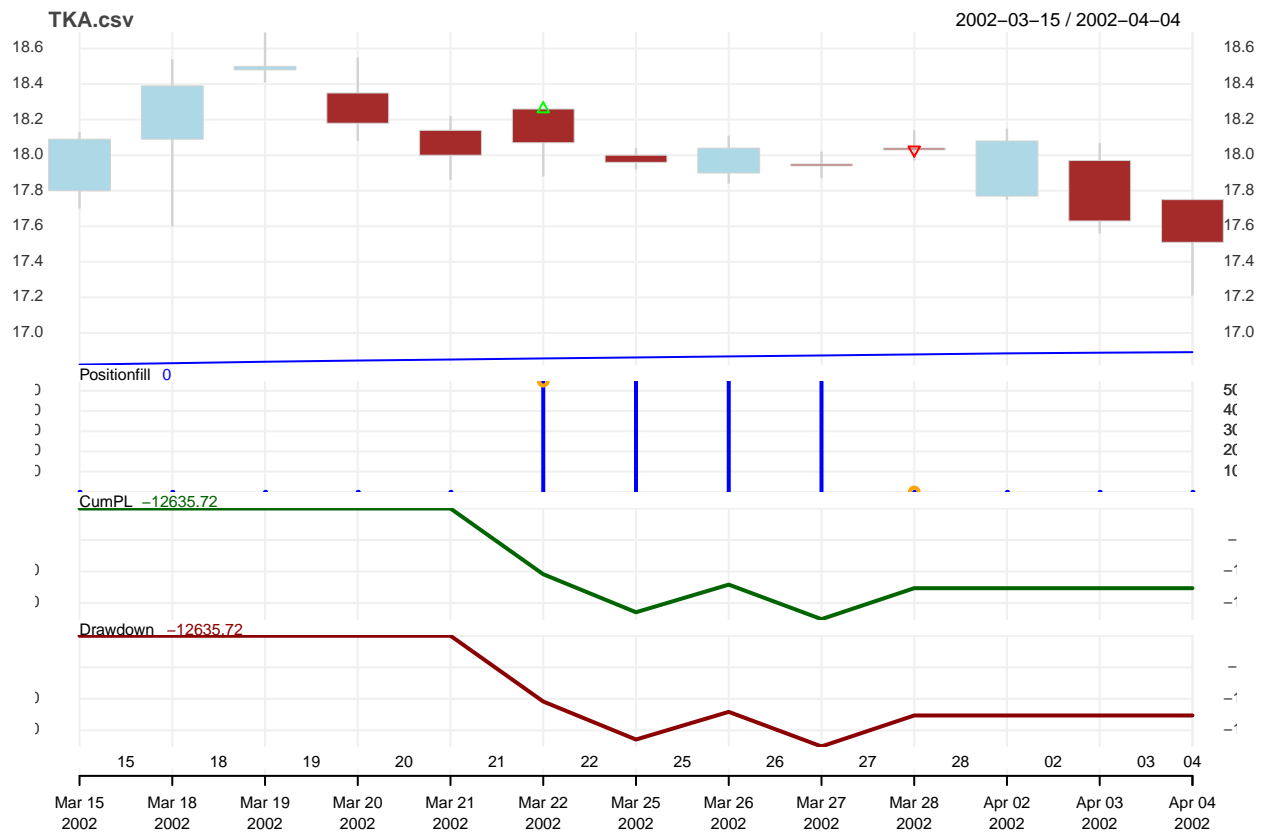


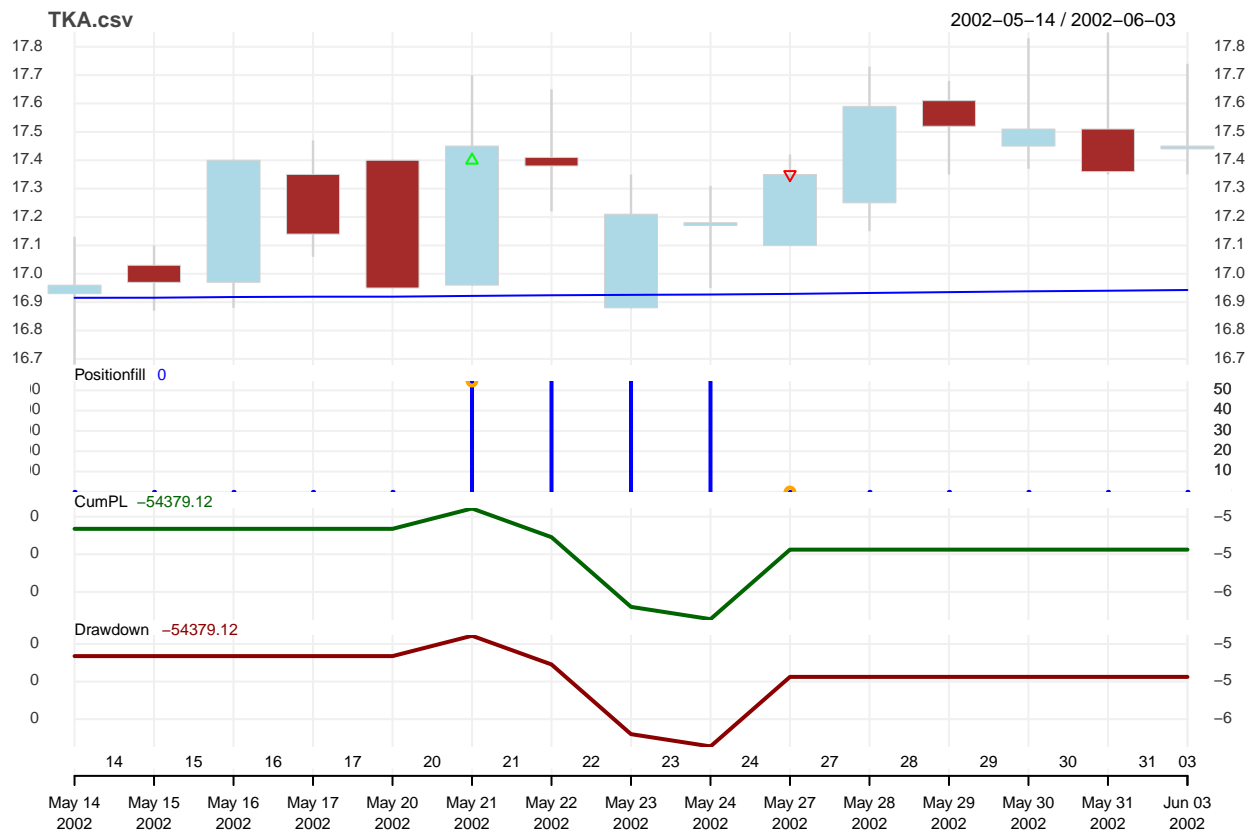


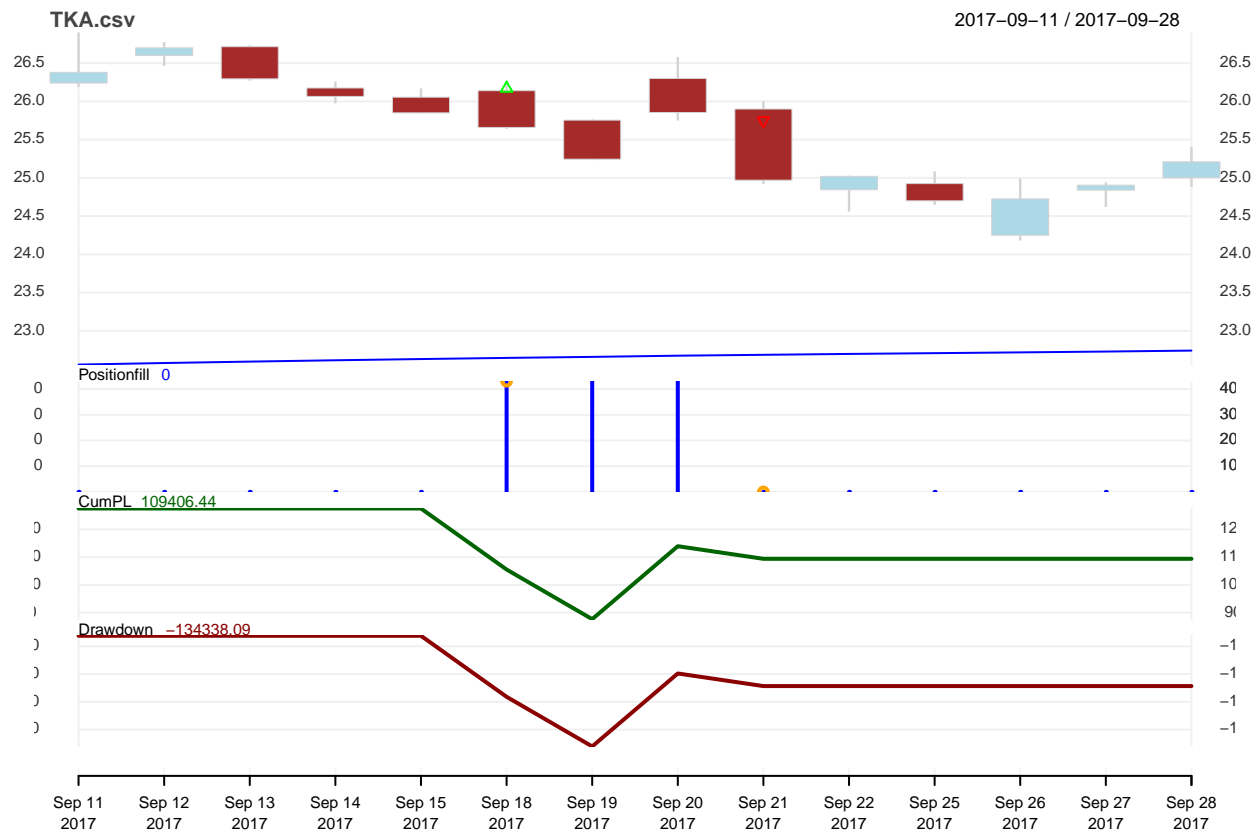


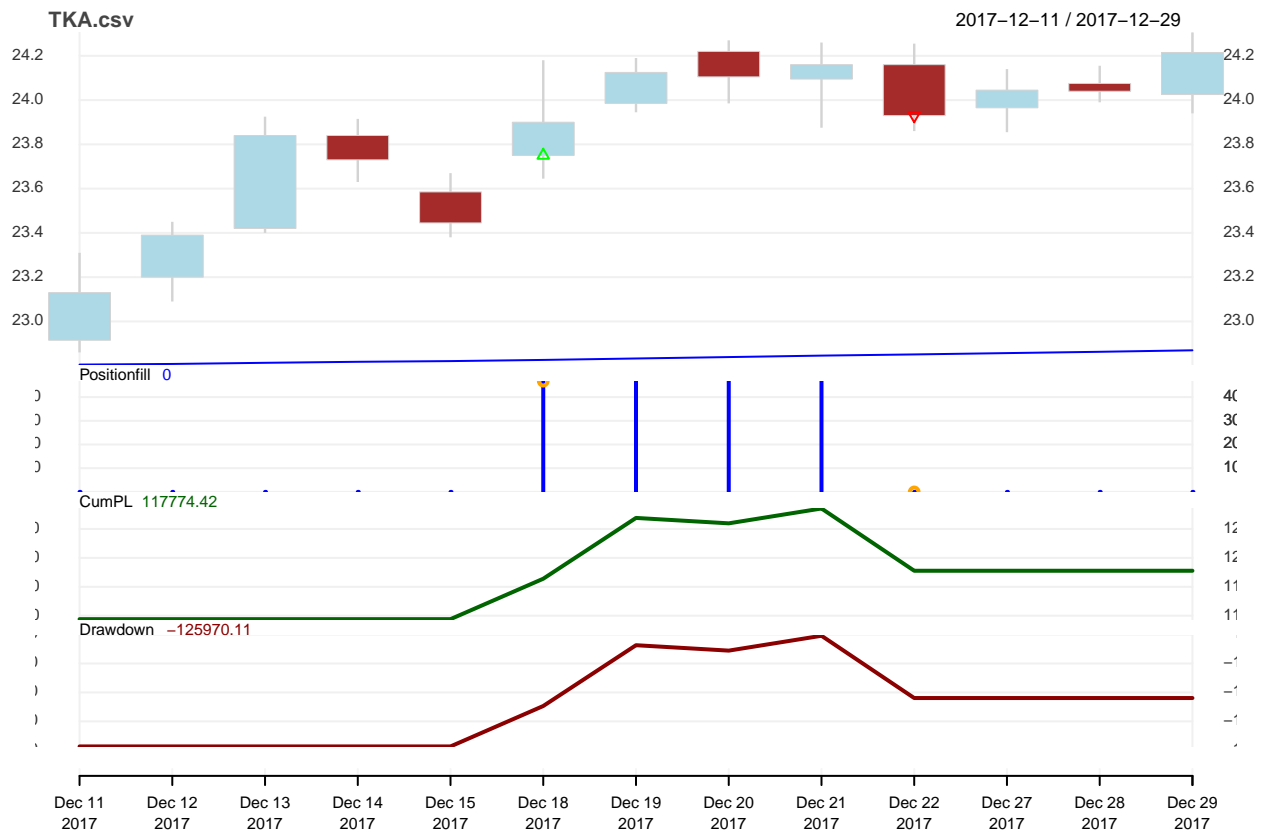


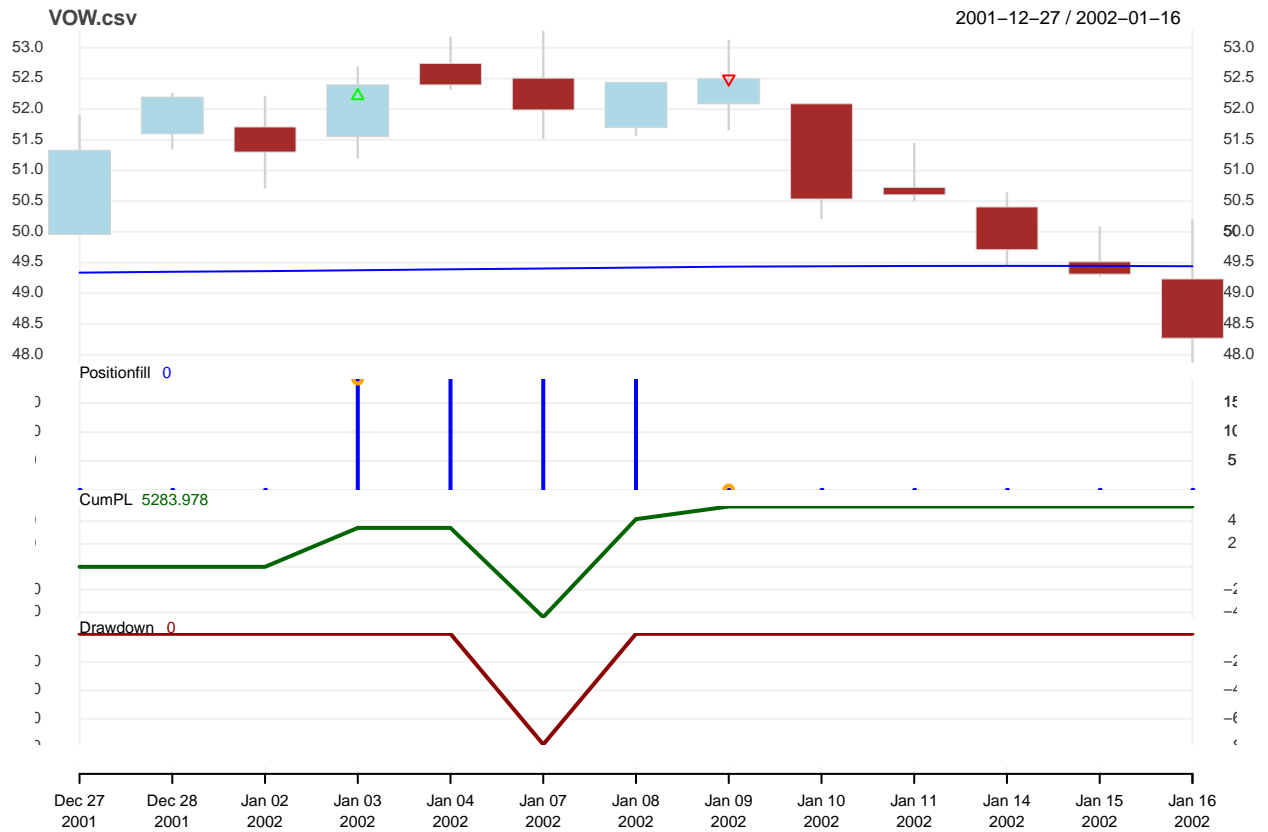


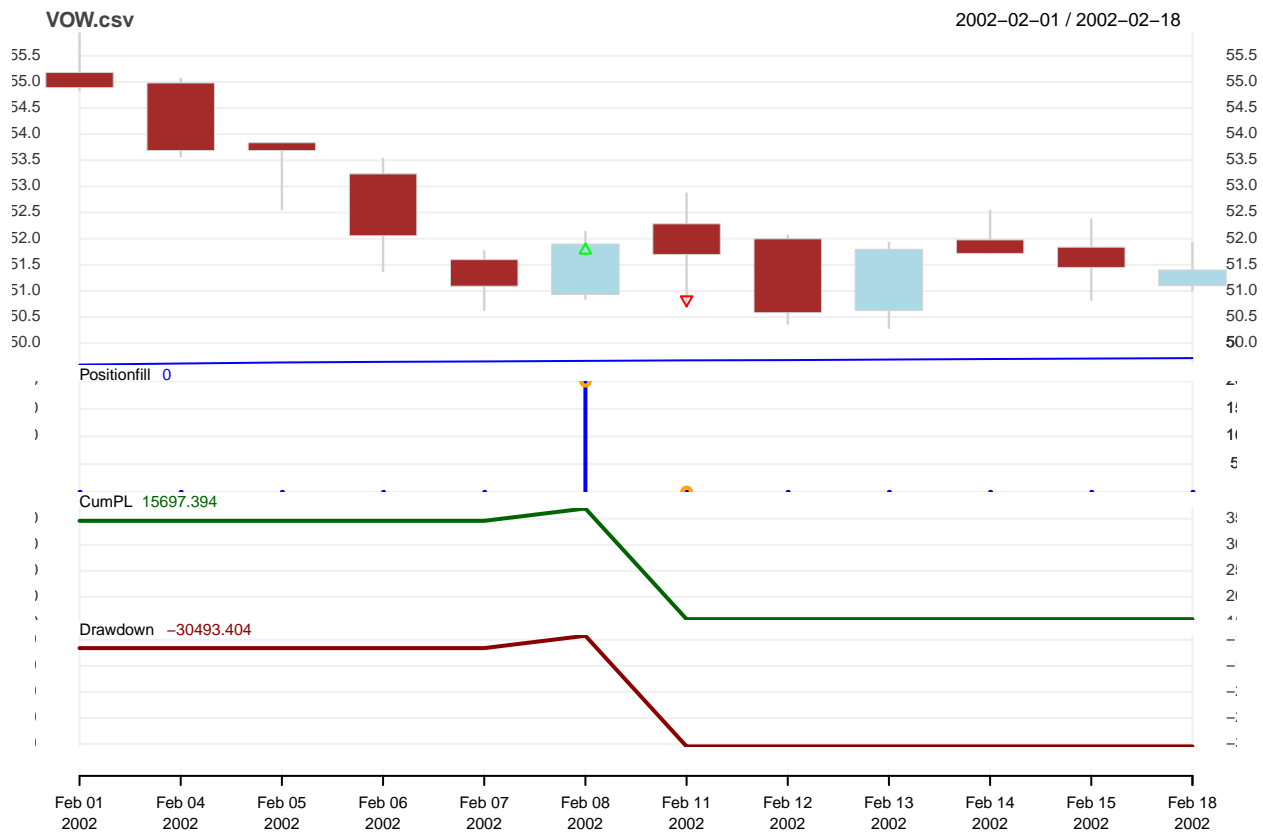


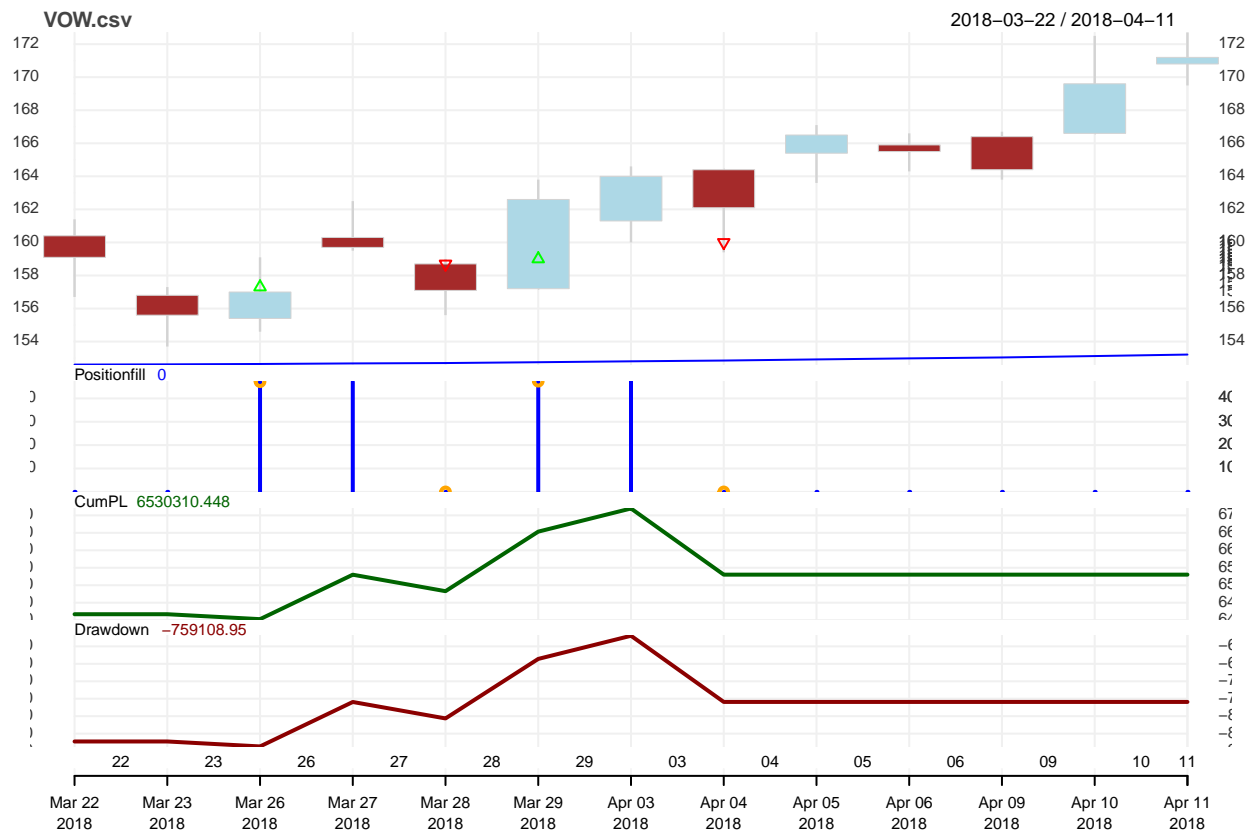


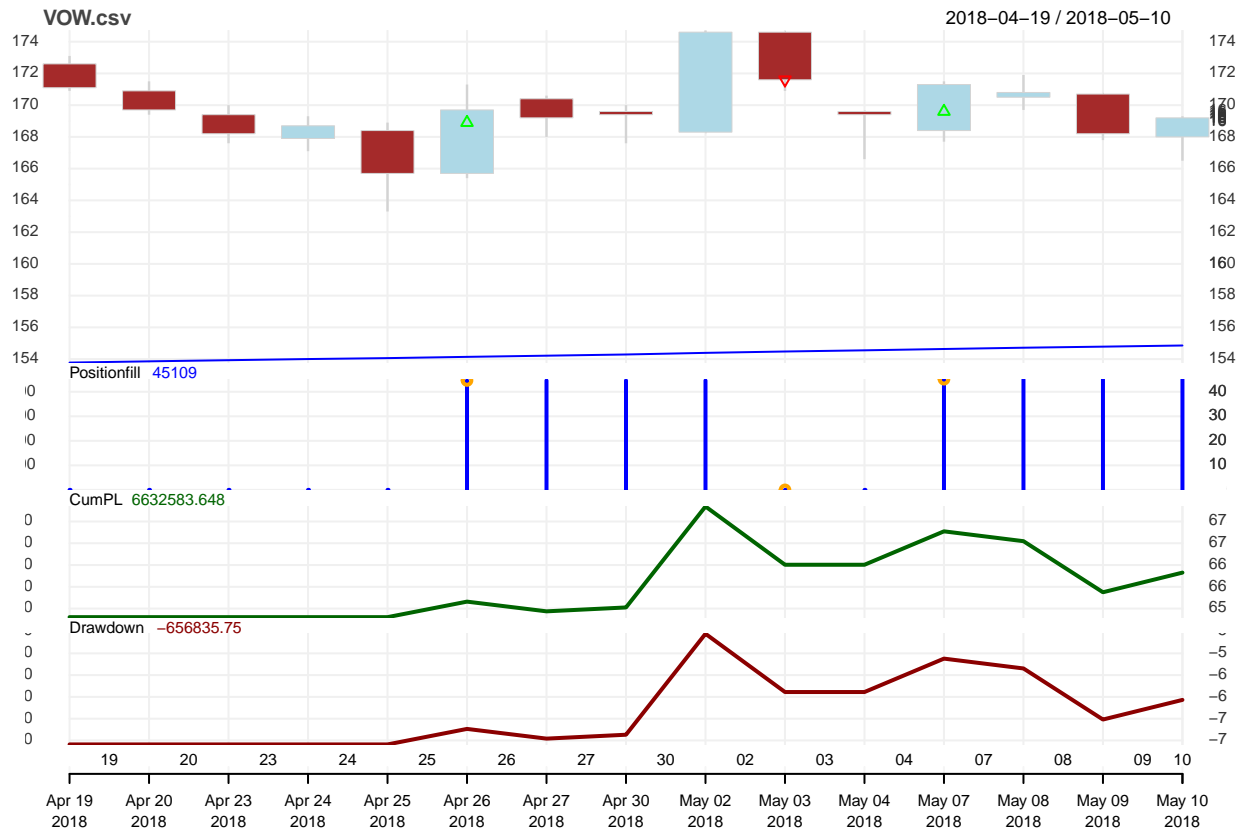












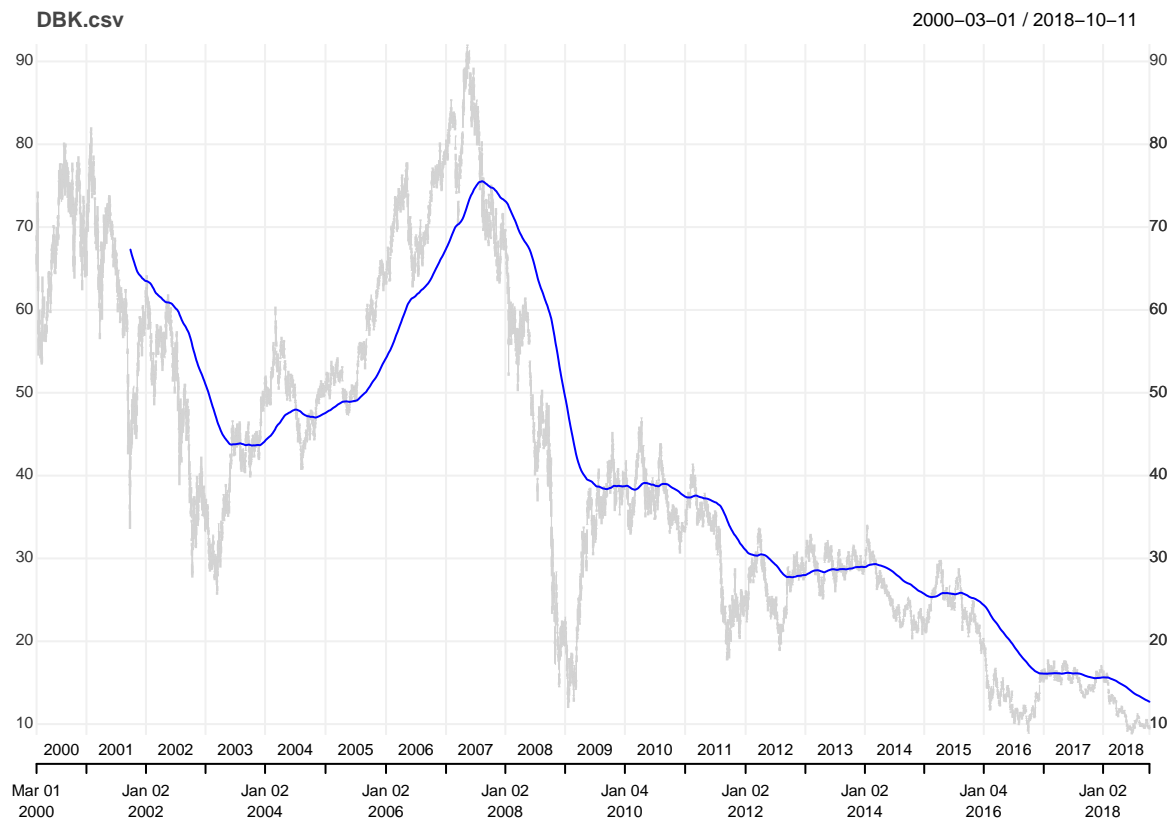
Part C: Analysis and Reporting

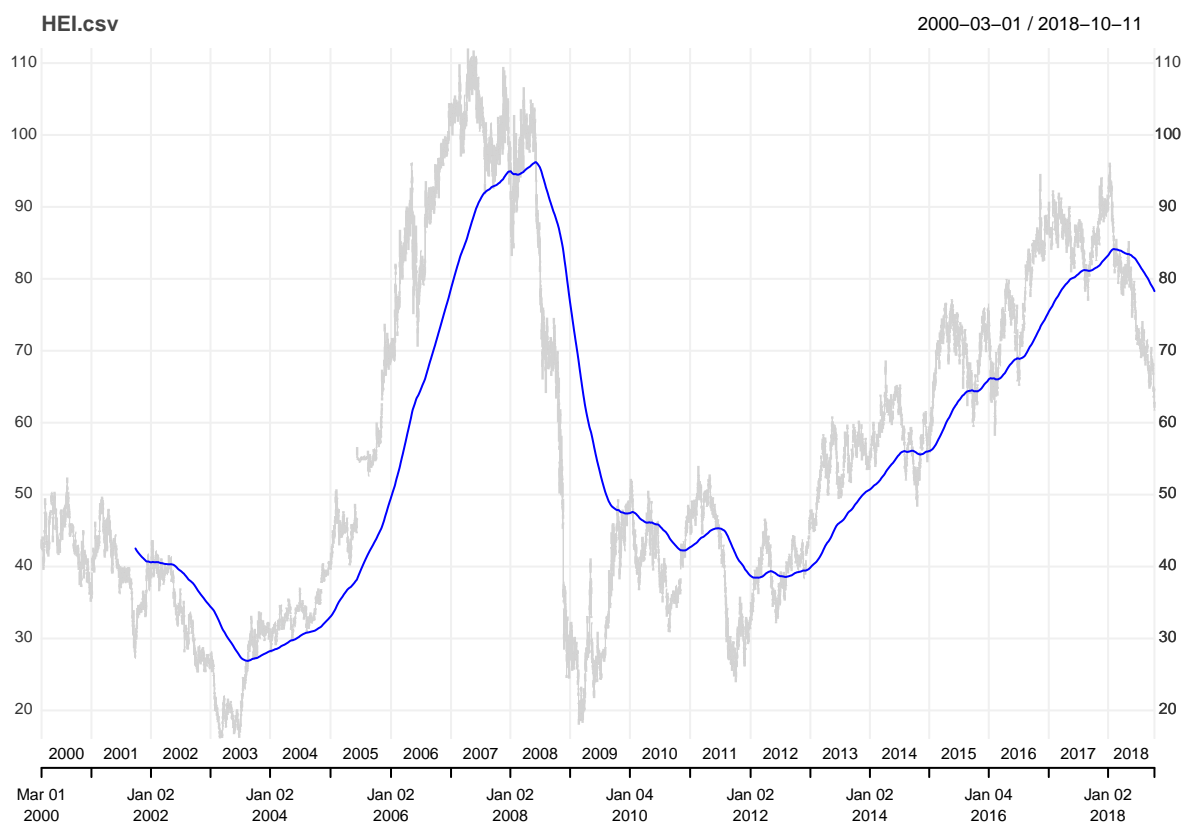
Step 1: Visualize original data

Plot of the instrument with the EMA line which indicates the general trend of the stock exponentially smoothed for the last 200 days. Moreover, the tradevolume is added below the graph. This plots can be used to get a first impression of the long term trend of the instrument and to see which general behaviour of the price can be observed

```
for (instrument in instrumentlist){
  chart <- get(instrument)
  print(chart_Series(x=chart,name=instrument,
    theme=myTheme,
    subset=daterange,
    TA="add_TA((chart$EMA), on=1,type='l',col='blue')"))
}
```

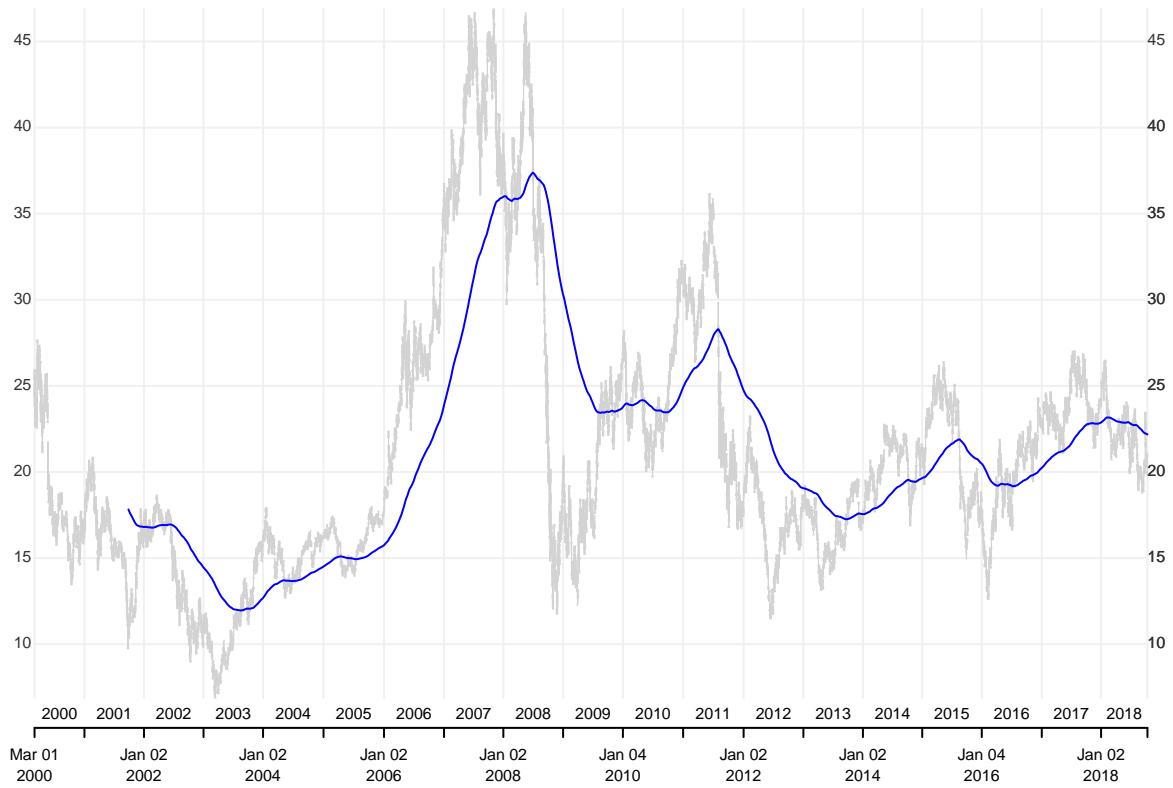


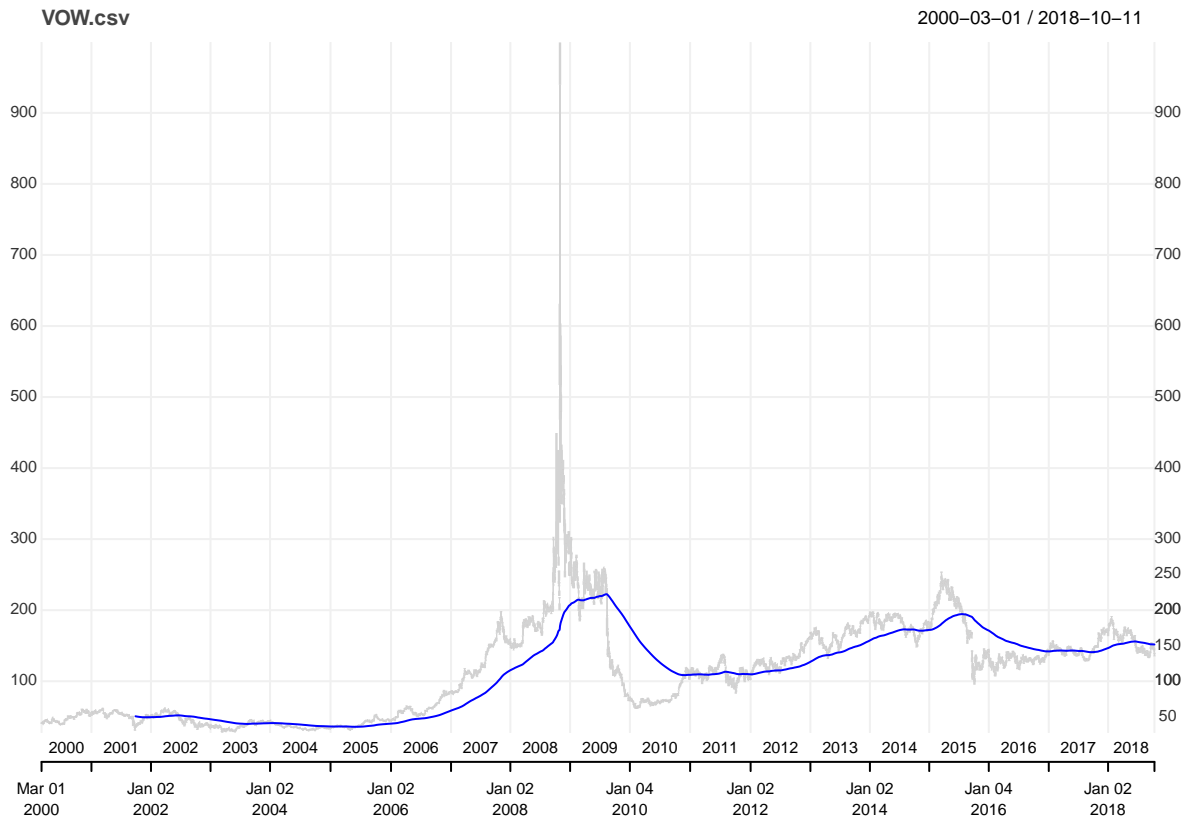




TKA.csv

2000-03-01 / 2018-10-11





Step 2: All transactions performed by the trading system

The following table can be used to get a better overview of the transactions performed and the exact details like the quantity, price and value per transaction.

```
for (instrument in instrumentlist){
  print(sprintf("Transactions for the instrument: %s", instrument))
  txns <- getTxns(Portfolio = portfolioname, Symbol = instrument)
  txns.pr <- txns[,c(1,2,4,6)]
  colnames(txns.pr) <- c("Quantity", "Price", "Value", "Net realized Profit")
  print(txns.pr)
  writeLines("")
}
```

```
## [1] "Transactions for the instrument: BAY.csv"
##           Quantity   Price      Value Net realized Profit
## 1999-12-31         0  0.000        0.0          0.000
## 2004-01-27      44025 22.714    999983.8         -20.000
## 2004-02-02     -44025 22.419   -986996.5        -13007.375
## 2004-02-09      45348 21.764    986953.9         -20.000
## 2004-02-12     -45348 21.884   -992395.6         5421.760
## 2004-06-02      45888 21.626    992373.9         -20.000
## 2004-06-08     -45888 21.700   -995769.6         3375.712
## 2004-11-17      44709 22.271    995714.1         -20.000
## 2004-11-23     -44709 21.893   -978814.1        -16920.002
## 2004-12-01      43658 22.419    978768.7         -20.000
## 2004-12-03     -43658 22.400   -977939.2         -849.502
```


## 2005-02-17	37813	25.862	977919.8	-20.000
## 2005-02-23	-37813	25.586	-967483.4	-10456.388
## 2005-04-19	38811	24.927	967441.8	-20.000
## 2005-04-25	-38811	24.484	-950248.5	-17213.273
## 2005-06-28	34908	27.220	950195.8	-20.000
## 2005-06-29	-34908	26.787	-935080.6	-15135.164
## 2005-09-26	31874	29.336	935055.7	-20.000
## 2005-09-30	-31874	30.005	-956379.4	21303.706
## 2005-10-07	32157	29.739	956317.0	-20.000
## 2005-10-13	-32157	29.228	-939884.8	-16452.227
## 2005-10-24	32864	28.598	939844.7	-20.000
## 2005-10-28	-32864	27.712	-910727.2	-29137.504
## 2006-01-09	25480	35.742	910706.2	-20.000
## 2006-01-13	-25480	34.778	-886143.4	-24582.720
## 2006-01-19	25785	34.365	886101.5	-20.000
## 2006-01-25	-25785	33.548	-865035.2	-21086.345
## 2006-02-06	25776	33.558	864991.0	-20.000
## 2006-02-10	-25776	33.715	-869037.8	4026.832
## 2006-03-22	26574	32.701	868996.4	-20.000
## 2006-03-27	-26574	34.197	-908751.1	39734.704
## 2006-04-13	27556	32.977	908714.2	-20.000
## 2006-04-18	-27556	32.633	-899234.9	-9499.264
## 2006-05-03	25276	35.575	899193.7	-20.000
## 2006-05-09	-25276	35.939	-908394.2	9180.464
## 2006-05-23	27349	33.213	908342.3	-20.000
## 2006-05-29	-27349	35.250	-964052.2	55689.913
## 2006-06-14	31000	31.097	964007.0	-20.000
## 2006-06-20	-31000	32.209	-998479.0	34452.000
## 2006-06-28	30322	32.928	998442.8	-20.000
## 2006-07-04	-30322	35.900	-1088559.8	90096.984
## 2006-07-07	31290	34.788	1088516.5	-20.000
## 2006-07-13	-31290	35.870	-1122372.3	33835.780
## 2006-07-18	31505	35.624	1122334.1	-20.000
## 2006-07-24	-31505	37.789	-1190542.4	68188.325
## 2006-09-04	31227	38.124	1190498.1	-20.000
## 2006-09-08	-31227	37.504	-1171137.4	-19380.740
## 2006-09-25	30436	38.478	1171116.4	-20.000
## 2006-09-27	-30436	38.478	-1171116.4	-20.000
## 2006-09-28	30205	38.970	1177088.8	-20.000
## 2006-10-04	-30205	40.092	-1210978.9	33870.010
## 2006-10-18	30687	39.265	1204925.1	-20.000
## 2006-10-24	-30687	40.151	-1232113.7	27168.682
## 2006-10-31	31808	38.734	1232051.1	-20.000
## 2006-11-06	-31808	39.698	-1262714.0	30642.912
## 2006-11-23	32029	39.423	1262679.3	-20.000
## 2006-11-24	-32029	39.118	-1252910.4	-9788.845
## 2006-11-27	32100	39.364	1263584.4	-20.000
## 2006-12-01	-32100	38.212	-1226605.2	-36999.200
## 2006-12-20	30282	40.151	1215852.6	-20.000
## 2006-12-28	-30282	40.190	-1217033.6	1160.998
## 2007-01-17	28370	42.897	1216987.9	-20.000
## 2007-01-23	-28370	43.064	-1221725.7	4717.790
## 2007-03-15	28415	42.995	1221702.9	-20.000
## 2007-03-21	-28415	44.068	-1252192.2	30469.295

## 2007-04-13	26026	48.112	1252162.9	-20.000
## 2007-04-17	-26026	48.368	-1258825.6	6642.656
## 2007-05-18	25618	49.136	1258766.0	-20.000
## 2007-05-24	-25618	51.695	-1324322.5	65536.462
## 2007-06-22	23759	55.739	1324302.9	-20.000
## 2007-06-28	-23759	55.168	-1310736.5	-13586.389
## 2007-07-19	23673	55.365	1310655.6	-20.000
## 2007-07-25	-23673	52.098	-1233316.0	-77359.691
## 2007-07-30	24415	50.514	1233299.3	-20.000
## 2007-08-01	-24415	50.287	-1227757.1	-5562.205
## 2007-08-02	24354	51.567	1255862.7	-20.000
## 2007-08-03	-24354	51.114	-1244830.4	-11052.362
## 2007-08-08	23152	52.551	1216660.8	-20.000
## 2007-08-14	-23152	51.468	-1191587.1	-25093.616
## 2007-08-15	23177	52.216	1210210.2	-20.000
## 2007-08-21	-23177	55.867	-1294829.5	84599.227
## 2007-08-29	22971	55.552	1276085.0	-20.000
## 2007-09-04	-22971	57.629	-1323795.8	47690.767
## 2007-09-11	24194	54.716	1323798.9	-20.000
## 2007-09-17	-24194	55.670	-1346880.0	23061.076
## 2007-10-01	24300	55.424	1346803.2	-20.000
## 2007-10-02	-24300	54.775	-1331032.5	-15790.700
## 2007-11-20	24858	53.545	1331021.6	-20.000
## 2007-11-26	-24858	54.991	-1366966.3	35924.668
## 2007-12-04	24351	56.133	1366894.7	-20.000
## 2007-12-07	-24351	57.117	-1390856.1	23941.384
## 2007-12-18	23853	58.308	1390820.7	-20.000
## 2007-12-27	-23853	60.758	-1449260.6	58419.850
## 2008-01-18	24016	60.345	1449245.5	-20.000
## 2008-01-24	-24016	53.938	-1295375.0	-153890.512
## 2008-02-21	24152	53.633	1295344.2	-20.000
## 2008-02-27	-24152	52.206	-1260879.3	-34484.904
## 2008-05-16	23002	54.814	1260831.6	-20.000
## 2008-05-22	-23002	54.076	-1243856.2	-16995.476
## 2008-06-03	22181	56.074	1243777.4	-20.000
## 2008-06-09	-22181	54.519	-1209285.9	-34511.455
## 2008-07-16	22493	53.761	1209246.2	-20.000
## 2008-07-22	-22493	53.358	-1200181.5	-9084.679
## 2008-08-05	21934	54.716	1200140.7	-20.000
## 2008-08-11	-21934	53.397	-1171209.8	-28950.946
## 2008-08-13	21777	53.781	1171188.8	-20.000
## 2008-08-19	-21777	51.911	-1130465.8	-40742.990
## 2009-09-22	23892	47.315	1130450.0	-20.000
## 2009-09-28	-23892	47.679	-1139146.7	8676.688
## 2009-10-05	25131	45.327	1139112.8	-20.000
## 2009-10-09	-25131	46.233	-1161881.5	22748.686
## 2009-11-20	22682	51.222	1161817.4	-20.000
## 2009-11-26	-22682	50.435	-1143966.7	-17870.734
## 2010-01-04	20603	55.523	1143940.4	-20.000
## 2010-01-08	-20603	52.964	-1091217.3	-52743.077
## 2010-01-13	20526	53.161	1091182.7	-20.000
## 2010-01-15	-20526	53.535	-1098859.4	7656.724
## 2010-01-26	21859	50.268	1098808.2	-20.000
## 2010-02-01	-21859	48.821	-1067178.2	-31649.973

## 2010-03-01	22221	48.024	1067141.3	-20.000
## 2010-03-05	-22221	51.468	-1143670.4	76509.124
## 2010-03-16	22344	51.183	1143633.0	-20.000
## 2010-03-22	-22344	49.608	-1108441.2	-35211.800
## 2010-04-01	22459	49.352	1108396.6	-20.000
## 2010-04-06	-22459	49.254	-1106195.6	-2220.982
## 2010-04-13	22258	49.697	1106155.8	-20.000
## 2010-04-19	-22258	48.875	-1087859.8	-18316.076
## 2010-04-23	21802	49.894	1087789.0	-20.000
## 2010-04-27	-21802	50.947	-1110746.5	22937.506
## 2010-08-12	23291	47.689	1110724.5	-20.000
## 2010-08-18	-23291	47.468	-1105577.2	-5167.311
## 2010-09-20	21476	51.478	1105541.5	-20.000
## 2010-09-24	-21476	51.478	-1105541.5	-20.000
## 2010-10-13	20900	52.895	1105505.5	-20.000
## 2010-10-15	-20900	54.086	-1130397.4	24871.900
## 2010-10-21	21192	53.338	1130338.9	-20.000
## 2010-10-27	-21192	54.007	-1144516.3	14157.448
## 2010-11-01	21076	54.302	1144469.0	-20.000
## 2010-11-05	-21076	54.903	-1157135.6	12646.676
## 2010-11-15	21343	54.214	1157089.4	-20.000
## 2010-11-19	-21343	56.861	-1213584.3	56474.921
## 2010-11-24	21518	56.398	1213572.2	-20.000
## 2010-11-26	-21518	56.398	-1213572.2	-20.000
## 2010-12-01	21826	55.601	1213547.4	-20.000
## 2010-12-07	-21826	57.196	-1248359.9	34792.470
## 2011-01-06	23275	53.633	1248308.1	-20.000
## 2011-01-12	-23275	55.060	-1281521.5	33193.425
## 2011-03-14	23629	54.233	1281471.6	-20.000
## 2011-03-18	-23629	51.163	-1208930.5	-72561.030
## 2011-04-20	22466	53.810	1208895.5	-20.000
## 2011-04-26	-22466	55.493	-1246705.7	37790.278
## 2011-05-13	21725	57.383	1246645.7	-20.000
## 2011-05-19	-21725	56.891	-1235957.0	-10708.700
## 2011-05-24	22264	55.513	1235941.4	-20.000
## 2011-05-30	-22264	54.932	-1223006.0	-12955.384
## 2011-06-09	22259	54.942	1222954.0	-20.000
## 2011-06-15	-22259	55.247	-1229743.0	6768.995
## 2011-07-13	22402	54.893	1229713.0	-20.000
## 2011-07-19	-22402	55.424	-1241608.4	11875.462
## 2012-01-31	23626	52.551	1241569.9	-20.000
## 2012-02-06	-23626	54.371	-1284569.2	42979.320
## 2012-02-09	23468	54.735	1284521.0	-20.000
## 2012-02-15	-23468	54.676	-1283136.4	-1404.612
## 2012-02-23	22971	55.857	1283091.1	-20.000
## 2012-02-29	-22971	54.617	-1254607.1	-28504.040
## 2012-03-30	24081	52.098	1254571.9	-20.000
## 2012-04-05	-24081	51.173	-1232297.0	-22294.925
## 2012-05-02	22917	53.771	1232270.0	-20.000
## 2012-05-08	-22917	50.514	-1157629.3	-74660.669
## 2012-07-13	20482	56.517	1157581.2	-20.000
## 2012-07-19	-20482	58.829	-1204935.6	47334.384
## 2012-09-11	18787	64.133	1204866.7	-20.000
## 2012-09-13	-18787	64.104	-1204321.8	-564.823

## 2012-09-27	17912	67.233	1204277.5	-20.000
## 2012-09-28	-17912	66.741	-1195464.8	-8832.704
## 2012-10-01	17785	67.794	1205716.3	-20.000
## 2012-10-05	-17785	67.912	-1207814.9	2078.630
## 2012-11-16	18426	64.990	1197505.7	-20.000
## 2012-11-22	-18426	67.548	-1244639.4	47113.708
## 2012-12-03	18052	68.946	1244613.2	-20.000
## 2012-12-07	-18052	70.756	-1277287.3	32654.120
## 2013-01-16	17892	71.386	1277238.3	-20.000
## 2013-01-22	-17892	71.859	-1285701.2	8442.916
## 2013-01-25	17884	71.888	1285645.0	-20.000
## 2013-01-31	-17884	71.524	-1279135.2	-6529.776
## 2013-02-06	18098	70.678	1279130.4	-20.000
## 2013-02-12	-18098	69.743	-1262208.8	-16941.630
## 2013-02-22	17683	71.376	1262141.8	-20.000
## 2013-02-26	-17683	70.491	-1246492.4	-15669.455
## 2013-02-27	17731	72.380	1283369.8	-20.000
## 2013-03-05	-17731	76.750	-1360854.2	77464.470
## 2013-03-25	17018	77.793	1323881.3	-20.000
## 2013-04-02	-17018	80.981	-1378134.7	54233.384
## 2013-04-15	17111	80.538	1378085.7	-20.000
## 2013-04-19	-17111	77.074	-1318813.2	-59292.504
## 2013-04-23	16968	77.724	1318820.8	-20.000
## 2013-04-29	-16968	78.836	-1337689.2	18848.416
## 2013-04-30	17145	79.043	1355192.2	-20.000
## 2013-05-07	-17145	80.548	-1380995.5	25783.225
## 2013-05-24	16301	83.638	1363383.0	-20.000
## 2013-05-29	-16301	84.199	-1372527.9	9124.861
## 2013-06-06	17006	80.706	1372486.2	-20.000
## 2013-06-11	-17006	81.414	-1384526.5	12020.248
## 2013-06-14	17045	81.227	1384514.2	-20.000
## 2013-06-20	-17045	80.991	-1380491.6	-4042.620
## 2013-07-04	17237	80.086	1380442.4	-20.000
## 2013-07-05	-17237	79.790	-1375340.2	-5122.152
## 2013-07-08	17195	81.454	1400601.5	-20.000
## 2013-07-12	-17195	83.264	-1431724.5	31102.950
## 2013-09-02	16734	84.042	1406358.8	-20.000
## 2013-09-03	-16734	83.441	-1396301.7	-10077.134
## 2013-09-10	17051	81.887	1396255.2	-20.000
## 2013-09-12	-17051	82.418	-1405309.3	9034.081
## 2013-10-08	16667	84.317	1405311.4	-20.000
## 2013-10-14	-16667	85.587	-1426478.5	21147.090
## 2013-10-22	16098	88.608	1426411.6	-20.000
## 2013-10-28	-16098	89.936	-1447789.7	21358.144
## 2013-11-27	15214	95.162	1447794.7	-20.000
## 2013-12-03	-15214	96.008	-1460665.7	12851.044
## 2014-01-02	14389	101.509	1460613.0	-20.000
## 2014-01-08	-14389	98.459	-1416726.6	-43906.450
## 2014-02-28	14183	99.886	1416683.1	-20.000
## 2014-03-03	-14183	96.786	-1372715.8	-43987.300
## 2014-03-04	14485	99.148	1436158.8	-20.000
## 2014-03-10	-14485	94.906	-1374713.4	-61465.370
## 2014-04-14	14225	92.170	1311118.2	-20.000
## 2014-04-22	-14225	95.772	-1362356.7	51218.450

## 2014-06-24	13311	102.346	1362327.6	-20.000
## 2014-06-30	-13311	101.509	-1351186.3	-11161.307
## 2014-07-16	13389	100.919	1351204.5	-20.000
## 2014-07-22	-13389	98.301	-1316152.1	-35072.402
## 2014-08-05	13864	94.926	1316054.1	-20.000
## 2014-08-11	-13864	95.438	-1323152.4	7078.368
## 2014-08-13	13874	95.369	1323149.5	-20.000
## 2014-08-15	-13874	95.192	-1320693.8	-2475.698
## 2014-08-21	13525	97.642	1320608.1	-20.000
## 2014-08-27	-13525	100.033	-1352946.3	32318.275
## 2014-08-29	13532	99.984	1352983.5	-20.000
## 2014-09-04	-13532	101.509	-1373619.8	20616.300
## 2014-09-30	12631	108.742	1373520.2	-20.000
## 2014-10-07	-12631	103.920	-1312613.5	-60926.682
## 2014-10-09	12489	105.101	1312606.4	-20.000
## 2014-10-15	-12489	97.307	-1215267.1	-97359.266
## 2014-10-28	11546	105.249	1215205.0	-20.000
## 2014-11-03	-11546	110.219	-1272588.6	57363.620
## 2014-11-05	11393	111.695	1272541.1	-20.000
## 2014-11-06	-11393	110.760	-1261888.7	-10672.455
## 2014-12-05	10654	118.436	1261817.1	-20.000
## 2014-12-11	-10654	113.958	-1214108.5	-47728.612
## 2015-01-02	10705	113.417	1214129.0	-20.000
## 2015-01-08	-10705	114.598	-1226771.6	12622.605
## 2015-03-27	8910	137.675	1226684.2	-20.000
## 2015-04-02	-8910	136.592	-1217034.7	-9669.530
## 2015-05-13	9422	129.162	1216964.4	-20.000
## 2015-05-19	-9422	135.313	-1274919.1	57934.722
## 2015-06-16	10315	123.602	1274954.6	-20.000
## 2015-06-22	-10315	131.475	-1356164.6	81189.995
## 2015-07-01	10736	126.309	1356053.4	-20.000
## 2015-07-02	-10736	124.439	-1335977.1	-20096.320
## 2015-07-08	10935	122.175	1335983.6	-20.000
## 2015-07-14	-10935	135.165	-1478029.3	142025.650
## 2015-08-13	11509	128.424	1478031.8	-20.000
## 2015-08-19	-11509	123.602	-1422535.4	-55516.398
## 2015-09-02	12177	116.812	1422419.7	-20.000
## 2015-09-04	-12177	117.649	-1432611.9	10172.149
## 2015-09-14	12126	118.141	1432577.8	-20.000
## 2015-09-18	-12126	113.220	-1372905.7	-59692.046
## 2015-11-16	11511	119.272	1372940.0	-20.000
## 2015-11-20	-11511	123.209	-1418258.8	45298.807
## 2015-11-25	11575	122.520	1418169.0	-20.000
## 2015-12-01	-11575	122.864	-1422150.8	3961.800
## 2017-03-01	13816	102.936	1422163.8	-20.000
## 2017-03-07	-13816	105.446	-1456841.9	34658.160
## 2017-03-10	13906	104.757	1456750.8	-20.000
## 2017-03-14	-13906	104.905	-1458808.9	2038.088
## 2017-03-16	13726	106.282	1458826.7	-20.000
## 2017-03-22	-13726	103.379	-1418980.2	-39866.578
## 2017-03-28	13469	105.347	1418918.7	-20.000
## 2017-04-03	-13469	106.085	-1428858.9	9920.122
## 2017-04-05	13419	106.479	1428841.7	-20.000
## 2017-04-11	-13419	104.216	-1398474.5	-30387.197

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## 2017-04-27      12936 108.103 1398420.4      -20.000
## 2017-05-02     -12936 109.677 -1418781.7     20341.264
## 2017-05-03      13150 109.973 1446144.9      -20.000
## 2017-05-05     -13150 111.104 -1461017.6    14852.650
## 2017-06-08      12251 117.009 1433477.3      -20.000
## 2017-06-14     -12251 119.518 -1464215.0    30717.759
## 2017-08-22      13828 105.889 1464233.1      -20.000
## 2017-08-28     -13828 107.217 -1482596.7    18343.584
## 2017-09-05      13924 106.479 1482613.6      -20.000
## 2017-09-08     -13924 107.070 -1490842.7     8209.084
## 2017-09-11      13892 107.857 1498349.4      -20.000
## 2017-09-13     -13892 108.841 -1512019.2    13649.728
## 2017-09-20      13834 108.742 1504336.8      -20.000
## 2017-09-26     -13834 110.612 -1530206.4    25849.580
## 2017-10-18      13034 117.403 1530230.7      -20.000
## 2017-10-24     -13034 114.401 -1491102.6   -39148.068
## 2017-11-16      13971 106.725 1491055.0      -20.000
## 2017-11-20     -13971 105.397 -1472501.5   -18573.488
##
## [1] "Transactions for the instrument: DBK.csv"
##      Quantity  Price      Value Net realized Profit
## 1999-12-31         0  0.000         0.0         0.000
## 2003-06-16      21916 45.627    999961.3        -20.000
## 2003-06-20     -21916 44.197   -968621.5   -31359.880
## 2003-07-11      21858 44.314    968615.4        -20.000
## 2003-07-17     -21858 44.353   -969467.9     832.462
## 2003-09-08      21705 44.663    969410.4        -20.000
## 2003-09-12     -21705 44.228   -959968.7   -9461.675
## 2003-11-12      21662 44.314    959929.9        -20.000
## 2003-11-18     -21662 43.537   -943098.5   -16851.374
## 2003-12-11      19379 48.664    943059.7        -20.000
## 2003-12-15     -19379 48.936   -948330.7    5251.088
## 2004-01-13      19247 49.270    948299.7        -20.000
## 2004-01-19     -19247 49.798   -958462.1   10142.416
## 2004-03-23      18383 52.136    958416.1        -20.000
## 2004-03-29     -18383 52.610   -967129.6    8693.542
## 2004-04-22      17573 55.033    967094.9        -20.000
## 2004-04-28     -17573 55.398   -973509.1    6394.145
## 2004-05-03      18129 53.697    973472.9        -20.000
## 2004-05-07     -18129 51.623   -935873.4   -37619.546
## 2004-05-11      18413 50.823    935803.9        -20.000
## 2004-05-12     -18413 50.147   -923356.7   -12467.188
## 2004-05-26      17702 52.159    923318.6        -20.000
## 2004-06-01     -17702 49.409   -874638.1   -48700.500
## 2004-11-05      18170 48.135    874612.9        -20.000
## 2004-11-11     -18170 49.440   -898324.8   23691.850
## 2004-12-01      17943 50.062    898262.5        -20.000
## 2004-12-07     -17943 50.846   -912329.8   14047.312
## 2005-01-06      18092 50.427    912325.3        -20.000
## 2005-01-12     -18092 50.567   -914858.2    2512.880
## 2005-02-23      17689 51.716    914804.3        -20.000
## 2005-02-28     -17689 51.654   -913707.6   -1116.718
## 2005-03-24      17669 51.709    913646.3        -20.000
## 2005-03-29     -17669 51.274   -905960.3   -7706.015

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## 2005-04-13	17228	52.586	905951.6	-20.000
## 2005-04-15	-17228	52.377	-902351.0	-3620.652
## 2005-04-28	18035	50.031	902309.1	-20.000
## 2005-04-29	-18035	49.635	-895167.2	-7161.860
## 2005-05-04	18176	49.246	895095.3	-20.000
## 2005-05-10	-18176	48.042	-873211.4	-21903.904
## 2005-06-07	17565	49.712	873191.3	-20.000
## 2005-06-13	-17565	50.349	-884380.2	11168.905
## 2005-08-19	16087	54.971	884318.5	-20.000
## 2005-08-23	-16087	55.608	-894565.9	10227.419
## 2005-08-26	16280	54.948	894553.4	-20.000
## 2005-09-01	-16280	55.033	-895937.2	1363.800
## 2005-09-16	15279	58.637	895914.7	-20.000
## 2005-09-19	-15279	57.954	-885479.2	-10455.557
## 2005-09-23	15280	57.946	885414.9	-20.000
## 2005-09-27	-15280	58.824	-898830.7	13395.840
## 2005-10-07	14940	60.160	898790.4	-20.000
## 2005-10-13	-14940	59.002	-881489.9	-17320.520
## 2005-10-20	14992	58.793	881424.7	-20.000
## 2005-10-21	-14992	58.101	-871050.2	-10394.464
## 2005-10-24	14944	58.606	875808.1	-20.000
## 2005-10-26	-14944	59.305	-886253.9	10425.856
## 2005-12-06	13379	65.884	881462.0	-20.000
## 2005-12-12	-13379	65.069	-870558.2	-10923.885
## 2006-01-02	13597	64.020	870479.9	-20.000
## 2006-01-06	-13597	65.434	-889706.1	19206.158
## 2006-01-19	13658	65.139	889668.5	-20.000
## 2006-01-20	-13658	64.805	-885106.7	-4581.772
## 2006-01-24	13737	64.432	885102.4	-20.000
## 2006-01-30	-13737	67.912	-932907.1	47784.760
## 2006-02-06	13647	68.354	932827.0	-20.000
## 2006-02-08	-13647	68.409	-933577.6	730.585
## 2006-03-09	13247	70.475	933582.3	-20.000
## 2006-03-15	-13247	72.968	-966607.1	33004.771
## 2006-04-25	13028	74.188	966521.3	-20.000
## 2006-04-26	-13028	74.040	-964593.1	-1948.144
## 2006-05-19	13601	70.918	964555.7	-20.000
## 2006-05-25	-13601	69.986	-951879.6	-12696.132
## 2006-06-09	14451	65.869	951872.9	-20.000
## 2006-06-12	-14451	65.177	-941872.8	-10020.092
## 2006-07-24	13929	67.616	941823.3	-20.000
## 2006-07-28	-13929	68.976	-960766.7	18923.440
## 2006-08-02	13983	68.704	960688.0	-20.000
## 2006-08-08	-13983	66.832	-934511.9	-26196.176
## 2006-09-08	13525	69.092	934469.3	-20.000
## 2006-09-14	-13525	71.081	-961370.5	26881.225
## 2006-09-20	13409	71.694	961344.8	-20.000
## 2006-09-22	-13409	71.834	-963222.1	1857.260
## 2006-09-25	13472	72.588	977905.5	-20.000
## 2006-09-29	-13472	73.916	-995796.4	17870.816
## 2006-10-18	12902	76.036	981016.5	-20.000
## 2006-10-24	-12902	76.518	-987235.2	6198.764
## 2006-11-29	12914	76.448	987249.5	-20.000
## 2006-11-30	-12914	76.161	-983543.2	-3726.318

## 2006-12-20	12490	78.740	983462.6	-20.000
## 2006-12-21	-12490	78.312	-978116.9	-5365.720
## 2006-12-27	12377	79.027	978117.2	-20.000
## 2007-01-03	-12377	80.270	-993501.8	15364.611
## 2007-01-09	12518	79.361	993441.0	-20.000
## 2007-01-15	-12518	81.396	-1018915.1	25454.130
## 2007-02-06	12208	83.462	1018904.1	-20.000
## 2007-02-12	-12208	82.204	-1003546.4	-15377.664
## 2007-03-29	13036	76.976	1003459.1	-20.000
## 2007-04-02	-13036	77.800	-1014200.8	10721.664
## 2007-04-03	13048	78.258	1021110.4	-20.000
## 2007-04-11	-13048	80.627	-1052021.1	30890.712
## 2007-04-25	11874	88.014	1045078.2	-20.000
## 2007-05-02	-11874	87.882	-1043510.9	-1587.368
## 2007-05-29	11950	87.315	1043414.2	-20.000
## 2007-05-30	-11950	86.771	-1036913.4	-6520.800
## 2007-06-11	12435	83.385	1036892.5	-20.000
## 2007-06-12	-12435	83.012	-1032254.2	-4658.255
## 2007-06-28	12423	83.089	1032214.6	-20.000
## 2007-07-04	-12423	84.348	-1047855.2	15620.557
## 2007-07-12	12783	81.971	1047835.3	-20.000
## 2007-07-17	-12783	83.245	-1064120.8	16265.542
## 2007-07-19	12854	82.779	1064041.3	-20.000
## 2007-07-25	-12854	78.685	-1011417.0	-52644.276
## 2007-08-02	12828	78.841	1011372.3	-20.000
## 2007-08-08	-12828	79.726	-1022725.1	11332.780
## 2009-09-22	25226	40.543	1022737.7	-20.000
## 2009-09-24	-25226	40.554	-1023015.2	257.486
## 2009-10-05	26143	39.129	1022949.4	-20.000
## 2009-10-09	-26143	41.378	-1081745.1	58775.607
## 2009-11-25	27571	39.234	1081720.6	-20.000
## 2009-11-26	-27571	38.232	-1054094.5	-27646.142
## 2010-01-14	26608	39.614	1054049.3	-20.000
## 2010-01-18	-26608	37.983	-1010651.7	-43417.648
## 2010-03-19	23777	42.504	1010617.6	-20.000
## 2010-03-25	-23777	44.524	-1058647.1	48009.540
## 2010-04-01	23522	45.005	1058607.6	-20.000
## 2010-04-07	-23522	44.477	-1046188.0	-12439.616
## 2010-04-09	23616	44.298	1046141.6	-20.000
## 2010-04-13	-23616	44.927	-1060996.0	14834.464
## 2010-04-14	23640	45.246	1069615.4	-20.000
## 2010-04-16	-23640	45.945	-1086139.8	16504.360
## 2010-04-20	24881	43.304	1077446.8	-20.000
## 2010-04-26	-24881	42.993	-1069708.8	-7757.991
## 2010-04-29	25827	41.417	1069676.9	-20.000
## 2010-04-30	-25827	40.523	-1046587.5	-23109.338
## 2010-08-13	25113	41.673	1046534.0	-20.000
## 2010-08-19	-25113	39.762	-998543.1	-48010.943
## 2010-08-23	24869	40.150	998490.3	-20.000
## 2010-08-26	-24869	39.071	-971656.7	-26853.651
## 2011-02-25	24714	39.315	971630.9	-20.000
## 2011-02-28	-24714	38.907	-961547.6	-10103.312
## 2012-11-06	31925	30.118	961517.1	-20.000
## 2012-11-07	-31925	29.841	-952673.9	-8863.225


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## 2012-11-29      33252 28.649   952636.5          -20.000
## 2012-12-05     -33252 29.752  -989313.5        36656.956
## 2012-12-11      33906 29.177   989275.4          -20.000
## 2012-12-17     -33906 27.713  -939637.0       -49658.384
## 2012-12-27      33122 28.368   939604.9          -20.000
## 2013-01-04     -33122 29.615  -980908.0        41283.134
## 2013-03-14      33632 29.164   980843.6          -20.000
## 2013-03-19     -33632 28.492  -958242.9       -22620.704
## 2013-05-22      30317 31.607   958229.4          -20.000
## 2013-05-23     -30317 30.518  -925214.2       -33035.213
## 2013-05-30      30022 30.816   925158.0          -20.000
## 2013-06-05     -30022 30.867  -926689.1        1511.122
## 2013-06-07      30063 30.824   926661.9          -20.000
## 2013-06-13     -30063 29.381  -883281.0       -43400.909
## 2013-08-01      30293 29.156   883222.7          -20.000
## 2013-08-07     -30293 28.304  -857413.1       -25829.636
## 2013-10-01      29619 28.947   857381.2          -20.000
## 2013-10-07     -29619 29.015  -859395.3        1994.092
## 2013-10-09      29505 29.126   859362.6          -20.000
## 2013-10-15     -29505 30.799  -908724.5       49341.865
## 2013-10-22      28877 31.467   908672.6          -20.000
## 2013-10-28     -28877 30.560  -882481.1       -26211.439
## 2013-11-14      30000 29.415   882450.0          -20.000
## 2013-11-15     -30000 29.011  -870330.0       -12140.000
## 2014-02-05      29052 29.956   870281.7          -20.000
## 2014-02-11     -29052 30.224  -878067.6       7765.936
## 2014-02-21      29109 30.164   878043.9          -20.000
## 2014-02-27     -29109 29.794  -867273.5      -10790.330
## 2015-03-27      30412 28.516   867228.6          -20.000
## 2015-04-02     -30412 29.247  -889459.8       22211.172
## 2017-01-31      52313 17.002   889425.6          -20.000
## 2017-02-02     -52313 16.494  -862850.6      -26595.004
## 2017-02-03      53509 16.735   895473.1          -20.000
## 2017-02-09     -53509 16.114  -862244.0      -33249.089
## 2017-11-24      51636 16.065   829532.3          -20.000
## 2017-11-30     -51636 15.885  -820237.9      -9314.480
## 2017-12-04      50802 16.145   820198.3          -20.000
## 2017-12-05     -50802 15.980  -811816.0      -8402.330
## 2017-12-07      51297 15.825   811775.0          -20.000
## 2017-12-13     -51297 16.520  -847426.4       35631.415
## 2018-01-02      52849 16.034   847380.9          -20.000
## 2018-01-05     -52849 15.884  -839453.5      -7947.350
##
## [1] "Transactions for the instrument: HEI.csv"
##           Quantity    Price      Value Net realized Profit
## 1999-12-31         0  0.000         0.0         0.000
## 2002-01-11      23333 42.857   999982.4        -20.000
## 2002-01-16     -23333 39.901  -931010.0       -68992.348
## 2003-08-21      32240 28.876   930962.2          -20.000
## 2003-08-25     -32240 28.930  -932703.2       1720.960
## 2003-08-28      32048 29.102   932660.9          -20.000
## 2003-09-03     -32048 30.241  -969163.6       36482.672
## 2003-11-12      30857 31.407   969125.8          -20.000
## 2003-11-13     -30857 30.919  -954067.6      -15078.216

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## 2003-11-14	30857	31.552	973600.1	-20.000
## 2003-11-20	-30857	31.335	-966904.1	-6715.969
## 2003-12-18	29516	32.094	947286.5	-20.000
## 2003-12-29	-29516	31.136	-919010.2	-28296.328
## 2004-01-02	29387	31.272	918990.3	-20.000
## 2004-01-05	-29387	30.603	-899330.4	-19679.903
## 2004-03-23	28044	32.067	899286.9	-20.000
## 2004-03-29	-28044	32.067	-899286.9	-20.000
## 2004-06-02	27629	32.547	899241.1	-20.000
## 2004-06-08	-27629	33.894	-936457.3	37196.263
## 2004-07-09	27044	34.626	936425.5	-20.000
## 2004-07-15	-27044	34.545	-934235.0	-2210.564
## 2004-08-04	27770	33.640	934182.8	-20.000
## 2004-08-06	-27770	33.369	-926657.1	-7545.670
## 2004-09-02	28166	32.899	926633.2	-20.000
## 2004-09-08	-28166	32.709	-921281.7	-5371.540
## 2004-09-10	28227	32.637	921244.6	-20.000
## 2004-09-13	-28227	32.465	-916389.6	-4875.044
## 2004-10-07	25706	35.647	916341.8	-20.000
## 2004-10-13	-25706	36.018	-925878.7	9516.926
## 2004-10-19	25532	36.262	925841.4	-20.000
## 2004-10-25	-25532	34.888	-890760.4	-35100.968
## 2004-11-29	22680	39.273	890711.6	-20.000
## 2004-12-03	-22680	39.146	-887831.3	-2900.360
## 2004-12-28	22072	40.222	887780.0	-20.000
## 2004-12-30	-22072	40.050	-883983.6	-3816.384
## 2005-01-04	21972	40.231	883955.5	-20.000
## 2005-01-10	-21972	42.329	-930052.8	46077.256
## 2005-02-10	18765	49.561	930012.2	-20.000
## 2005-02-16	-18765	47.192	-885557.9	-44474.285
## 2005-05-04	21282	41.609	885522.7	-20.000
## 2005-05-10	-21282	45.257	-963159.5	77616.736
## 2005-05-16	21487	44.823	963111.8	-20.000
## 2005-05-20	-21487	45.349	-974414.0	11282.162
## 2005-06-06	21015	46.365	974360.5	-20.000
## 2005-06-07	-21015	46.181	-970493.7	-3886.760
## 2005-06-27	17719	54.770	970469.6	-20.000
## 2005-07-01	-17719	55.140	-977025.7	6536.030
## 2005-08-03	17718	55.140	976970.5	-20.000
## 2005-08-04	-17718	55.001	-974507.7	-2482.802
## 2005-08-26	17843	54.613	974459.8	-20.000
## 2005-09-01	-17843	54.077	-964895.9	-9583.848
## 2005-09-06	17721	54.447	964855.3	-20.000
## 2005-09-07	-17721	53.985	-956668.2	-8207.102
## 2005-11-30	13906	68.791	956607.6	-20.000
## 2005-12-06	-13906	69.225	-962642.8	6015.204
## 2006-01-19	13805	69.733	962664.1	-20.000
## 2006-01-25	-13805	74.609	-1029977.2	67293.180
## 2006-02-09	13826	74.489	1029884.9	-20.000
## 2006-02-15	-13826	76.844	-1062445.1	32540.230
## 2006-03-02	12640	84.049	1062379.4	-20.000
## 2006-03-08	-12640	81.518	-1030387.5	-32011.840
## 2006-05-18	12071	85.360	1030380.6	-20.000
## 2006-05-24	-12071	78.729	-950337.8	-80062.801

## 2006-06-14	12815	74.157	950322.0	-20.000
## 2006-06-16	-12815	74.674	-956947.3	6605.355
## 2006-08-08	10670	89.683	956917.6	-20.000
## 2006-08-09	-10670	89.027	-949918.1	-7019.520
## 2006-09-08	10320	92.038	949832.2	-20.000
## 2006-09-14	-10320	91.530	-944589.6	-5262.560
## 2006-09-25	10237	92.269	944557.8	-20.000
## 2006-09-26	-10237	91.280	-934433.4	-10144.393
## 2006-10-04	9918	94.208	934354.9	-20.000
## 2006-10-09	-9918	92.961	-921987.2	-12387.746
## 2006-10-31	9564	96.397	921940.9	-20.000
## 2006-11-06	-9564	97.995	-937224.2	15263.272
## 2006-11-21	9453	99.150	937265.0	-20.000
## 2006-11-27	-9453	98.245	-928710.0	-8574.965
## 2007-01-11	9065	102.438	928600.5	-20.000
## 2007-01-17	-9065	103.999	-942750.9	14130.465
## 2007-02-02	9046	104.220	942774.1	-20.000
## 2007-02-08	-9046	103.722	-938269.2	-4524.908
## 2007-03-01	9086	103.260	938220.4	-20.000
## 2007-03-07	-9086	101.597	-923110.3	-15130.018
## 2007-03-15	9215	100.166	923029.7	-20.000
## 2007-03-20	-9215	99.390	-915878.8	-7170.840
## 2007-03-29	8901	102.890	915823.9	-20.000
## 2007-04-04	-8901	102.521	-912539.4	-3304.469
## 2007-06-22	8667	105.292	912565.8	-20.000
## 2007-06-28	-8667	102.742	-890464.9	-22120.850
## 2007-07-19	8732	101.967	890375.8	-20.000
## 2007-07-25	-8732	96.794	-845205.2	-45190.636
## 2007-08-17	8782	96.240	845179.7	-20.000
## 2007-08-23	-8782	96.979	-851669.6	6469.898
## 2007-09-11	8732	97.533	851658.2	-20.000
## 2007-09-17	-8732	94.920	-828841.4	-22836.716
## 2007-09-26	8652	95.788	828757.8	-20.000
## 2007-10-02	-8652	97.118	-840264.9	11487.160
## 2007-10-09	8648	97.164	840274.3	-20.000
## 2007-10-15	-8648	101.449	-877331.0	37036.680
## 2007-10-23	8964	97.866	877270.8	-20.000
## 2007-10-29	-8964	101.505	-909890.8	32599.996
## 2007-10-31	8956	101.588	909822.1	-20.000
## 2007-11-01	-8956	100.507	-900140.7	-9701.436
## 2007-11-23	8594	104.737	900109.8	-20.000
## 2007-11-29	-8594	103.611	-890432.9	-9696.844
## 2008-01-29	9314	95.594	890362.5	-20.000
## 2008-01-30	-9314	94.855	-883479.5	-6903.046
## 2008-03-04	9123	96.841	883480.4	-20.000
## 2008-03-10	-9123	95.603	-872186.2	-11314.274
## 2008-04-23	8688	100.387	872162.3	-20.000
## 2008-04-29	-8688	97.958	-851059.1	-21123.152
## 2008-05-23	8519	99.889	850954.4	-20.000
## 2008-05-29	-8519	100.600	-857011.4	6037.009
## 2009-12-29	17664	48.520	857057.3	-20.000
## 2009-12-30	-17664	47.820	-844692.5	-12384.800
## 2010-12-13	18031	46.845	844662.2	-20.000
## 2010-12-17	-18031	48.230	-869635.1	24952.935

## 2011-01-03	18282	47.565	869583.3	-20.000
## 2011-01-04	-18282	47.180	-862544.8	-7058.570
## 2011-04-13	17385	49.610	862469.8	-20.000
## 2011-04-19	-17385	49.390	-858645.2	-3844.700
## 2011-05-13	17740	48.400	858616.0	-20.000
## 2011-05-16	-17740	48.295	-856753.3	-1882.700
## 2011-05-19	17703	48.395	856736.7	-20.000
## 2011-05-25	-17703	47.305	-837440.4	-19316.270
## 2011-05-31	17449	47.990	837377.5	-20.000
## 2011-06-06	-17449	46.750	-815740.8	-21656.760
## 2011-06-09	17603	46.340	815723.0	-20.000
## 2011-06-10	-17603	45.590	-802520.8	-13222.250
## 2012-03-21	17956	44.690	802453.6	-20.000
## 2012-03-27	-17956	45.950	-825078.2	22604.560
## 2012-03-30	18363	44.930	825049.6	-20.000
## 2012-04-02	-18363	44.480	-816786.2	-8283.350
## 2012-04-11	19021	42.940	816761.7	-20.000
## 2012-04-13	-19021	42.880	-815620.5	-1161.260
## 2012-09-03	20026	40.725	815558.8	-20.000
## 2012-09-07	-20026	43.065	-862419.7	46840.840
## 2012-09-14	19569	44.070	862405.8	-20.000
## 2012-09-17	-19569	43.660	-854382.5	-8043.290
## 2012-09-19	19599	43.590	854320.4	-20.000
## 2012-09-20	-19599	43.035	-843443.0	-10897.445
## 2012-10-01	20077	42.010	843434.8	-20.000
## 2012-10-05	-20077	41.995	-843133.6	-321.155
## 2012-10-11	20651	40.825	843077.1	-20.000
## 2012-10-17	-20651	41.005	-846794.3	3697.180
## 2012-11-08	19363	43.730	846744.0	-20.000
## 2012-11-09	-19363	42.390	-820797.6	-25966.420
## 2013-01-09	17374	47.240	820747.8	-20.000
## 2013-01-15	-17374	45.515	-790777.6	-29990.150
## 2013-03-11	14611	54.120	790747.3	-20.000
## 2013-03-15	-14611	56.900	-831365.9	40598.580
## 2013-03-19	14675	56.650	831338.8	-20.000
## 2013-03-21	-14675	56.970	-836034.8	4676.000
## 2013-03-25	14597	57.270	835970.2	-20.000
## 2013-03-28	-14597	56.580	-825898.3	-10091.930
## 2013-04-02	14482	57.200	828370.4	-20.000
## 2013-04-04	-14482	56.660	-820550.1	-7840.280
## 2013-04-19	16106	50.790	818023.7	-20.000
## 2013-04-25	-16106	54.210	-873106.3	55062.520
## 2013-05-03	16168	54.000	873072.0	-20.000
## 2013-05-09	-16168	56.580	-914785.4	41693.440
## 2013-05-24	15562	58.780	914734.4	-20.000
## 2013-05-29	-15562	58.610	-912088.8	-2665.540
## 2013-06-25	18060	50.500	912030.0	-20.000
## 2013-07-01	-18060	51.890	-937133.4	25083.400
## 2013-07-04	18389	50.960	937103.4	-20.000
## 2013-07-05	-18389	50.350	-925886.2	-11237.290
## 2013-07-31	16712	55.400	925844.8	-20.000
## 2013-08-06	-16712	57.200	-955926.4	30061.600
## 2013-08-08	16607	57.560	955898.9	-20.000
## 2013-08-12	-16607	56.880	-944606.2	-11312.760

## 2013-09-02	17748	53.220	944548.6	-20.000
## 2013-09-03	-17748	52.920	-939224.2	-5344.400
## 2013-09-23	15970	58.810	939195.7	-20.000
## 2013-09-27	-15970	58.050	-927058.5	-12157.200
## 2013-10-01	16074	57.670	926987.6	-20.000
## 2013-10-07	-16074	56.120	-902072.9	-24934.700
## 2013-10-10	16128	55.930	902039.0	-20.000
## 2013-10-16	-16128	58.130	-937520.6	35461.600
## 2013-11-19	16643	56.330	937500.2	-20.000
## 2013-11-25	-16643	56.220	-935669.5	-1850.730
## 2013-11-27	16472	56.800	935609.6	-20.000
## 2013-12-02	-16472	57.180	-941869.0	6239.360
## 2014-02-19	16253	57.950	941861.4	-20.000
## 2014-02-25	-16253	59.960	-974529.9	32648.530
## 2014-03-04	16578	58.780	974454.8	-20.000
## 2014-03-10	-16578	61.840	-1025183.5	50708.680
## 2014-03-13	16442	62.350	1025158.7	-20.000
## 2014-03-19	-16442	59.900	-984875.8	-40302.900
## 2014-04-14	15608	63.100	984864.8	-20.000
## 2014-04-22	-15608	62.710	-978777.7	-6107.120
## 2014-04-28	15837	61.800	978726.6	-20.000
## 2014-05-05	-15837	62.620	-991712.9	12966.340
## 2014-05-08	15917	62.300	991629.1	-20.000
## 2014-05-14	-15917	62.810	-999746.8	8097.670
## 2014-05-19	16370	61.070	999715.9	-20.000
## 2014-05-23	-16370	61.660	-1009374.2	9638.300
## 2014-06-16	15620	64.620	1009364.4	-20.000
## 2014-06-20	-15620	64.500	-1007490.0	-1894.400
## 2014-07-21	17310	58.200	1007442.0	-20.000
## 2014-07-25	-17310	58.210	-1007615.1	153.100
## 2014-07-29	17168	58.690	1007589.9	-20.000
## 2014-07-30	-17168	57.540	-987846.7	-19763.200
## 2014-11-21	17054	57.920	987767.7	-20.000
## 2014-11-27	-17054	60.630	-1033984.0	46196.340
## 2014-12-05	16851	61.360	1033977.4	-20.000
## 2014-12-08	-16851	60.100	-1012745.1	-21252.260
## 2015-03-11	14316	70.740	1012713.8	-20.000
## 2015-03-17	-14316	71.510	-1023737.2	11003.320
## 2015-03-27	14145	72.370	1023673.7	-20.000
## 2015-04-02	-14145	73.810	-1044042.5	20348.800
## 2015-05-07	14450	72.250	1044012.5	-20.000
## 2015-05-12	-14450	74.080	-1070456.0	26423.500
## 2015-05-13	14490	74.750	1083127.5	-20.000
## 2015-05-19	-14490	76.080	-1102399.2	19251.700
## 2015-06-03	14705	74.100	1089640.5	-20.000
## 2015-06-04	-14705	73.260	-1077288.3	-12372.200
## 2015-06-10	15153	71.090	1077226.8	-20.000
## 2015-06-16	-15153	71.450	-1082681.9	5435.080
## 2015-07-01	14960	72.370	1082655.2	-20.000
## 2015-07-07	-14960	68.750	-1028500.0	-54175.200
## 2015-07-16	14089	73.000	1028497.0	-20.000
## 2015-07-22	-14089	73.100	-1029905.9	1388.900
## 2015-07-23	14142	73.230	1035618.7	-20.000
## 2015-07-29	-14142	66.400	-939028.8	-96609.860

## 2015-08-13	13173	70.840	933175.3	-20.000
## 2015-08-19	-13173	70.280	-925798.4	-7396.880
## 2015-08-25	14031	65.980	925765.4	-20.000
## 2015-08-28	-14031	67.300	-944286.3	18500.920
## 2015-09-11	14264	66.200	944276.8	-20.000
## 2015-09-17	-14264	66.880	-953976.3	9679.520
## 2015-11-25	12823	74.390	953903.0	-20.000
## 2015-12-01	-12823	75.430	-967238.9	13315.920
## 2015-12-15	13571	71.270	967205.2	-20.000
## 2015-12-21	-13571	72.080	-978197.7	10972.510
## 2016-01-12	13851	70.620	978157.6	-20.000
## 2016-01-18	-13851	65.050	-901007.5	-77170.070
## 2016-03-22	12112	74.390	901011.7	-20.000
## 2016-03-24	-12112	73.800	-893865.6	-7166.080
## 2016-03-29	12184	74.580	908682.7	-20.000
## 2016-04-04	-12184	75.130	-915383.9	6681.200
## 2016-04-07	12360	72.850	900426.0	-20.000
## 2016-04-13	-12360	78.160	-966057.6	65611.600
## 2016-06-03	12683	76.170	966064.1	-20.000
## 2016-06-09	-12683	74.800	-948688.4	-17395.710
## 2016-06-15	13294	71.360	948659.8	-20.000
## 2016-06-21	-13294	73.700	-979767.8	31087.960
## 2016-07-18	13630	71.880	979724.4	-20.000
## 2016-07-22	-13630	71.360	-972636.8	-7107.600
## 2016-08-04	13247	73.420	972594.7	-20.000
## 2016-08-10	-13247	77.850	-1031278.9	58664.210
## 2016-09-05	12459	82.770	1031231.4	-20.000
## 2016-09-06	-12459	82.380	-1026372.4	-4879.010
## 2016-09-07	12418	83.080	1031687.4	-20.000
## 2016-09-08	-12418	82.020	-1018524.4	-13183.080
## 2016-09-13	12802	79.140	1013150.3	-20.000
## 2016-09-19	-12802	81.330	-1041186.7	28016.380
## 2016-10-14	12378	84.110	1041113.6	-20.000
## 2016-10-20	-12378	85.230	-1054976.9	13843.360
## 2016-10-27	12343	85.470	1054956.2	-20.000
## 2016-11-02	-12343	84.580	-1043970.9	-11005.270
## 2016-11-18	12316	84.760	1043904.2	-20.000
## 2016-11-23	-12316	84.620	-1042179.9	-1744.240
## 2017-02-01	11561	90.140	1042108.5	-20.000
## 2017-02-07	-11561	87.960	-1016905.6	-25222.980
## 2017-02-27	11763	86.450	1016911.3	-20.000
## 2017-03-03	-11763	90.490	-1064433.9	47502.520
## 2017-03-09	11840	89.900	1064416.0	-20.000
## 2017-03-15	-11840	90.430	-1070691.2	6255.200
## 2017-03-23	12302	87.030	1070643.1	-20.000
## 2017-03-29	-12302	87.700	-1078885.4	8222.340
## 2017-05-19	12973	83.160	1078834.7	-20.000
## 2017-05-25	-12973	82.720	-1073126.6	-5728.120
## 2017-06-08	13035	82.320	1073041.2	-20.000
## 2017-06-14	-13035	86.480	-1127266.8	54205.600
## 2017-06-16	12997	86.730	1127229.8	-20.000
## 2017-06-22	-12997	85.780	-1114882.7	-12367.150
## 2017-10-19	13238	84.220	1114904.4	-20.000
## 2017-10-25	-13238	86.050	-1139129.9	24205.540

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## 2017-12-04      12680  89.830  1139044.4      -20.000
## 2017-12-08     -12680  90.260 -1144496.8      5432.400
## 2017-12-15      12736  89.860  1144457.0      -20.000
## 2017-12-21     -12736  90.150 -1148150.4      3673.440
## 2018-01-03      12653  90.740  1148133.2      -20.000
## 2018-01-09     -12653  94.160 -1191406.5     43253.260
## 2018-01-23      12852  92.700  1191380.4      -20.000
## 2018-01-24     -12852  92.160 -1184440.3     -6960.080
## 2018-01-26      13096  90.440  1184402.2      -20.000
## 2018-02-01     -13096  87.240 -1142495.0    -41927.200
##
## [1] "Transactions for the instrument: TKA.csv"
##      Quantity  Price      Value Net realized Profit
## 1999-12-31         0  0.000         0.0         0.000
## 2002-03-22      54764 18.260      999990.6        -20.000
## 2002-03-28     -54764 18.030     -987394.9     -12615.720
## 2002-04-05      55626 17.750      987361.5        -20.000
## 2002-04-11     -55626 17.050     -948423.3    -38958.200
## 2002-05-21      54504 17.400      948369.6        -20.000
## 2002-05-27     -54504 17.350     -945644.4     -2745.200
## 2004-04-19      62334 15.170      945606.8        -20.000
## 2004-04-23     -62334 15.240     -949970.2      4343.380
## 2004-07-21      68145 13.940      949941.3        -20.000
## 2004-07-27     -68145 14.430     -983332.3     33371.050
## 2004-08-05      66573 14.770      983283.2        -20.000
## 2004-08-11     -66573 14.090     -938013.6    -45289.640
## 2004-08-16      64113 14.630      937973.2        -20.000
## 2004-08-20     -64113 14.740     -945025.6      7032.430
## 2004-10-26      63083 14.980      944983.3        -20.000
## 2004-11-01     -63083 14.940     -942460.0    -2543.320
## 2004-11-17      59086 15.950      942421.7        -20.000
## 2004-11-23     -59086 15.770     -931786.2   -10655.480
## 2005-01-25      56504 16.490      931751.0        -20.000
## 2005-01-31     -56504 16.390     -926100.6    -5670.400
## 2005-03-31      58611 15.800      926053.8        -20.000
## 2005-04-01     -58611 15.770     -924295.5    -1778.330
## 2005-08-19      58833 15.710      924266.4        -20.000
## 2005-08-25     -58833 15.530     -913676.5   -10609.940
## 2005-10-07      52508 17.400      913639.2        -20.000
## 2005-10-11     -52508 17.580     -923090.6      9431.440
## 2005-10-14      53048 17.400      923035.2        -20.000
## 2005-10-20     -53048 17.030     -903407.4   -19647.760
## 2005-10-24      52953 17.060      903378.2        -20.000
## 2005-10-27     -52953 16.910     -895435.2    -7962.950
## 2005-10-31      53171 16.840      895399.6        -20.000
## 2005-11-04     -53171 17.180     -913477.8     18058.140
## 2005-12-15      53417 17.100      913430.7        -20.000
## 2005-12-21     -53417 17.120     -914499.0     1048.340
## 2006-02-09      45025 20.310      914457.8        -20.000
## 2006-02-15     -45025 20.280     -913107.0   -1370.750
## 2006-05-17      33792 27.020      913059.8        -20.000
## 2006-05-23     -33792 25.930     -876226.6   -36853.280
## 2006-06-15      36986 23.690      876198.3        -20.000
## 2006-06-21     -36986 24.580     -909115.9     32897.540

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##	2006-07-12	32123	28.300	909080.9	-20.000
##	2006-07-18	-32123	25.540	-820421.4	-88679.480
##	2006-08-22	30554	26.850	820374.9	-20.000
##	2006-08-28	-30554	26.220	-801125.9	-19269.020
##	2006-09-13	30634	26.150	801079.1	-20.000
##	2006-09-19	-30634	26.210	-802917.1	1818.040
##	2006-11-01	27198	29.520	802885.0	-20.000
##	2006-11-07	-27198	29.750	-809140.5	6235.540
##	2006-12-27	23310	34.710	809090.1	-20.000
##	2007-01-03	-23310	35.960	-838227.6	29117.500
##	2007-01-11	24946	33.600	838185.6	-20.000
##	2007-01-17	-24946	35.610	-888327.1	50121.460
##	2007-01-24	25235	35.200	888272.0	-20.000
##	2007-01-30	-25235	35.770	-902656.0	14363.950
##	2007-02-07	24736	36.490	902616.6	-20.000
##	2007-02-13	-24736	36.400	-900390.4	-2246.240
##	2007-03-06	24797	36.310	900379.1	-20.000
##	2007-03-09	-24797	37.280	-924432.2	24033.090
##	2007-03-29	25236	36.630	924394.7	-20.000
##	2007-03-30	-25236	36.340	-917076.2	-7338.440
##	2007-05-29	21582	42.490	917019.2	-20.000
##	2007-06-04	-21582	45.810	-988671.4	71632.240
##	2007-06-11	22943	43.090	988613.9	-20.000
##	2007-06-12	-22943	42.760	-981042.7	-7591.190
##	2007-06-28	22767	43.090	981030.0	-20.000
##	2007-07-04	-22767	44.510	-1013359.2	32309.140
##	2007-07-06	22689	44.660	1013290.7	-20.000
##	2007-07-10	-22689	45.810	-1039383.1	26072.350
##	2007-07-19	23462	44.300	1039366.6	-20.000
##	2007-07-20	-23462	43.500	-1020597.0	-18789.600
##	2007-07-30	24843	41.080	1020550.4	-20.000
##	2007-08-03	-24843	39.960	-992726.3	-27844.160
##	2007-08-17	24755	40.100	992675.5	-20.000
##	2007-08-23	-24755	42.110	-1042433.0	49737.550
##	2007-09-07	24737	42.140	1042417.2	-20.000
##	2007-09-13	-24737	40.810	-1009517.0	-32920.210
##	2007-10-11	22508	44.850	1009483.8	-20.000
##	2007-10-17	-22508	43.280	-974146.2	-35357.560
##	2007-10-23	23050	42.260	974093.0	-20.000
##	2007-10-29	-23050	46.540	-1072747.0	98634.000
##	2007-11-06	24883	43.110	1072706.1	-20.000
##	2007-11-07	-24883	43.080	-1071959.6	-766.490
##	2007-12-12	28142	38.090	1071928.8	-20.000
##	2007-12-13	-28142	37.050	-1042661.1	-29287.680
##	2008-01-08	28027	37.200	1042604.4	-20.000
##	2008-01-11	-28027	35.250	-987951.8	-54672.650
##	2008-04-09	26464	37.330	987901.1	-20.000
##	2008-04-15	-26464	37.800	-1000339.2	12418.080
##	2009-11-23	40352	24.790	1000326.1	-20.000
##	2009-11-24	-40352	24.550	-990641.6	-9704.480
##	2010-03-16	39031	25.380	990606.8	-20.000
##	2010-03-22	-39031	24.790	-967578.5	-23048.290
##	2010-04-09	36455	26.540	967515.7	-20.000
##	2010-04-12	-36455	26.495	-965875.2	-1660.475

## 2010-04-14	36544	26.430	965857.9	-20.000
## 2010-04-15	-36544	26.365	-963482.6	-2395.360
## 2010-04-20	36941	26.080	963421.3	-20.000
## 2010-04-26	-36941	25.325	-935530.8	-27910.455
## 2010-04-29	37608	24.875	935499.0	-20.000
## 2010-05-05	-37608	23.610	-887924.9	-47594.120
## 2010-10-13	34697	25.590	887896.2	-20.000
## 2010-10-19	-34697	26.125	-906459.1	18542.895
## 2010-11-24	31681	28.610	906393.4	-20.000
## 2010-11-29	-31681	29.795	-943935.4	37521.985
## 2010-12-01	31542	29.925	943894.3	-20.000
## 2010-12-07	-31542	31.570	-995780.9	51866.590
## 2010-12-13	32739	30.415	995756.7	-20.000
## 2010-12-17	-32739	31.425	-1028823.1	33046.390
## 2011-01-03	32665	31.495	1028784.2	-20.000
## 2011-01-05	-32665	31.245	-1020617.9	-8186.250
## 2011-01-31	34139	29.895	1020585.4	-20.000
## 2011-02-04	-34139	30.685	-1047555.2	26949.810
## 2011-03-03	34987	29.940	1047510.8	-20.000
## 2011-03-09	-34987	28.570	-999578.6	-47952.190
## 2011-04-13	33218	30.090	999529.6	-20.000
## 2011-04-19	-33218	28.860	-958671.5	-40878.140
## 2011-05-06	29864	32.100	958634.4	-20.000
## 2011-05-12	-29864	32.730	-977448.7	18794.320
## 2011-05-19	29890	32.700	977403.0	-20.000
## 2011-05-25	-29890	32.110	-959767.9	-17655.100
## 2011-06-03	29686	32.330	959748.4	-20.000
## 2011-06-09	-29686	34.415	-1021643.7	61875.310
## 2011-07-13	32075	31.850	1021588.8	-20.000
## 2011-07-19	-32075	31.650	-1015173.8	-6435.000
## 2013-11-14	52625	19.290	1015136.2	-20.000
## 2013-11-20	-52625	19.085	-1004348.1	-10808.125
## 2013-11-22	53421	18.800	1004314.8	-20.000
## 2013-11-28	-53421	19.410	-1036901.6	32566.810
## 2014-01-22	54485	19.030	1036849.6	-20.000
## 2014-01-28	-54485	19.070	-1039029.0	2159.400
## 2014-02-12	53419	19.450	1038999.5	-20.000
## 2014-02-17	-53419	20.020	-1069448.4	30428.830
## 2014-03-04	55510	19.265	1069400.2	-20.000
## 2014-03-07	-55510	19.665	-1091604.1	22184.000
## 2014-03-26	58279	18.730	1091565.7	-20.000
## 2014-04-01	-58279	19.910	-1160334.9	68749.220
## 2014-06-02	52043	22.295	1160298.7	-20.000
## 2014-06-06	-52043	21.695	-1129072.9	-31245.800
## 2014-06-23	52234	21.615	1129037.9	-20.000
## 2014-06-27	-52234	21.330	-1114151.2	-14906.690
## 2014-07-24	51282	21.725	1114101.5	-20.000
## 2014-07-30	-51282	21.540	-1104614.3	-9507.170
## 2014-08-25	52115	21.195	1104577.4	-20.000
## 2014-08-28	-52115	21.195	-1104577.4	-20.000
## 2014-12-01	51422	21.480	1104544.6	-20.000
## 2014-12-05	-51422	21.940	-1128198.7	23634.120
## 2015-02-10	49093	22.980	1128157.1	-20.000
## 2015-02-13	-49093	22.870	-1122756.9	-5420.230

## 2015-03-05	47836	23.470	1122710.9	-20.000
## 2015-03-11	-47836	25.260	-1208337.4	85606.440
## 2015-03-16	47665	25.350	1208307.8	-20.000
## 2015-03-17	-47665	24.930	-1188288.4	-20039.300
## 2015-03-27	48638	24.430	1188226.3	-20.000
## 2015-04-02	-48638	24.760	-1204276.9	16030.540
## 2015-04-10	47883	25.150	1204257.4	-20.000
## 2015-04-16	-47883	25.590	-1225326.0	21048.520
## 2015-05-27	48913	25.050	1225270.7	-20.000
## 2015-06-02	-48913	24.140	-1180759.8	-44530.830
## 2015-06-10	50265	23.490	1180724.8	-20.000
## 2015-06-16	-50265	23.165	-1164388.7	-16356.125
## 2015-08-13	49557	23.495	1164341.7	-20.000
## 2015-08-19	-49557	21.360	-1058537.5	-105824.195
## 2016-08-18	48937	21.630	1058507.3	-20.000
## 2016-08-24	-48937	21.215	-1038198.5	-20328.855
## 2016-09-01	48981	21.195	1038152.3	-20.000
## 2016-09-07	-48981	22.265	-1090562.0	52389.670
## 2016-09-27	51440	21.200	1090528.0	-20.000
## 2016-10-04	-51440	21.445	-1103130.8	12582.800
## 2016-10-14	50163	21.990	1103084.4	-20.000
## 2016-10-20	-50163	21.995	-1103335.2	230.815
## 2016-11-14	50984	21.640	1103293.8	-20.000
## 2016-11-18	-50984	21.175	-1079586.2	-23727.560
## 2016-11-29	50791	21.255	1079562.7	-20.000
## 2016-12-05	-50791	21.935	-1114100.6	34517.880
## 2016-12-20	48259	23.085	1114059.0	-20.000
## 2016-12-21	-48259	22.855	-1102959.4	-11119.570
## 2017-01-20	46215	23.865	1102921.0	-20.000
## 2017-01-23	-46215	23.510	-1086514.7	-16426.325
## 2017-02-01	45736	23.755	1086458.7	-20.000
## 2017-02-07	-45736	23.460	-1072966.6	-13512.120
## 2017-02-15	45579	23.540	1072929.7	-20.000
## 2017-02-21	-45579	23.170	-1056065.4	-16884.230
## 2017-03-10	46470	22.725	1056030.8	-20.000
## 2017-03-16	-46470	23.415	-1088095.1	32044.300
## 2017-03-23	47985	22.675	1088059.9	-20.000
## 2017-03-29	-47985	22.745	-1091418.8	3338.950
## 2017-04-10	48184	22.650	1091367.6	-20.000
## 2017-04-18	-48184	21.275	-1025114.6	-66273.000
## 2017-06-08	44146	23.220	1025070.1	-20.000
## 2017-06-12	-44146	23.810	-1051116.3	26026.140
## 2017-06-21	43353	24.245	1051093.5	-20.000
## 2017-06-27	-43353	25.400	-1101166.2	50052.715
## 2017-07-10	41955	26.245	1101109.0	-20.000
## 2017-07-14	-41955	26.565	-1114534.6	13405.600
## 2017-08-10	42841	26.015	1114508.6	-20.000
## 2017-08-16	-42841	26.320	-1127575.1	13046.505
## 2017-09-18	43085	26.170	1127534.5	-20.000
## 2017-09-21	-43085	25.750	-1109438.8	-18115.700
## 2017-12-18	46711	23.750	1109386.2	-20.000
## 2017-12-22	-46711	23.930	-1117794.2	8387.980
## 2018-01-26	42728	26.160	1117764.5	-20.000
## 2018-02-01	-42728	24.900	-1063927.2	-53857.280

```

## 2018-06-11      44966 23.660 1063895.6          -20.000
## 2018-06-14     -44966 23.300 -1047707.8        -16207.760
##
## [1] "Transactions for the instrument: VOW.csv"
##      Quantity      Price      Value Net realized Profit
## 1999-12-31         0    0.000         0.0          0.000
## 2002-01-03      19151 52.216    999988.6         -20.000
## 2002-01-09     -19151 52.494 -1005312.6         5303.978
## 2002-01-28      19415 51.778    1005269.9         -20.000
## 2002-01-30     -19415 53.290 -1034625.3        29335.480
## 2002-02-08      19981 51.778    1034576.2         -20.000
## 2002-02-11     -19981 50.834 -1015714.2       -18882.064
## 2002-02-25      20086 50.565    1015648.6         -20.000
## 2002-03-01     -20086 56.769 -1140262.1       124593.544
## 2002-03-13      19808 57.565    1140247.5         -20.000
## 2002-03-19     -19808 59.653 -1181606.6        41339.104
## 2002-04-05      20350 58.062    1181561.7         -20.000
## 2002-04-11     -20350 57.018 -1160316.3       -21265.400
## 2002-05-13      20803 55.775    1160287.3         -20.000
## 2002-05-15     -20803 55.308 -1150572.3       -9735.001
## 2002-05-31      19959 57.644    1150516.6         -20.000
## 2002-06-06     -19959 55.745 -1112614.5       -37922.141
## 2003-09-11      25643 43.387    1112572.8         -20.000
## 2003-09-17     -25643 43.884 -1125317.4       12724.571
## 2003-10-27      26632 42.254    1125308.5         -20.000
## 2003-10-29     -26632 42.781 -1139343.6       14015.064
## 2003-11-20      26799 42.512    1139279.1         -20.000
## 2003-11-26     -26799 42.005 -1125692.0      -13607.093
## 2003-12-11      26454 42.552    1125670.6         -20.000
## 2003-12-15     -26454 43.248 -1144082.6       18391.984
## 2003-12-23      26260 43.566    1144043.2         -20.000
## 2004-01-05     -26260 44.024 -1156070.2       12007.080
## 2005-07-08      30131 38.367    1156036.1         -20.000
## 2005-07-13     -30131 39.917 -1202739.1       46683.050
## 2005-08-19      27675 43.457    1202672.5         -20.000
## 2005-08-25     -27675 43.109 -1193041.6      -9650.900
## 2005-09-05      28004 42.602    1193026.4         -20.000
## 2005-09-09     -28004 44.819 -1255111.3       62064.868
## 2005-10-20      26887 46.678    1255031.4         -20.000
## 2005-10-26     -26887 46.469 -1249412.0      -5639.383
## 2005-10-31      27933 44.729    1249415.2         -20.000
## 2005-11-04     -27933 45.087 -1259415.2        9980.014
## 2006-01-02      28061 44.879    1259349.6         -20.000
## 2006-01-06     -28061 45.087 -1265186.3        5816.688
## 2006-01-19      27490 46.022    1265144.8         -20.000
## 2006-01-20     -27490 45.744 -1257502.6      -7662.220
## 2006-01-24      27466 45.783    1257475.9         -20.000
## 2006-01-30     -27466 48.965 -1344872.7       87376.812
## 2006-02-01      27200 49.442    1344822.4         -20.000
## 2006-02-07     -27200 49.909 -1357524.8       12682.400
## 2006-04-19      21846 62.138    1357466.7         -20.000
## 2006-04-25     -21846 64.345 -1405680.9       48194.122
## 2006-05-03      22952 61.243    1405649.3         -20.000
## 2006-05-09     -22952 60.975 -1399498.2      -6171.136

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## 2006-06-15	27013	51.808	1399489.5	-20.000
## 2006-06-21	-27013	52.276	-1412131.6	12622.084
## 2006-07-14	26533	53.220	1412086.3	-20.000
## 2006-07-20	-26533	52.902	-1403648.8	-8457.494
## 2006-07-24	26339	53.290	1403605.3	-20.000
## 2006-07-26	-26339	53.488	-1408820.4	5195.122
## 2006-08-08	24119	58.410	1408790.8	-20.000
## 2006-08-14	-24119	61.810	-1490795.4	81984.600
## 2006-09-12	24274	61.412	1490714.9	-20.000
## 2006-09-18	-24274	64.624	-1568683.0	77948.088
## 2006-09-25	23852	65.767	1568674.5	-20.000
## 2006-09-29	-23852	66.791	-1593098.9	24404.448
## 2006-10-03	23581	67.557	1593061.6	-20.000
## 2006-10-09	-23581	68.909	-1624943.1	31861.512
## 2006-11-28	20115	80.779	1624869.6	-20.000
## 2006-11-30	-20115	82.072	-1650878.3	25988.695
## 2006-12-18	19569	84.359	1650821.3	-20.000
## 2006-12-22	-19569	83.514	-1634285.5	-16555.805
## 2007-01-05	19291	84.717	1634275.6	-20.000
## 2007-01-11	-19291	82.360	-1588806.8	-45488.887
## 2007-01-26	18747	84.746	1588733.3	-20.000
## 2007-02-01	-18747	85.124	-1595819.6	7066.366
## 2007-02-08	18912	84.379	1595775.6	-20.000
## 2007-02-14	-18912	87.759	-1659698.2	63902.560
## 2007-02-28	17524	94.708	1659663.0	-20.000
## 2007-03-06	-17524	93.505	-1638581.6	-21101.372
## 2007-03-15	15972	102.592	1638599.4	-20.000
## 2007-03-21	-15972	107.673	-1719753.2	81133.732
## 2007-04-11	15584	110.347	1719647.6	-20.000
## 2007-04-17	-15584	113.887	-1774815.0	55147.360
## 2007-04-23	15557	114.085	1774820.3	-20.000
## 2007-04-27	-15557	110.834	-1724244.5	-50595.807
## 2007-05-29	15323	112.525	1724220.6	-20.000
## 2007-05-30	-15323	110.884	-1699075.5	-25165.043
## 2007-07-12	14104	120.458	1698939.6	-20.000
## 2007-07-18	-14104	119.554	-1686189.6	-12770.016
## 2007-07-27	13845	121.791	1686196.4	-20.000
## 2007-08-01	-13845	129.744	-1796305.7	110089.285
## 2007-08-09	12877	139.497	1796302.9	-20.000
## 2007-08-14	-12877	142.192	-1831006.4	34683.515
## 2007-08-27	12323	148.575	1830889.7	-20.000
## 2007-08-28	-12323	148.068	-1824642.0	-6267.761
## 2007-09-10	12138	150.324	1824632.7	-20.000
## 2007-09-14	-12138	151.050	-1833444.9	8792.188
## 2007-11-06	9757	187.906	1833398.8	-20.000
## 2007-11-12	-9757	176.373	-1720871.4	-112547.481
## 2007-11-14	9790	175.776	1720847.0	-20.000
## 2007-11-20	-9790	163.657	-1602202.0	-118665.010
## 2007-12-11	10277	155.892	1602102.1	-20.000
## 2007-12-12	-10277	155.405	-1597097.2	-5024.899
## 2008-01-22	10546	151.448	1597170.6	-20.000
## 2008-01-28	-10546	153.546	-1619296.1	22105.508
## 2008-02-01	10606	152.661	1619122.6	-20.000
## 2008-02-07	-10606	148.535	-1575362.2	-43780.356

## 2008-02-18	10460	150.613	1575412.0	-20.000
## 2008-02-22	-10460	149.181	-1560433.3	-14998.720
## 2008-05-08	8390	185.987	1560430.9	-20.000
## 2008-05-14	-8390	189.327	-1588453.5	28002.600
## 2008-05-27	8868	179.107	1588320.9	-20.000
## 2008-06-02	-8868	172.545	-1530129.1	-58211.816
## 2008-06-25	8486	180.300	1530025.8	-20.000
## 2008-07-01	-8486	179.524	-1523440.7	-6605.136
## 2008-07-09	8781	173.489	1523406.9	-20.000
## 2008-07-15	-8781	166.878	-1465355.7	-58071.191
## 2008-08-05	7516	194.964	1465349.4	-20.000
## 2008-08-11	-7516	203.216	-1527371.5	62002.032
## 2008-09-08	7571	201.735	1527335.7	-20.000
## 2008-09-12	-7571	211.617	-1602152.3	74796.622
## 2008-09-16	7613	210.454	1602186.3	-20.000
## 2008-09-22	-7613	280.367	-2134434.0	532227.669
## 2008-10-22	8382	254.617	2134199.7	-20.000
## 2008-10-28	-8382	939.528	-7875123.7	5740904.002
## 2008-11-26	25146	313.176	7875123.7	-20.000
## 2008-12-02	-25146	289.573	-7281602.7	-593541.038
## 2008-12-08	24340	299.157	7281481.4	-20.000
## 2008-12-12	-24340	303.810	-7394735.4	113234.020
## 2008-12-23	27647	267.472	7394798.4	-20.000
## 2009-01-05	-27647	253.265	-7002017.5	-392800.929
## 2009-05-07	29587	236.662	7002118.6	-20.000
## 2009-05-13	-29587	223.200	-6603818.4	-398320.194
## 2009-05-21	29898	220.873	6603661.0	-20.000
## 2009-05-27	-29898	212.661	-6358138.6	-245542.376
## 2010-12-20	55289	115.000	6358235.0	-20.000
## 2010-12-27	-55289	105.500	-5832989.5	-525265.500
## 2011-01-06	51143	114.050	5832859.1	-20.000
## 2011-01-12	-51143	118.450	-6057888.4	225009.200
## 2011-02-01	53920	112.350	6057912.0	-20.000
## 2011-02-04	-53920	107.600	-5801792.0	-256140.000
## 2011-05-13	48816	118.850	5801781.6	-20.000
## 2011-05-19	-48816	115.250	-5626044.0	-175757.600
## 2011-06-24	45777	122.900	5625993.3	-20.000
## 2011-06-30	-45777	126.050	-5770190.8	144177.550
## 2011-12-07	50526	114.200	5770069.2	-20.000
## 2011-12-09	-50526	109.500	-5532597.0	-237492.200
## 2012-02-13	42428	130.400	5532611.2	-20.000
## 2012-02-17	-42428	129.400	-5490183.2	-42448.000
## 2012-03-08	43624	125.850	5490080.4	-20.000
## 2012-03-14	-43624	130.800	-5706019.2	215918.800
## 2012-04-11	48541	117.550	5705994.5	-20.000
## 2012-04-13	-48541	117.450	-5701140.5	-4874.100
## 2012-04-16	48378	119.250	5769076.5	-20.000
## 2012-04-20	-48378	113.100	-5471551.8	-297544.700
## 2012-05-17	43932	123.000	5403636.0	-20.000
## 2012-05-23	-43932	120.850	-5309182.2	-94473.800
## 2012-07-25	41236	128.750	5309135.0	-20.000
## 2012-07-26	-41236	126.550	-5218415.8	-90739.200
## 2012-08-03	39804	131.100	5218304.4	-20.000
## 2012-08-09	-39804	134.700	-5361598.8	143274.400

## 2012-10-16	40057	133.850	5361629.5	-20.000
## 2012-10-22	-40057	137.850	-5521857.5	160208.000
## 2012-10-24	39739	138.950	5521734.0	-20.000
## 2012-10-30	-39739	149.850	-5954889.1	433135.100
## 2012-11-07	40006	148.850	5954893.1	-20.000
## 2012-11-13	-40006	143.800	-5752862.8	-202050.300
## 2012-11-19	40527	141.950	5752807.6	-20.000
## 2012-11-23	-40527	150.850	-6113498.0	360670.300
## 2012-12-06	39189	156.000	6113484.0	-20.000
## 2012-12-10	-39189	155.200	-6082132.8	-31371.200
## 2013-02-01	35207	172.750	6082009.2	-20.000
## 2013-02-04	-35207	170.100	-5988710.7	-93318.550
## 2013-02-27	38662	154.900	5988743.8	-20.000
## 2013-03-01	-38662	156.650	-6056402.3	67638.500
## 2013-03-22	40783	148.500	6056275.5	-20.000
## 2013-03-28	-40783	146.750	-5984905.2	-71390.250
## 2013-04-29	41261	145.050	5984908.1	-20.000
## 2013-05-02	-41261	146.750	-6055051.8	70123.700
## 2013-05-03	40901	148.900	6090158.9	-20.000
## 2013-05-09	-40901	151.650	-6202636.7	112457.750
## 2013-05-24	37561	164.200	6167516.2	-20.000
## 2013-05-30	-37561	164.400	-6175028.4	7492.200
## 2013-06-07	38164	161.800	6174935.2	-20.000
## 2013-06-11	-38164	162.350	-6195925.4	20970.200
## 2013-06-14	39935	155.150	6195915.2	-20.000
## 2013-06-18	-39935	155.400	-6205899.0	9963.750
## 2013-06-25	42549	145.850	6205771.6	-20.000
## 2013-06-28	-42549	149.000	-6339801.0	134009.350
## 2013-07-04	42407	149.500	6339846.5	-20.000
## 2013-07-10	-42407	156.250	-6626093.8	286227.250
## 2013-07-17	40990	161.650	6626033.5	-20.000
## 2013-07-23	-40990	163.500	-6701865.0	75811.500
## 2013-08-08	38318	174.900	6701818.2	-20.000
## 2013-08-14	-38318	181.550	-6956632.9	254794.700
## 2013-09-02	40622	171.250	6956517.5	-20.000
## 2013-09-03	-40622	170.900	-6942299.8	-14237.700
## 2013-09-05	41484	167.350	6942347.4	-20.000
## 2013-09-11	-41484	174.500	-7238958.0	296590.600
## 2013-10-01	42770	169.250	7238822.5	-20.000
## 2013-10-02	-42770	167.800	-7176806.0	-62036.500
## 2013-10-28	41702	172.100	7176914.2	-20.000
## 2013-11-01	-41702	181.100	-7552232.2	375298.000
## 2013-12-06	40246	187.650	7552161.9	-20.000
## 2013-12-12	-40246	182.550	-7346907.3	-205274.600
## 2013-12-16	39994	183.700	7346897.8	-20.000
## 2013-12-20	-39994	190.550	-7620856.7	273938.900
## 2014-01-07	39323	193.800	7620797.4	-20.000
## 2014-01-13	-39323	196.800	-7738766.4	117949.000
## 2014-01-15	40190	192.550	7738584.5	-20.000
## 2014-01-20	-40190	196.100	-7881259.0	142654.500
## 2014-01-28	42202	186.750	7881223.5	-20.000
## 2014-01-29	-42202	184.850	-7801039.7	-80203.800
## 2014-02-05	43975	177.400	7801165.0	-20.000
## 2014-02-11	-43975	187.950	-8265101.2	463916.250

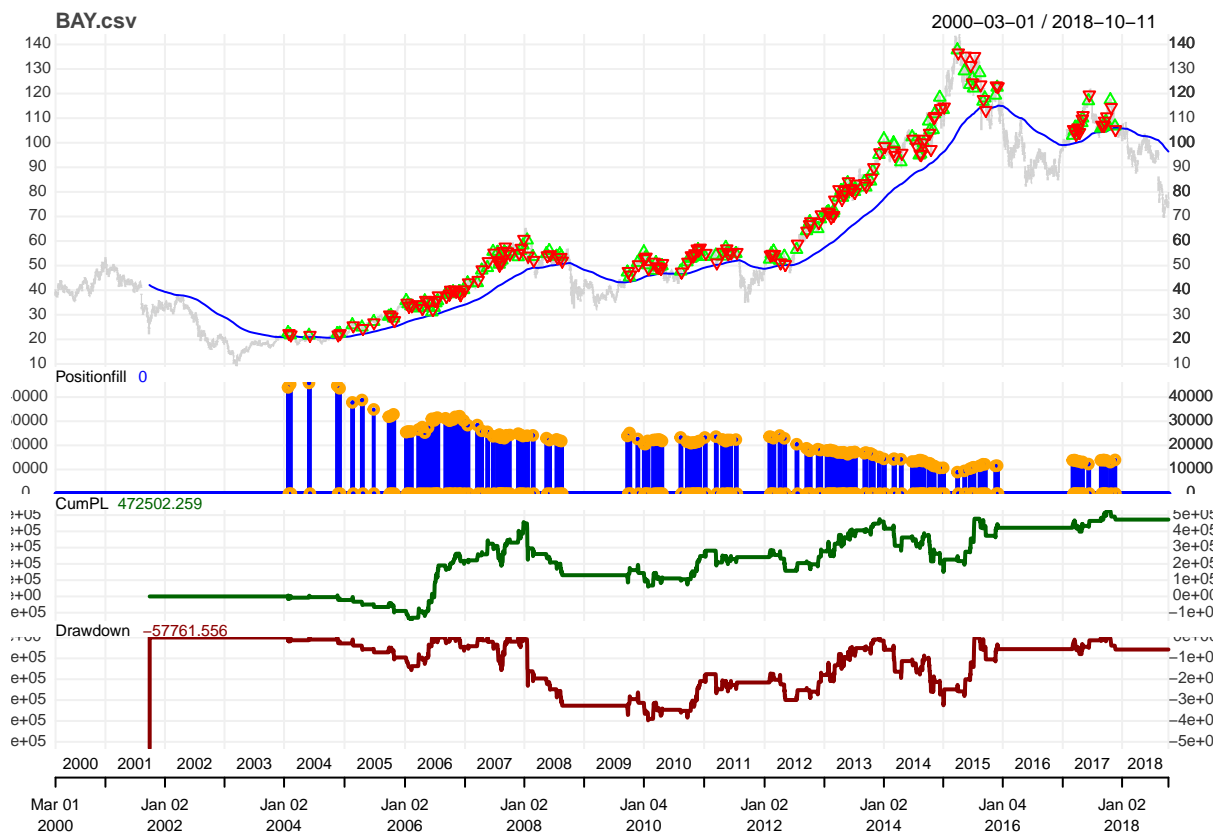
## 2014-02-25	44316	186.500	8264934.0	-20.000
## 2014-03-03	-44316	179.650	-7961369.4	-303584.600
## 2014-03-17	45416	175.300	7961424.8	-20.000
## 2014-03-21	-45416	174.400	-7920550.4	-40894.400
## 2014-04-04	42321	187.150	7920375.2	-20.000
## 2014-04-07	-42321	184.950	-7827268.9	-93126.200
## 2014-04-16	41392	189.100	7827227.2	-20.000
## 2014-04-23	-41392	191.900	-7943124.8	115877.600
## 2014-05-08	42477	187.000	7943199.0	-20.000
## 2014-05-14	-42477	185.350	-7873112.0	-70107.050
## 2014-06-05	41048	191.800	7873006.4	-20.000
## 2014-06-11	-41048	193.450	-7940735.6	67709.200
## 2014-06-17	41122	193.100	7940658.2	-20.000
## 2014-06-20	-41122	194.000	-7977668.0	36989.800
## 2014-07-31	44831	177.950	7977676.4	-20.000
## 2014-08-04	-44831	171.800	-7701965.8	-275730.650
## 2014-12-05	41802	184.250	7702018.5	-20.000
## 2014-12-11	-41802	182.400	-7624684.8	-77353.700
## 2015-05-04	33194	229.700	7624661.8	-20.000
## 2015-05-08	-33194	225.350	-7480267.9	-144413.900
## 2015-06-10	35518	210.600	7480090.8	-20.000
## 2015-06-16	-35518	208.150	-7393071.7	-87039.100
## 2015-07-09	36428	202.950	7393062.6	-20.000
## 2015-07-15	-36428	199.150	-7254636.2	-138446.400
## 2015-07-23	36391	199.350	7254545.8	-20.000
## 2015-07-24	-36391	196.400	-7147192.4	-107373.450
## 2017-03-10	49274	145.050	7147193.7	-20.000
## 2017-03-16	-49274	143.800	-7085601.2	-61612.500
## 2017-04-28	47779	148.300	7085625.7	-20.000
## 2017-05-05	-47779	147.500	-7047402.5	-38243.200
## 2017-10-11	47682	147.800	7047399.6	-20.000
## 2017-10-13	-47682	148.600	-7085545.2	38125.600
## 2017-10-18	47284	149.850	7085507.4	-20.000
## 2017-10-19	-47284	148.550	-7024038.2	-61489.200
## 2017-11-16	44455	158.000	7023890.0	-20.000
## 2017-11-22	-44455	167.750	-7457326.2	433416.250
## 2017-12-07	44601	167.200	7457287.2	-20.000
## 2017-12-13	-44601	169.950	-7579939.9	122632.750
## 2017-12-18	44588	170.000	7579960.0	-20.000
## 2017-12-22	-44588	170.000	-7579960.0	-20.000
## 2018-01-12	42134	179.900	7579906.6	-20.000
## 2018-01-17	-42134	181.700	-7655747.8	75821.200
## 2018-02-07	44954	170.300	7655666.2	-20.000
## 2018-02-08	-44954	168.200	-7561262.8	-94423.400
## 2018-02-22	45088	167.700	7561257.6	-20.000
## 2018-02-28	-45088	164.500	-7416976.0	-144301.600
## 2018-03-26	47152	157.300	7417009.6	-20.000
## 2018-03-28	-47152	158.700	-7483022.4	65992.800
## 2018-03-29	47359	159.000	7530081.0	-20.000
## 2018-04-04	-47359	160.000	-7577440.0	47339.000
## 2018-04-26	44584	168.900	7530237.6	-20.000
## 2018-05-03	-44584	171.600	-7650614.4	120356.800
## 2018-05-07	45109	169.600	7650486.4	-20.000
## 2018-05-11	-45109	169.400	-7641464.6	-9041.800

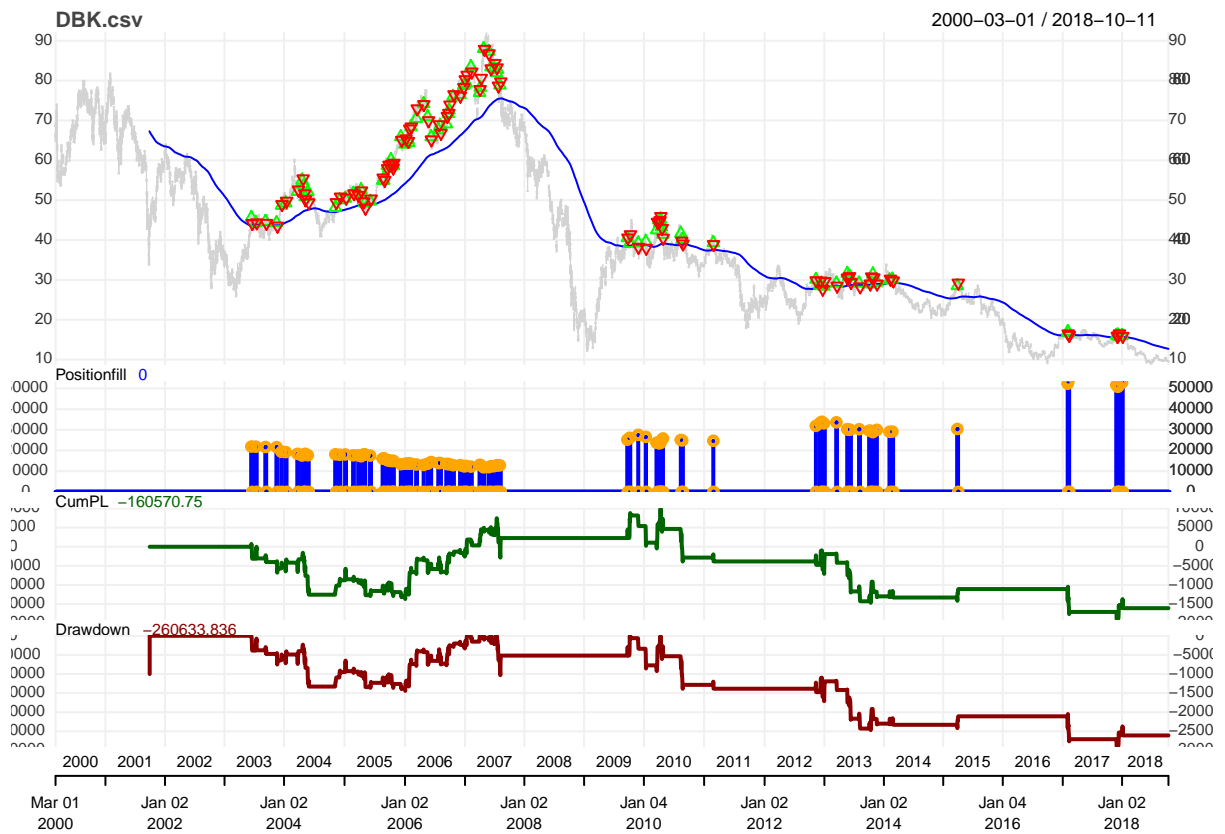
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## 2018-06-01    47170 162.000  7641540.0          -20.000
## 2018-06-07   -47170 162.800 -7679276.0          37716.000
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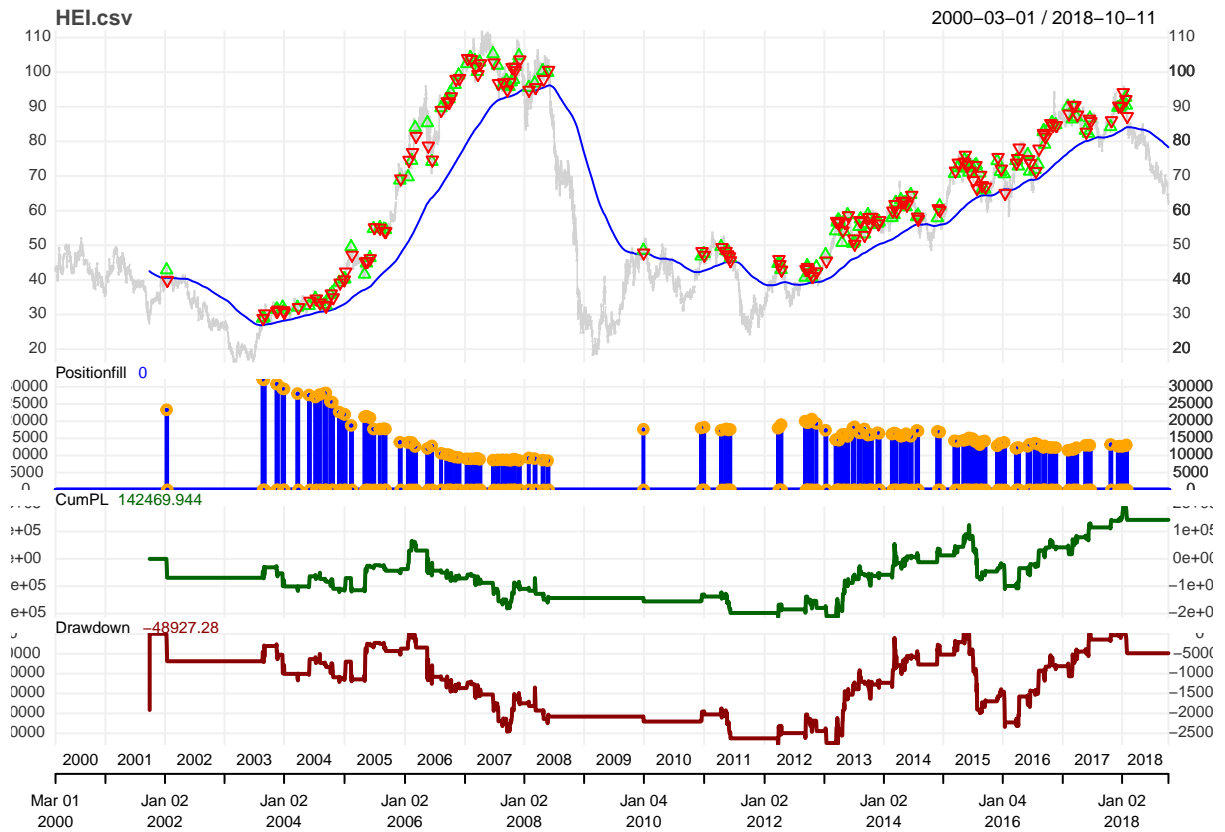
Step 3: Graph which visualize transactions

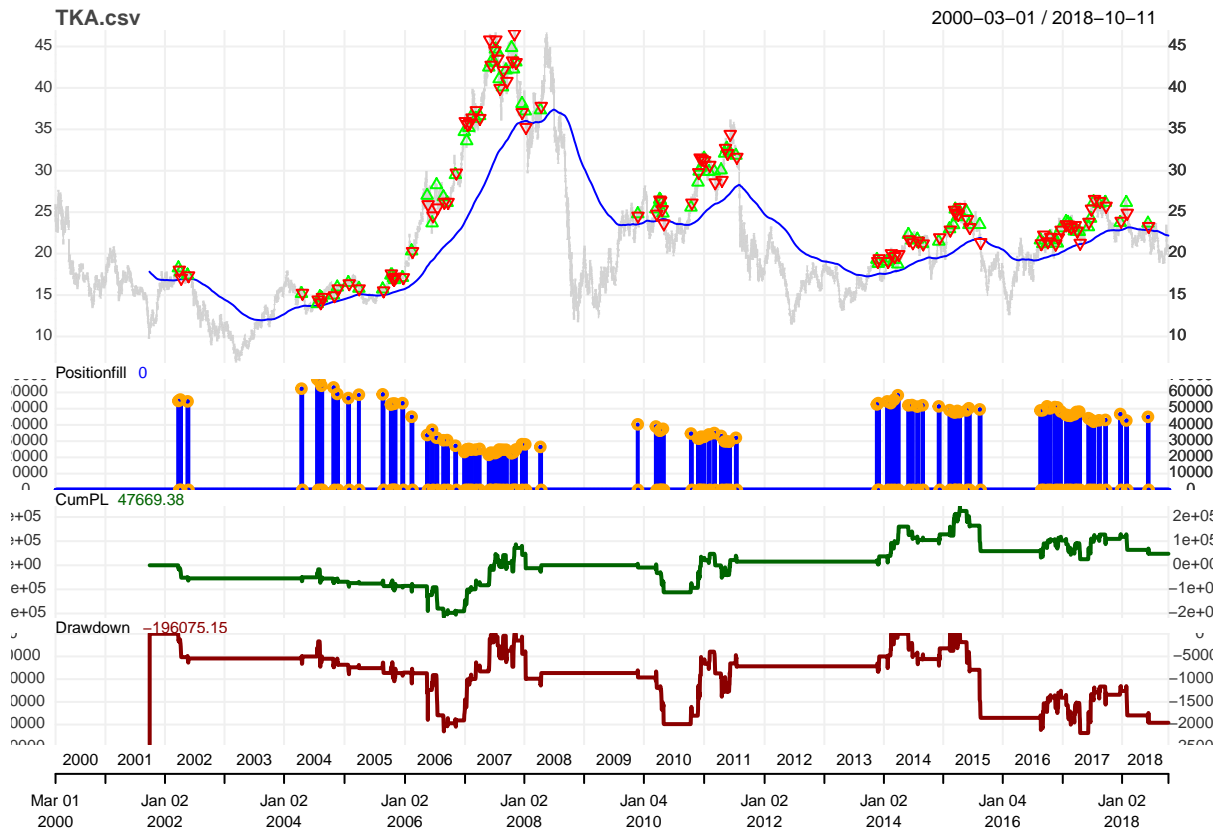
The following graphs show the combined view of the performance of the Smash Day trading system. It visualizes the trades (buy-transactions are visualized in green and sell-transactions are visualized in red). Moreover, the size of the blue squares indicates the size of the position (height) and the holding duration of the position (width). The green line shows the cumulative net profit curve, while the red line indicates the drawdown on each day compared to the last reached high.

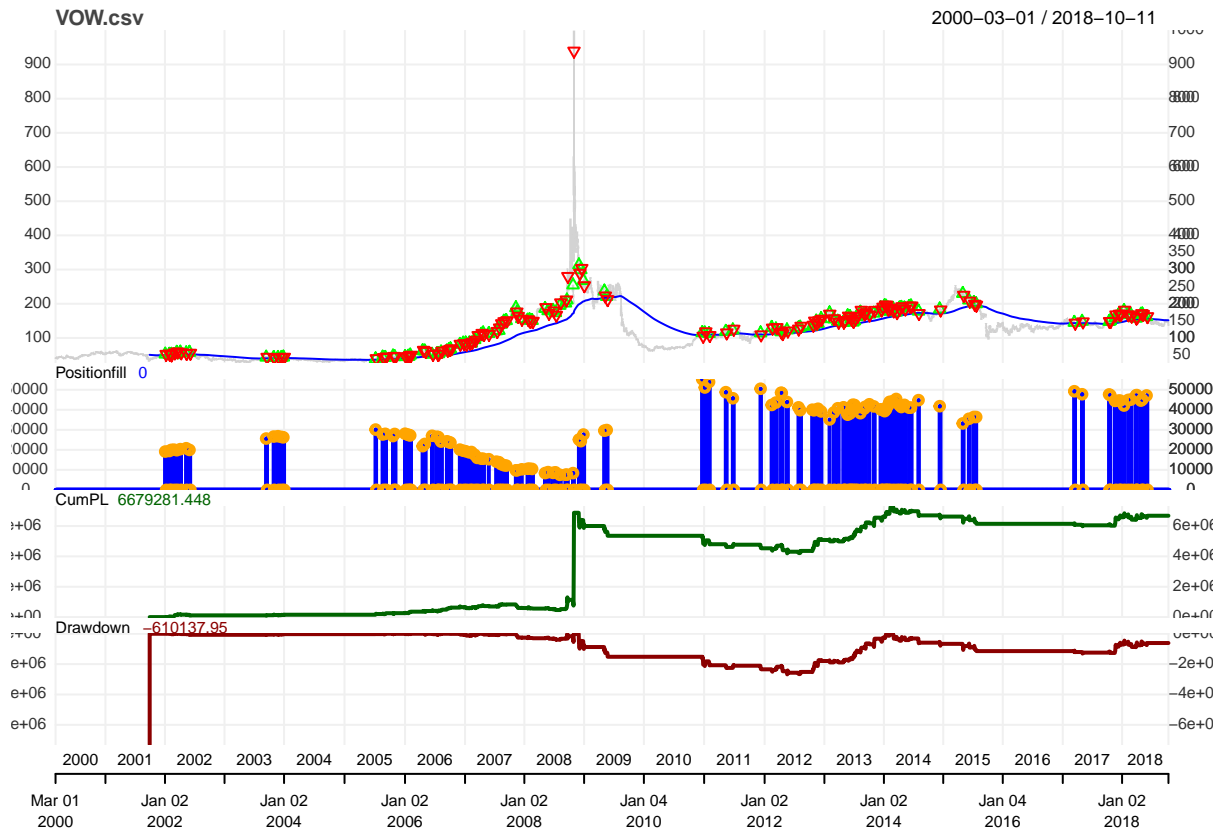
```
# Plot graph with indicators for transaction
for (instrument in instrumentlist){
  chart.Posn(portfolioName,
    Symbol=instrument,
    type='candlesticks',
    theme=myTheme,
    subset=daterange,
    TA=addEMAStrng)
}
```











Step 4: Performance Statistics

The following table summarizes some important trading statistics for all instruments. This statistic is just an excerpt of the overall statistics which can be calculated. It is printed here as it can be assumed that they are interesting for investors to rate the trading strategy.

```
library(PerformanceAnalytics)
# Get returns for the account
rets <- PortfReturns(Account=accountname)
rownames(rets) <- NULL
tstats <- tradeStats(Portfolio=portfolioname, Symbols=instrumentlist)
for (i in 1:nrow(tstats)) {
  trades.tab <- cbind(
    c("Trades", "Win Percent", "Loss Percent", "W/L Ratio"),
    c(tstats[i, "Num.Trades"],
      round(tstats[i, "Percent.Positive"], 2),
      round(tstats[i, "Percent.Negative"], 2),
      round((tstats[i, "Percent.Positive"] / tstats[i, "Percent.Negative"]), 2)))
  trades1 <- trades.tab
  rownames(trades1) <- c("Trades",
    "Win Percent",
    "Loss Percent",
    "W/L Ratio")
  trades1 <- trades1[, 2]
  print(row.names(tstats[i, ]))
  print(trades1)
}
```

```
writeLines("")
}
```

```
## [1] "BAY.csv"
##      Trades  Win Percent Loss Percent      W/L Ratio
##      "149"    "52.35"    "45.64"    "1.15"
##
## [1] "DBK.csv"
##      Trades  Win Percent Loss Percent      W/L Ratio
##      "91"    "46.15"    "53.85"    "0.86"
##
## [1] "HEI.csv"
##      Trades  Win Percent Loss Percent      W/L Ratio
##      "144"    "43.06"    "56.25"    "0.77"
##
## [1] "TKA.csv"
##      Trades  Win Percent Loss Percent      W/L Ratio
##      "102"    "45.1"    "53.92"    "0.84"
##
## [1] "VOW.csv"
##      Trades  Win Percent Loss Percent      W/L Ratio
##      "133"    "52.63"    "46.62"    "1.13"
```

Step 5: Calculate statistics of the Portfolio and all instruments in the portfolio

Performance Metrics

```
##
##           BAY           DBK           HEI           TKA
## Cumulative Return  0.42901231 -0.17406240 0.082349030 -0.0066437451
## Annualized Return  0.02099817 -0.01107051 0.004617162 -0.0003879612
## Annualized Sharp Ratio 0.18117770 -0.18536381 0.053778580 -0.0048815743
## Calmar Ratio       0.06149200 -0.04270210 0.017786607 -0.0019043629
##
##           VOW
## Cumulative Return  2.55862649
## Annualized Return  0.07669150
## Annualized Sharp Ratio 0.06606416
## Calmar Ratio       0.07900773
```

Risk Metrics

```
##
##           BAY           DBK           HEI           TKA
## Annualized StdDev  0.115898191 0.05972315 0.08585504 0.07947461
## Max Drawdown       0.341478037 0.25924976 0.25958646 0.20372233
## Value-at-Risk      -0.006365614 0.00000000 -0.00450422 -0.00148058
## Conditional VaR    -0.018154929 -0.01013511 -0.01332104 -0.01204068
##
##           VOW
## Annualized StdDev  1.160863928
## Max Drawdown       0.970683432
## Value-at-Risk      -0.009773418
## Conditional VaR    -0.065167066
```

Step 6: Visualize returns of the trading strategy for every instrument

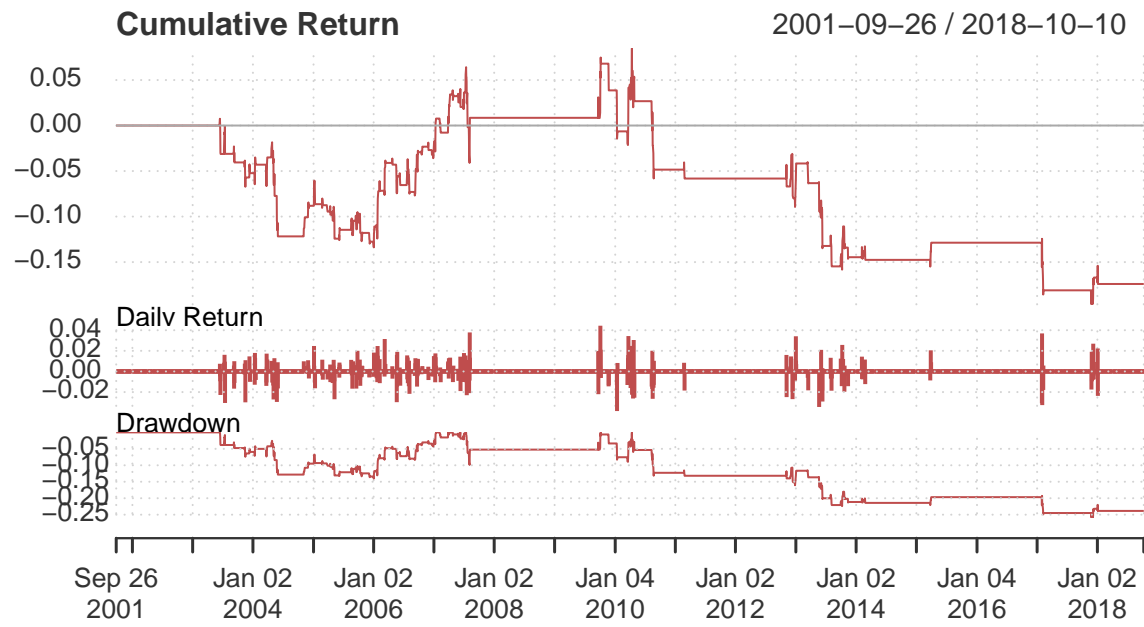
The following plots visualizes some important information about the returns of the strategy applied to the instruments on the instrumentlist. The cumulative return over the entire period, the daily returns and the drawdown for each instrument is illustrated.

```
for (i in 1:ncol(rets)){
  charts.PerformanceSummary(rets[,i],colorset=rainbow12equal,lwd=1,main=substr(colnames(rets[,i]),1,3))
}
```

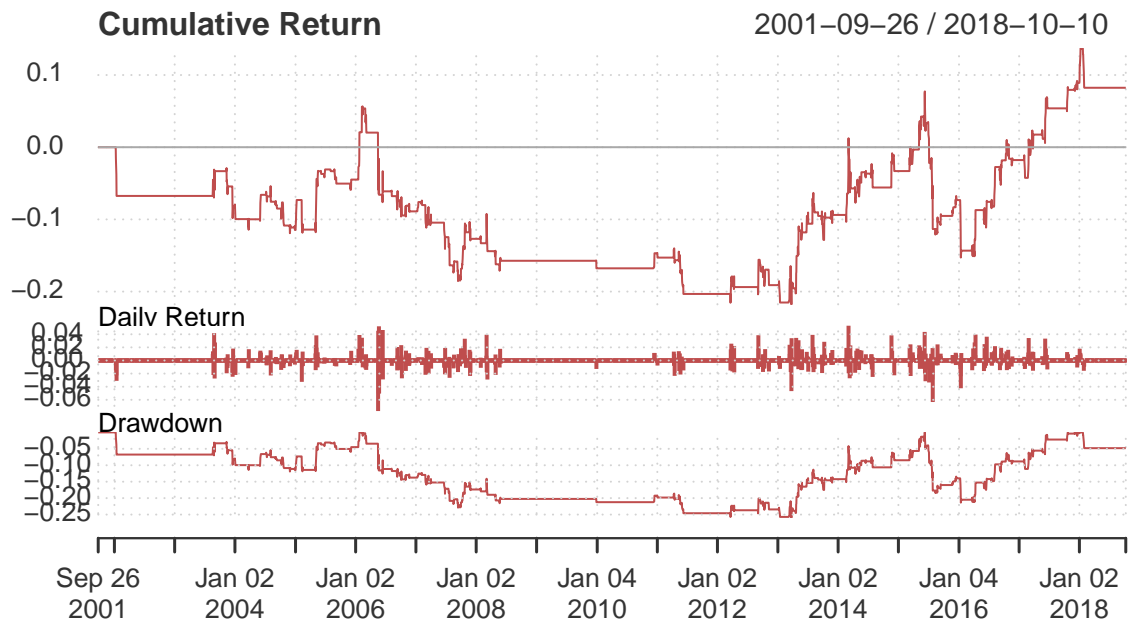
BAY



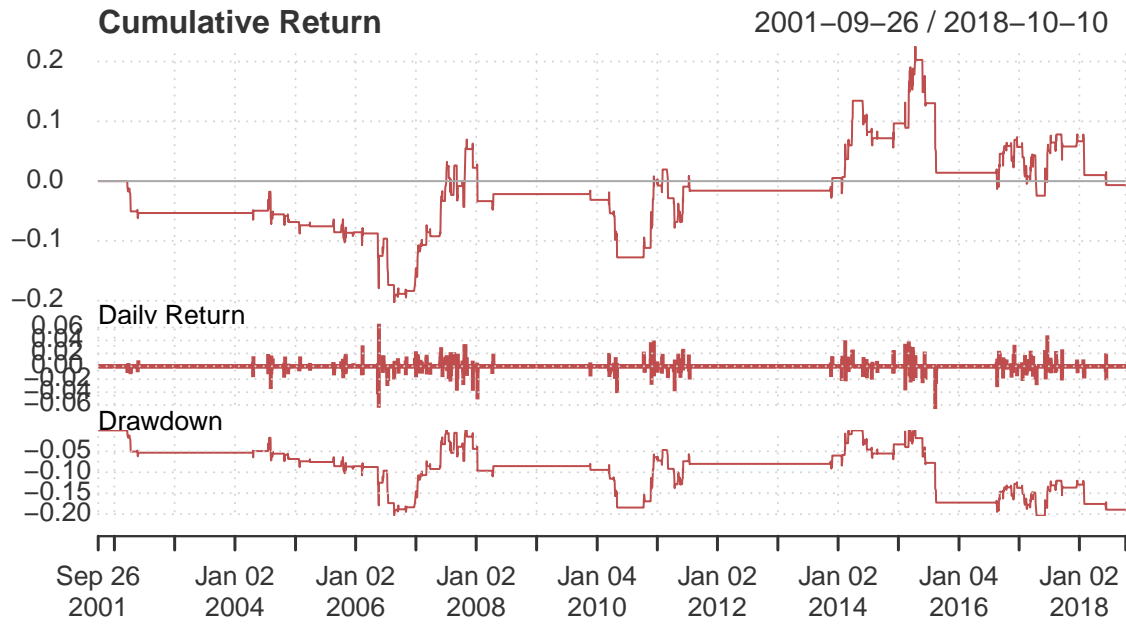
DBK



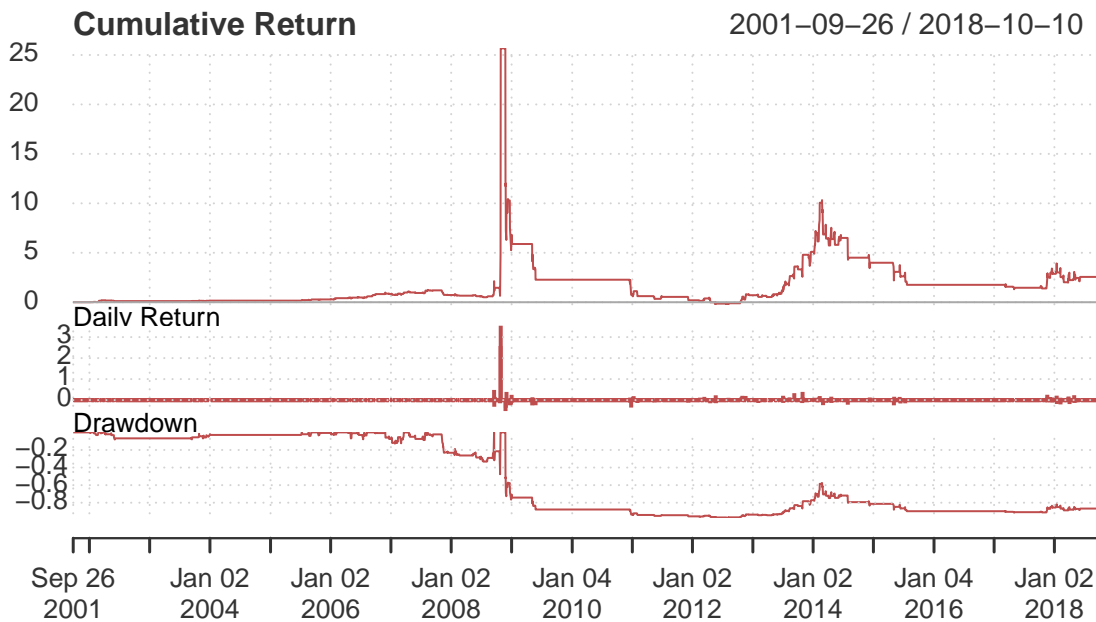
HEI



TKA



VOW



Compare with Buy and Hold Strategy

In order to compare the trading strategy properly we need to define a benchmark against which we can measure the results. In this case a simple buy and hold strategy is used. At the first date of the trading period we place a buy order and sell our position at the last day of the selected period. In order to do this we create a new Portfolio and a new Account. As stocks from the DAX (German Stocks Market Index) are used in the strategy, the buy and hold strategy is performed on an DAX ETF.

Step 1: Perform the Buy and Hold Strategy

```
# Any objects, in case there was a buyhold
# portfolio initialized before are removed
suppressWarnings(try(rm(list=c("account.buyhold",
                              "portfolio.buyhold"),
                        pos=.blotter)))

# The Buy and hold instrument is loaded
LoadCourseFile(BuyHoldDirectory,BuyHoldInstrument,debugme=TRUE,dates=daterange)
# The Buy and hold instrument is initialized
stock(BuyHoldInstrument,currency="EUR")

BuyHoldSymbol<-get(BuyHoldInstrument)

# The portfolio and account "buyhold" is initialized
initPortf("buyhold",
          BuyHoldInstrument,
```

```

        initDate=initdate,
        currency="EUR")
initAcct("buyhold",
        portfolios="buyhold",
        initDate=initdate,
        initEq=startCapital,
        currency="EUR")

# The first date of the defined daterange is selected
currentdate <- first(time(BuyHoldSymbol))

# The close price at this date is selected
closeprice <- as.numeric(Cl(BuyHoldSymbol[currentdate,]))

# Calculate the unitsize we can buy with our startingcapital
unitsize <- as.numeric(trunc(startCapital/closeprice))

# Place the transaction for the instrument at the first date
addTxn("buyhold",
        Symbol=BuyHoldInstrument,
        TxnDate=currentdate,
        TxnPrice=closeprice,
        TxnQty=unitsize,
        TxnFees=transactionCost)

# Select the last date of the daterange period
lastdate <-last(time(BuyHoldSymbol))

# Select the price at the last date
lastprice <- as.numeric(Cl(BuyHoldSymbol[lastdate,]))

# Sell the position at the last date of the daterange
addTxn("buyhold",
        Symbol=BuyHoldInstrument,
        TxnDate=lastdate,
        TxnPrice=lastprice,
        TxnQty=-unitsize,
        TxnFees=transactionCost)

# update portfolio and account
updatePortf(Portfolio="buyhold")
updateAcct(name="buyhold")
updateEndEq(Account="buyhold")

```

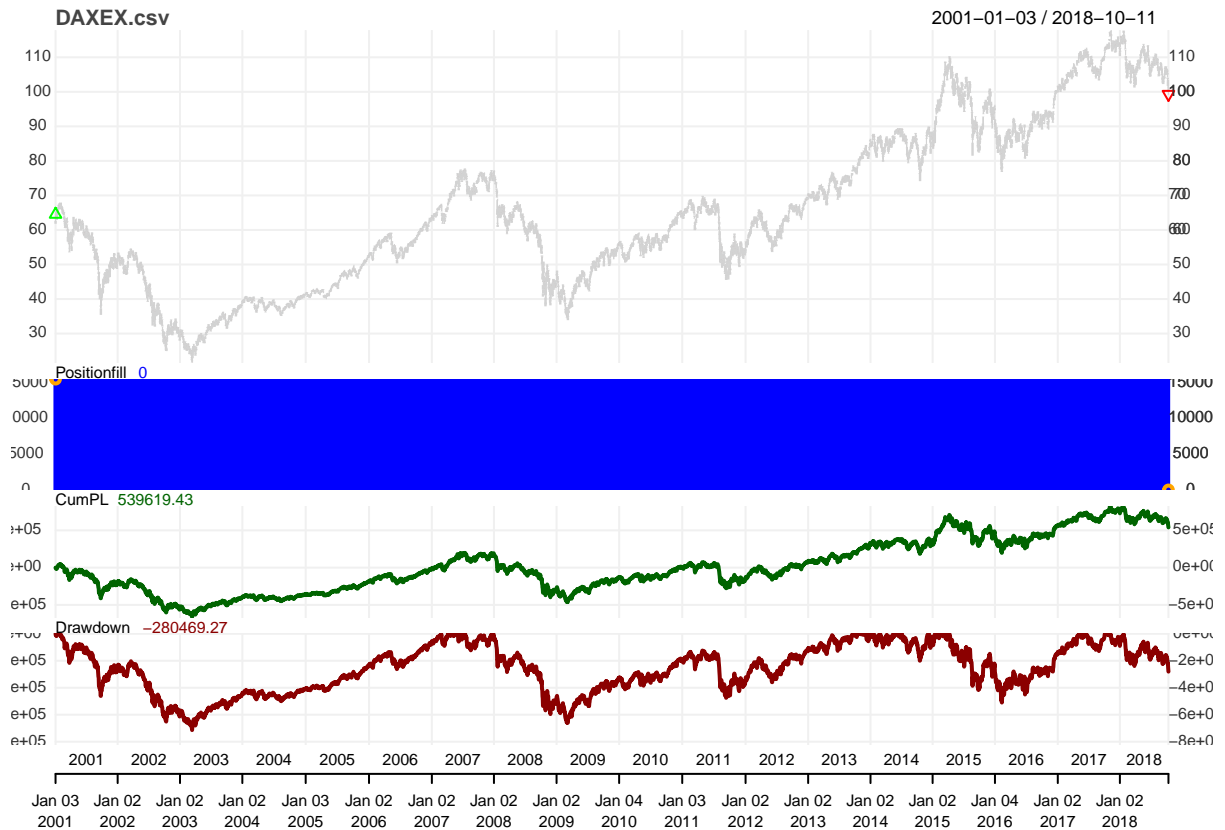
Step 2: Visualize the Buy and Hold strategy

We can see that we hold the position from the first until the last date. The cumulative profits are visualized by the green line.

```

chart.Posn("buyhold",Symbol=BuyHoldInstrument, theme=myTheme)

```



Step 3: Compare the returns of the trading strategy with the buy and hold strategy

In order to compare the results of both strategies, we calculate the returns for the buy and hold strategy and combine them with the returns of the trading strategy which were calculated before.

```
rets.bh <- PortfReturns(Account='buyhold')
returns <- cbind(rets,rets.bh)
colnames(returns) <- substr(colnames(returns),1,3)
```

In order to compare the performance between the strategy investment in one of the stocks and the alternative buy and hold strategy of the DAX ETF, the following graphs visualize the relative performance between each of the stocks used and the DAX ETF.

```
table.Stats(returns)
```

##	BAY	DBK	HEI	TKA	VOW
## Observations	4329.0000	4329.0000	4329.0000	4329.0000	4329.0000
## NAs	188.0000	188.0000	188.0000	188.0000	188.0000
## Minimum	-0.1099	-0.0384	-0.0772	-0.0662	-0.5225
## Quartile 1	0.0000	0.0000	0.0000	0.0000	0.0000
## Median	0.0000	0.0000	0.0000	0.0000	0.0000
## Arithmetic Mean	0.0001	0.0000	0.0000	0.0000	0.0015
## Geometric Mean	0.0001	0.0000	0.0000	0.0000	0.0003
## Quartile 3	0.0000	0.0000	0.0000	0.0000	0.0000
## Maximum	0.0697	0.0444	0.0530	0.0659	3.5417
## SE Mean	0.0001	0.0001	0.0001	0.0001	0.0011
## LCL Mean (0.95)	-0.0001	-0.0001	-0.0001	-0.0001	-0.0006
## UCL Mean (0.95)	0.0003	0.0001	0.0002	0.0002	0.0037

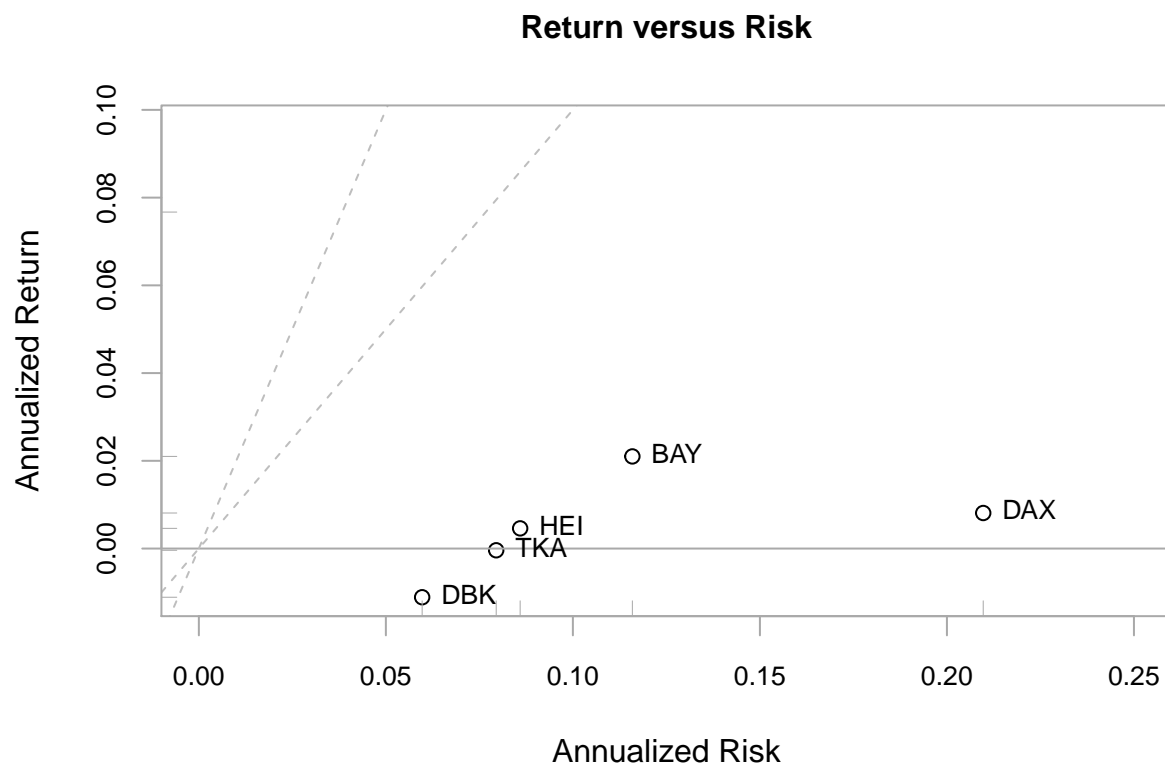
```
## Variance      0.0001    0.0000    0.0000    0.0000    0.0053
## Stdev         0.0073    0.0038    0.0054    0.0050    0.0731
## Skewness      -0.0896   -0.2773   -0.0002   -0.3587   36.2843
## Kurtosis      34.9855   39.0143   39.8777   43.7244  1623.9587
##              DAX
## Observations  4517.0000
## NAs           0.0000
## Minimum       -0.0935
## Quartile 1    -0.0065
## Median        0.0008
## Arithmetic Mean 0.0001
## Geometric Mean 0.0000
## Quartile 3    0.0071
## Maximum       0.0788
## SE Mean       0.0002
## LCL Mean (0.95) -0.0003
## UCL Mean (0.95) 0.0005
## Variance      0.0002
## Stdev         0.0132
## Skewness      -0.2480
## Kurtosis      2.9187
```

```
table.AnnualizedReturns(returns)
```

```
##              BAY      DBK      HEI      TKA      VOW      DAX
## Annualized Return    0.0210 -0.0111 0.0046 -0.0004 0.0767 0.0081
## Annualized Std Dev    0.1159 0.0597 0.0859 0.0795 1.1609 0.2097
## Annualized Sharpe (Rf=0%) 0.1812 -0.1854 0.0538 -0.0049 0.0661 0.0387
```

```
# charts.PerformanceSummary(returns,geometric=FALSE,wealth.index=TRUE)
chart.RiskReturnScatter(returns,Rf=0,
  add.sharpe=c(1,2),
  xlim=c(0,0.25),
  main="Return versus Risk"
)
```

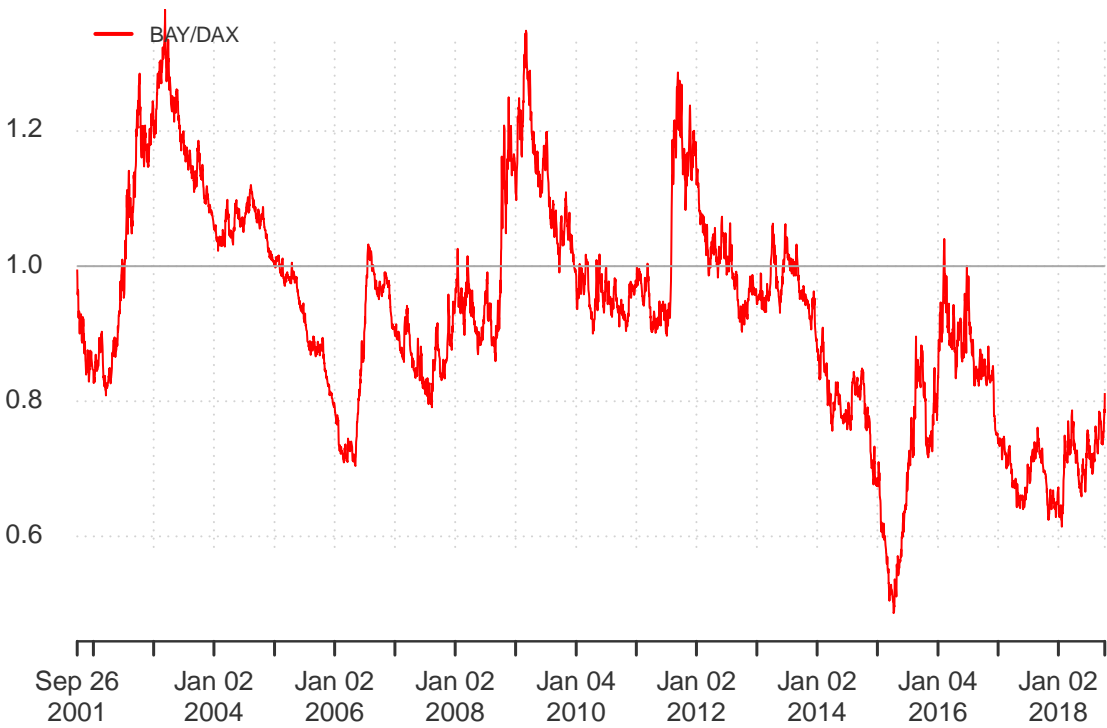
```
## Warning in rug(side = 1, risk, col = element.color): some values will be
## clipped
```



```
for (i in colnames(returns[, -which(names(returns) == "DAX")))){
  print(chart.RelativePerformance(returns[, i], returns[, "DAX"],
    colorset=c("red", "blue"),
    lwd=1,
    legend.loc="topleft"))
}
```

Relative Performance

2001-09-26 / 2018-10-10



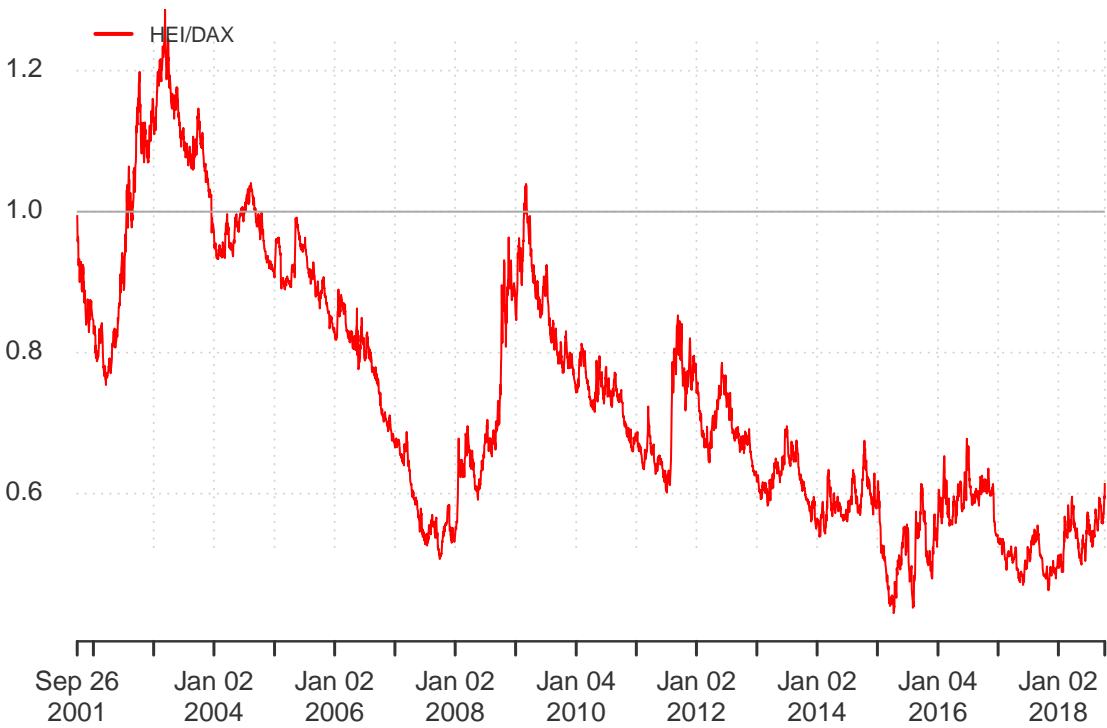
Relative Performance

2001-09-26 / 2018-10-10



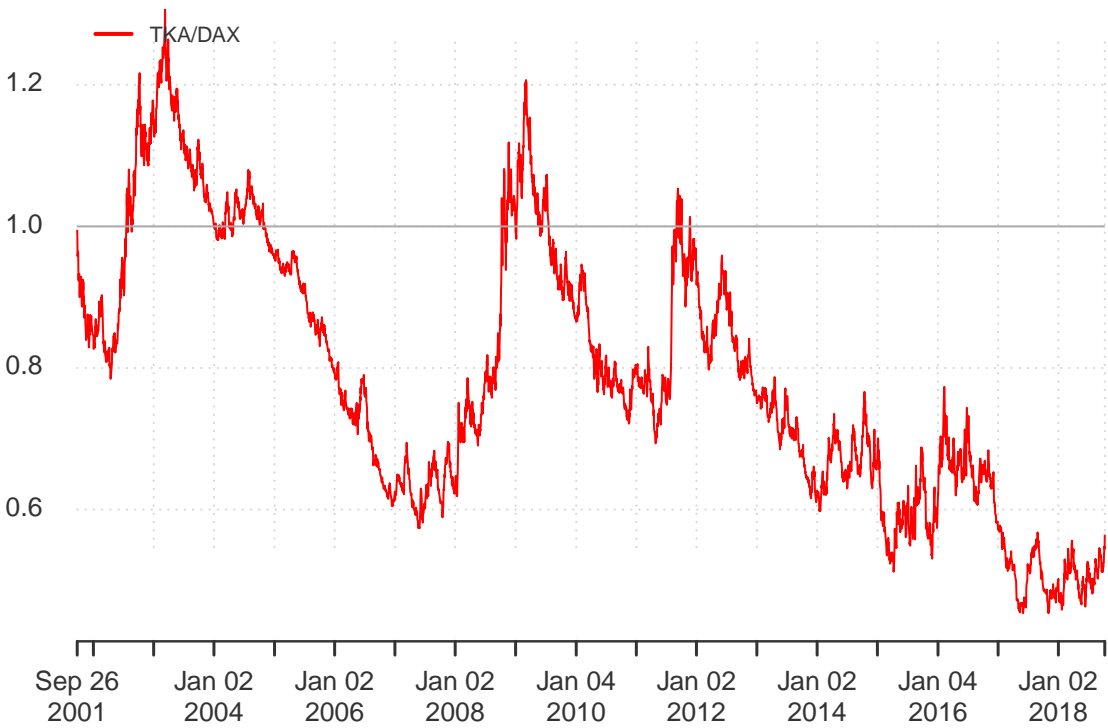
Relative Performance

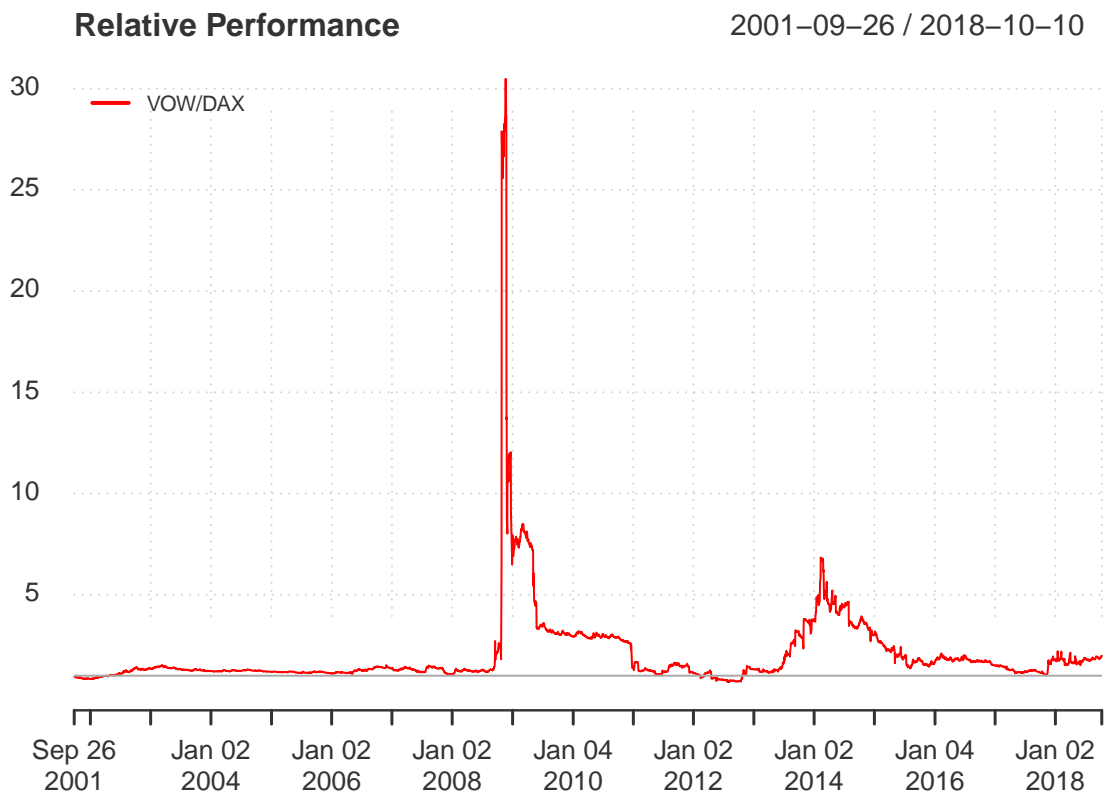
2001-09-26 / 2018-10-10



Relative Performance

2001-09-26 / 2018-10-10

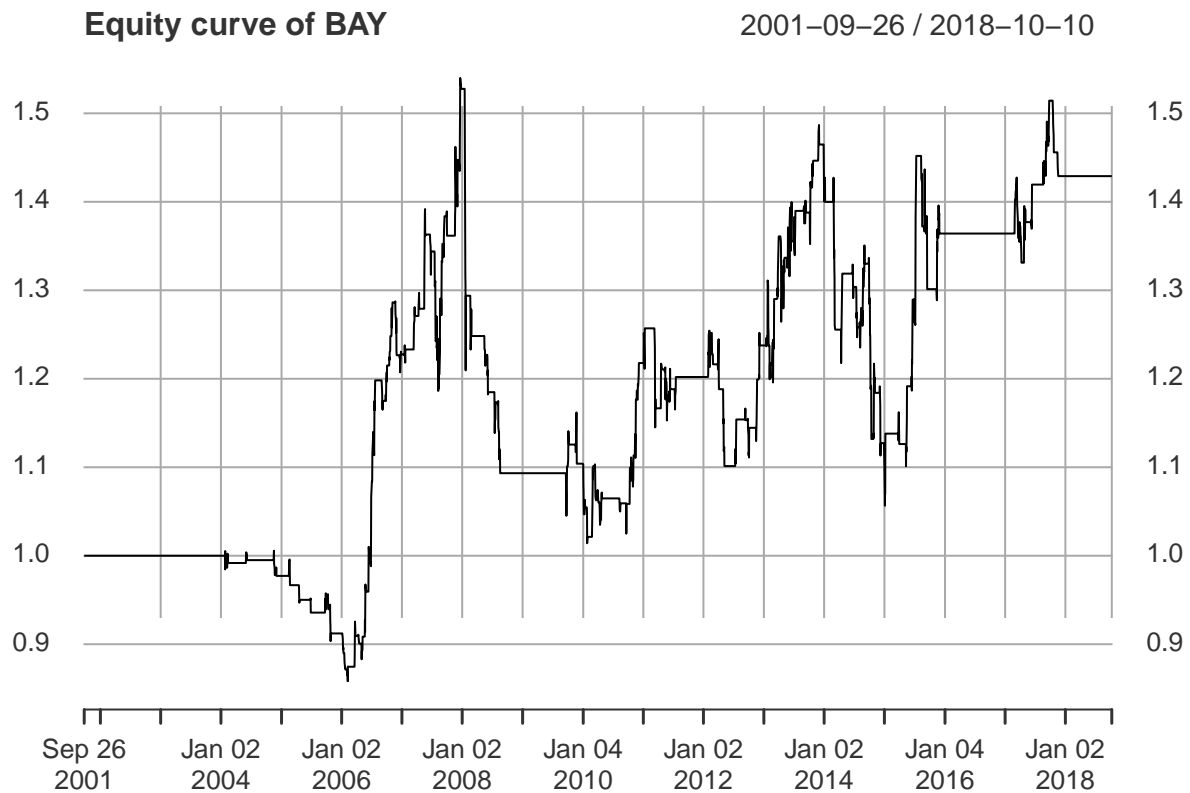
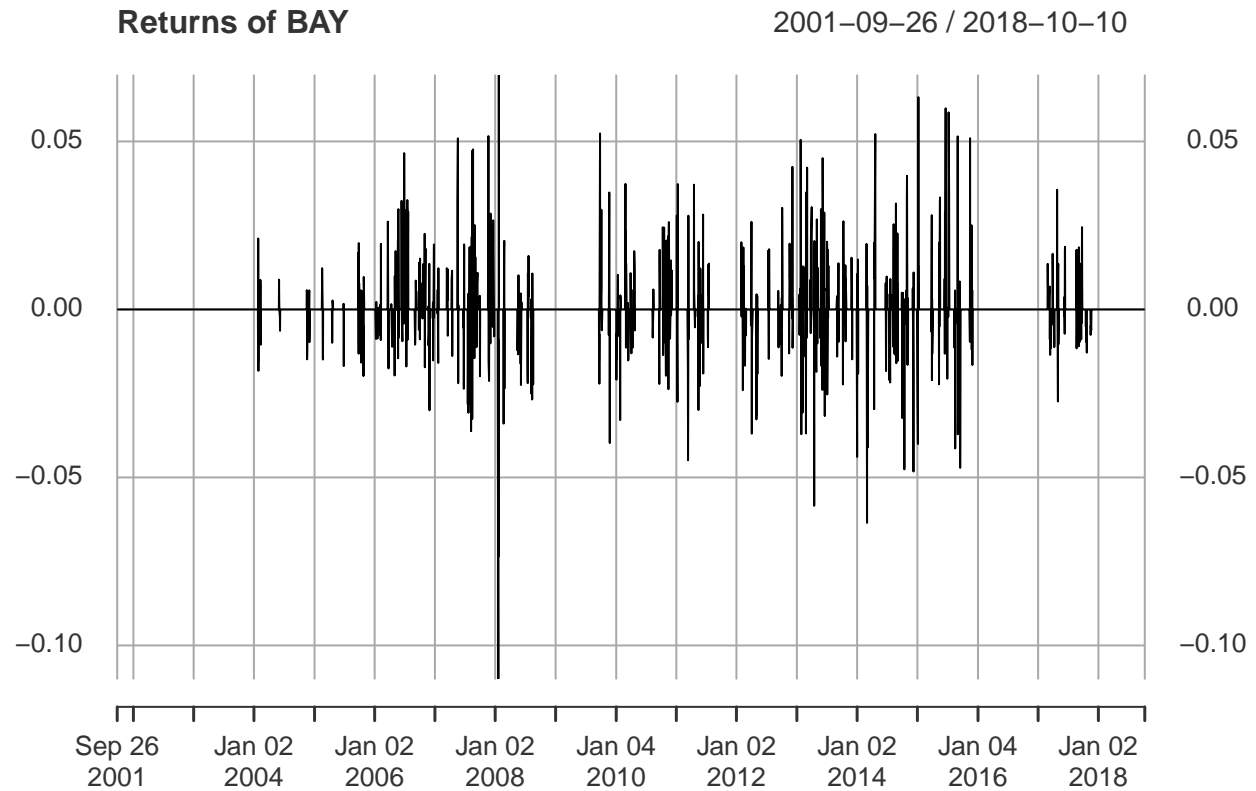




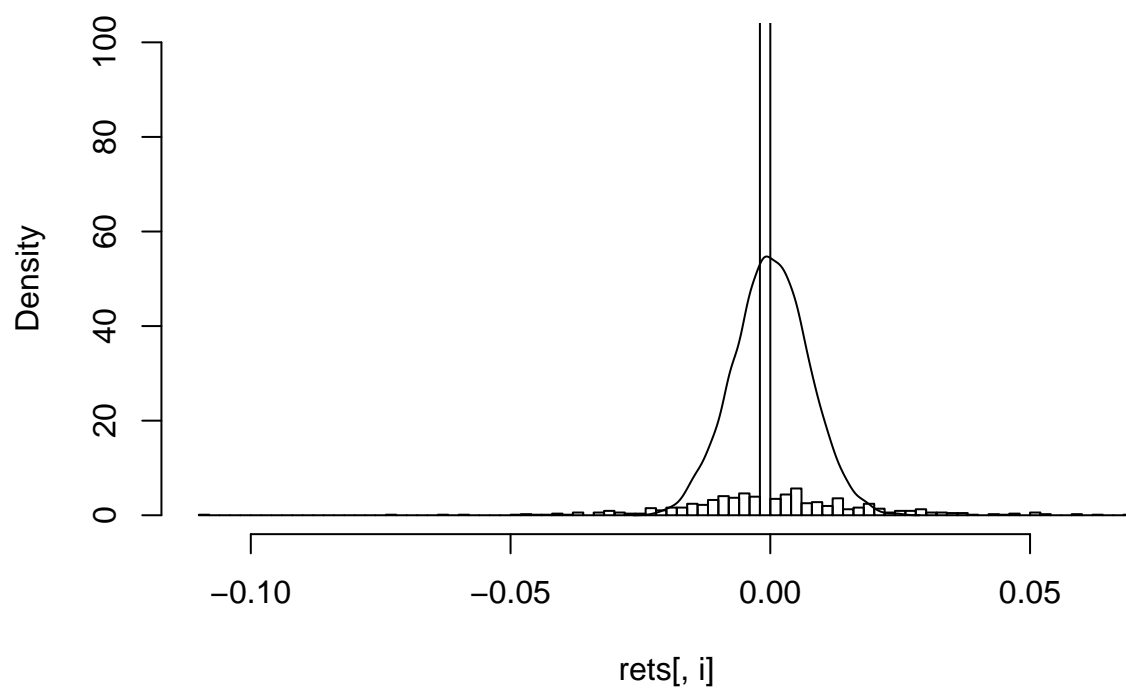
Calculations and visualizations based on returns

The visualization of returns, equity curve, value at risk and some other measure which can be calculated based on the returns of the trading strategy, can be observed in the following graphs.

Returns and Equity Curve

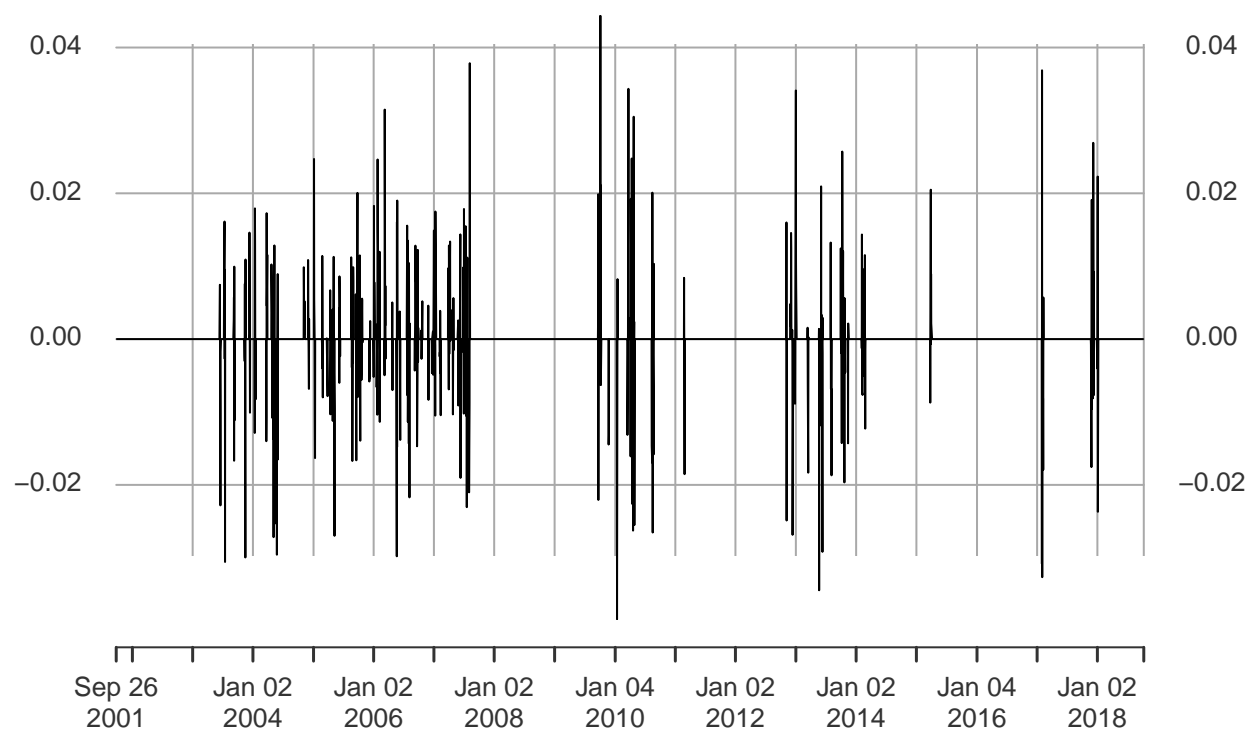


Histogram of Simple Returns of BAY



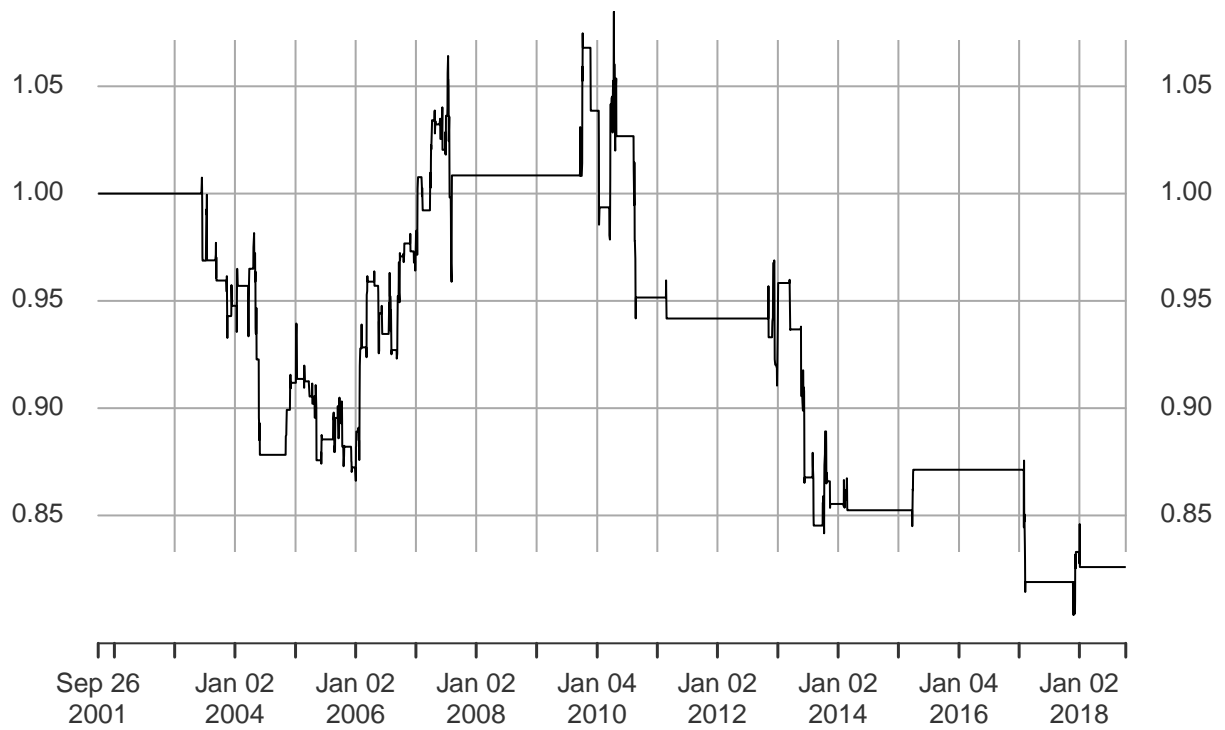
Returns of DBK

2001-09-26 / 2018-10-10

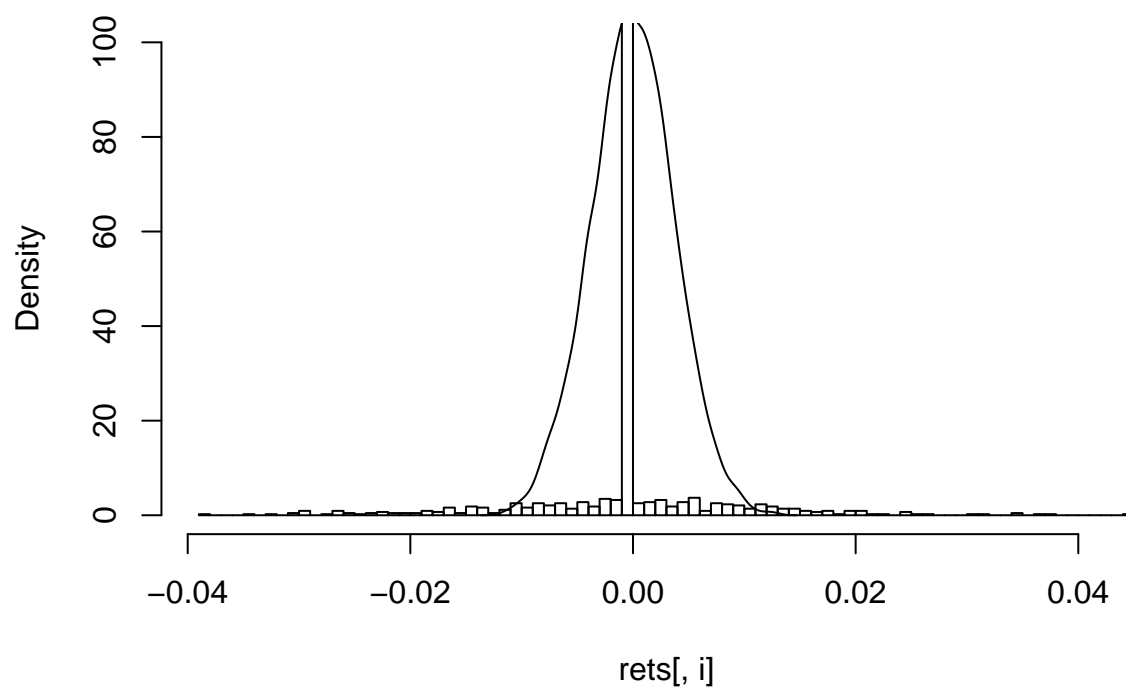


Equity curve of DBK

2001-09-26 / 2018-10-10

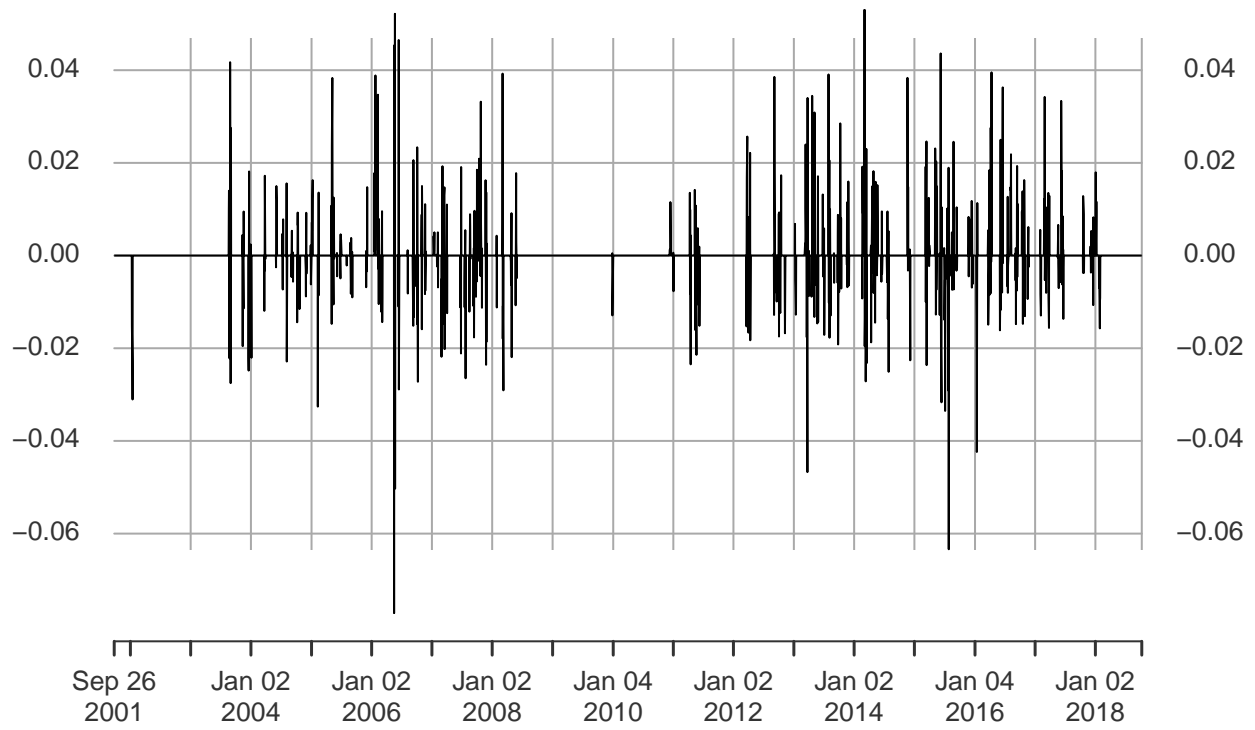


Histogram of Simple Returns of DBK



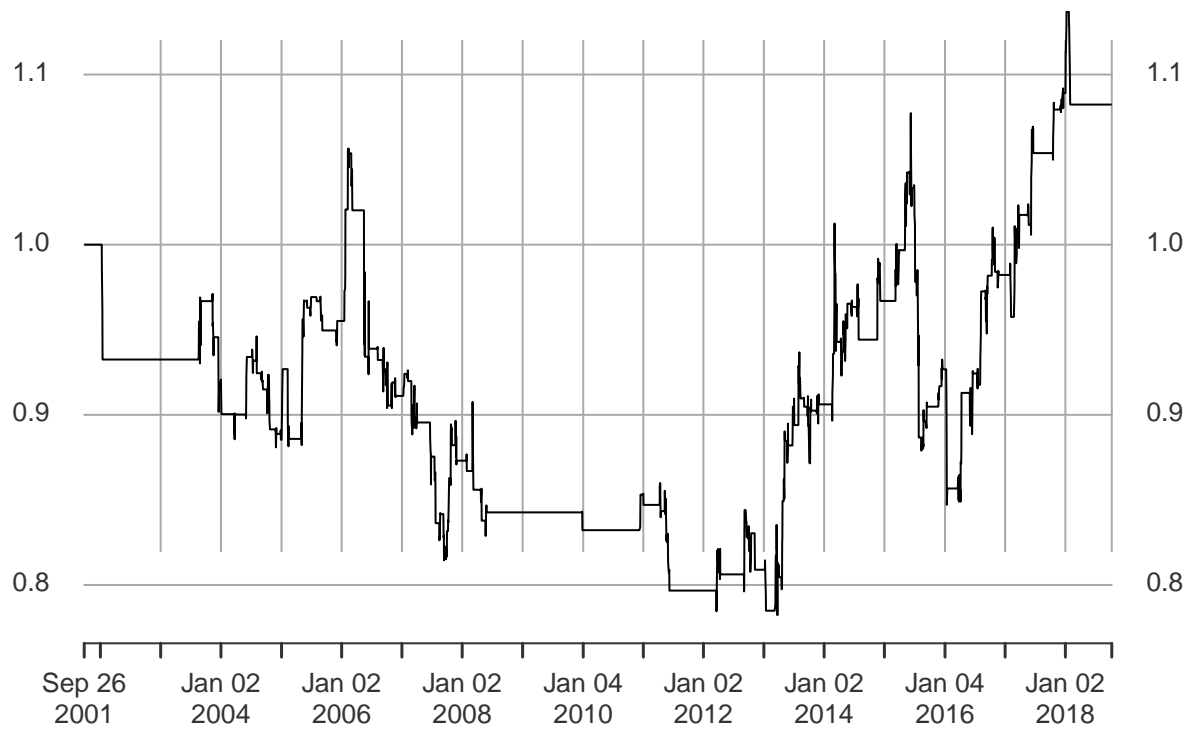
Returns of HEI

2001-09-26 / 2018-10-10

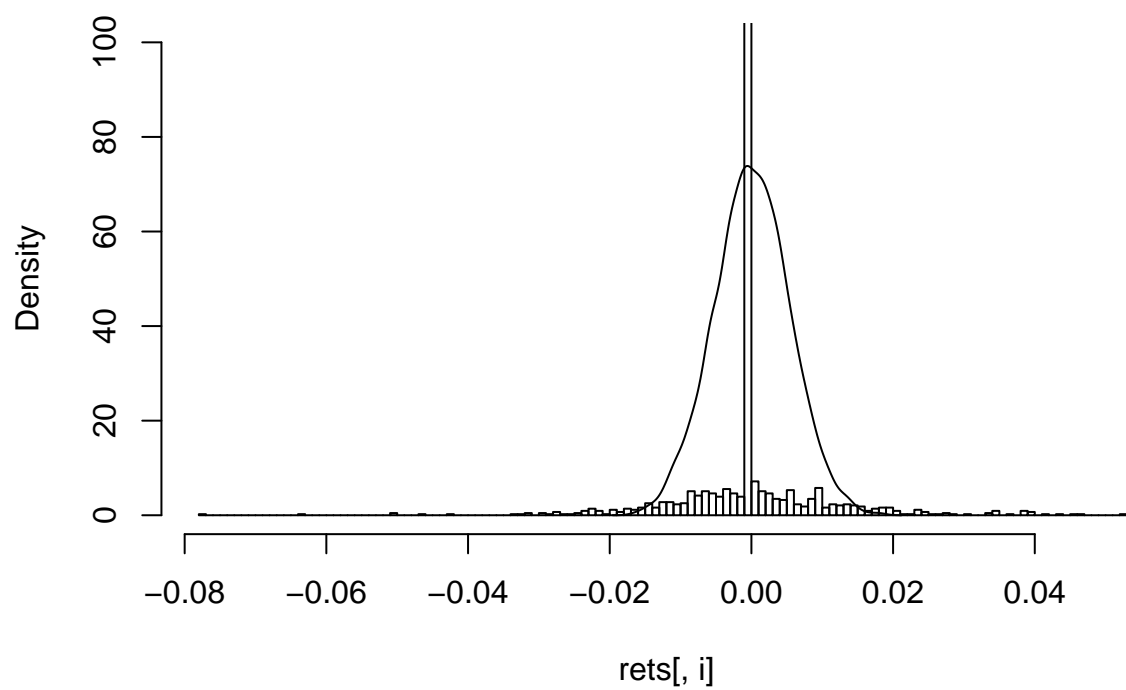


Equity curve of HEI

2001-09-26 / 2018-10-10

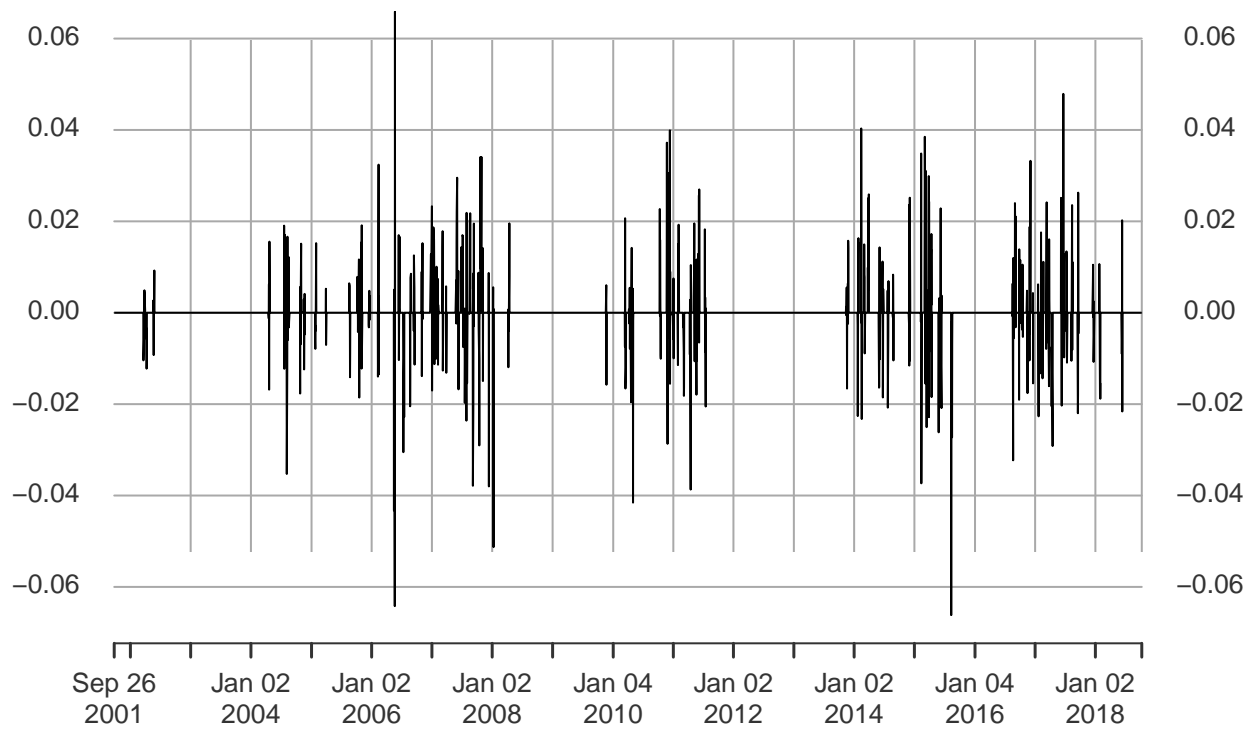


Histogram of Simple Returns of HEI



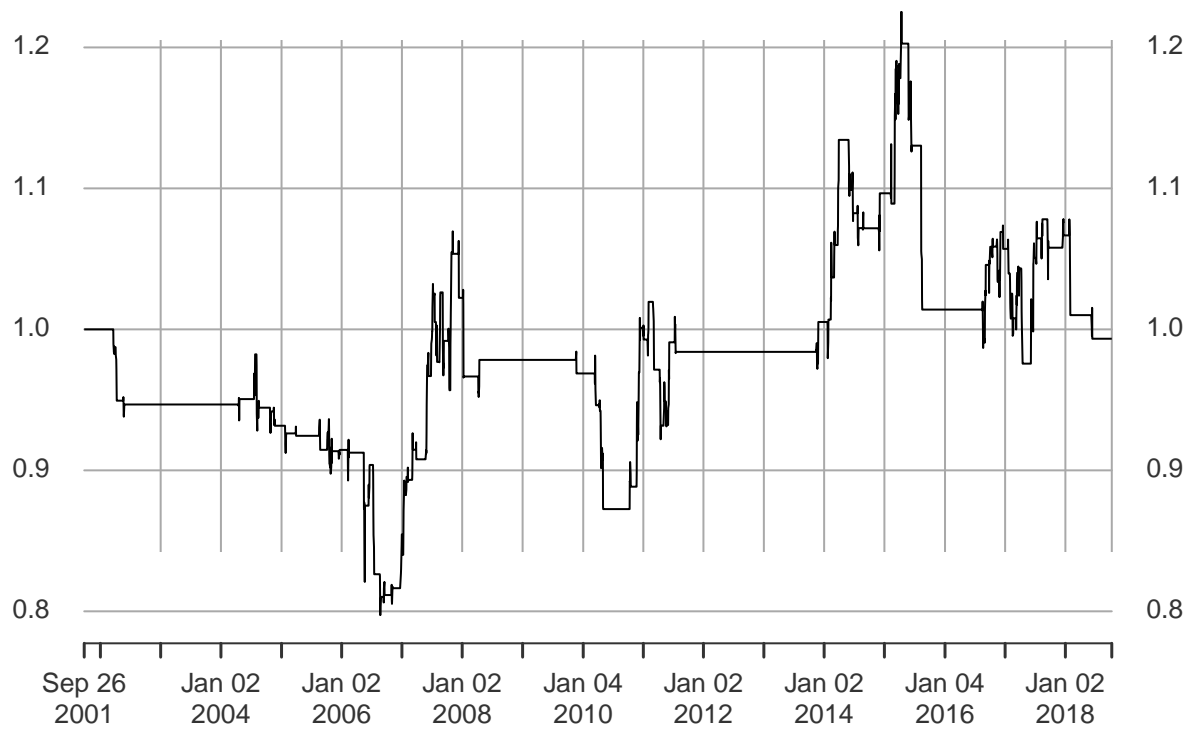
Returns of TKA

2001-09-26 / 2018-10-10

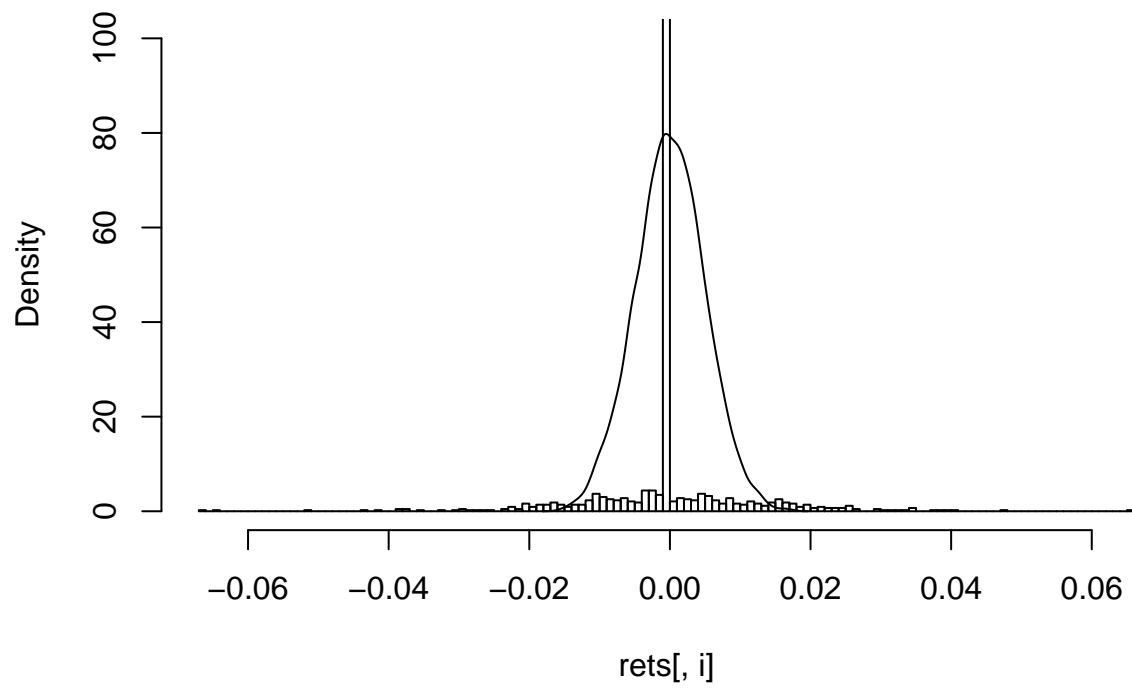


Equity curve of TKA

2001-09-26 / 2018-10-10

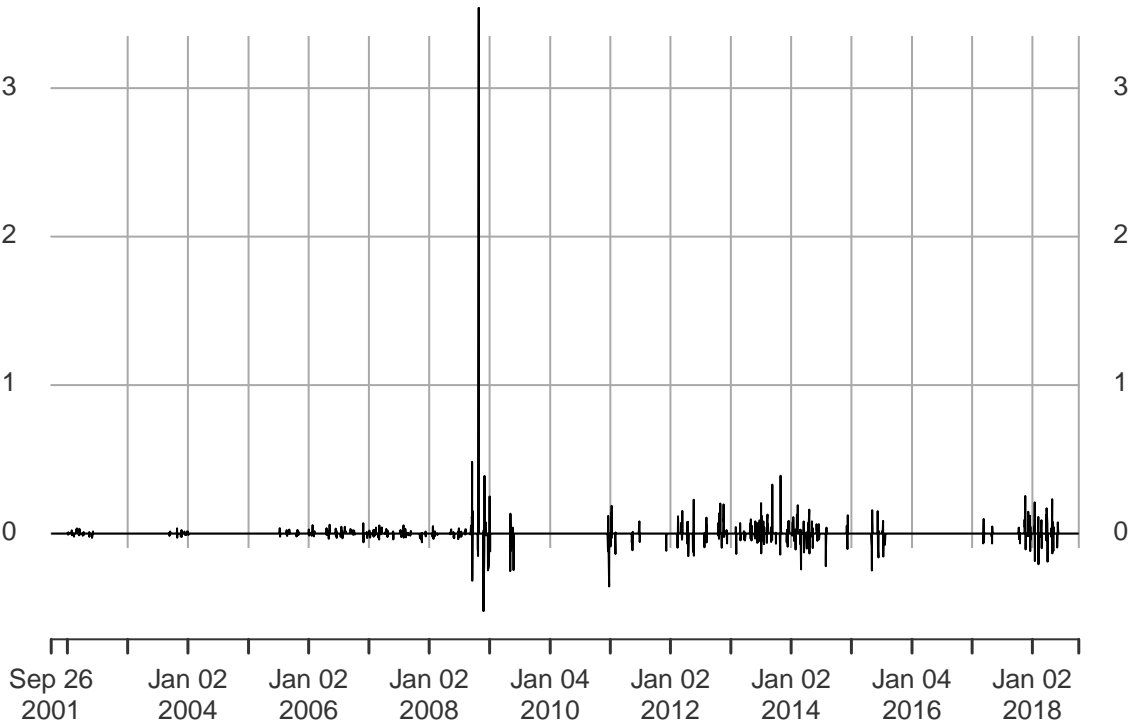


Histogram of Simple Returns of TKA



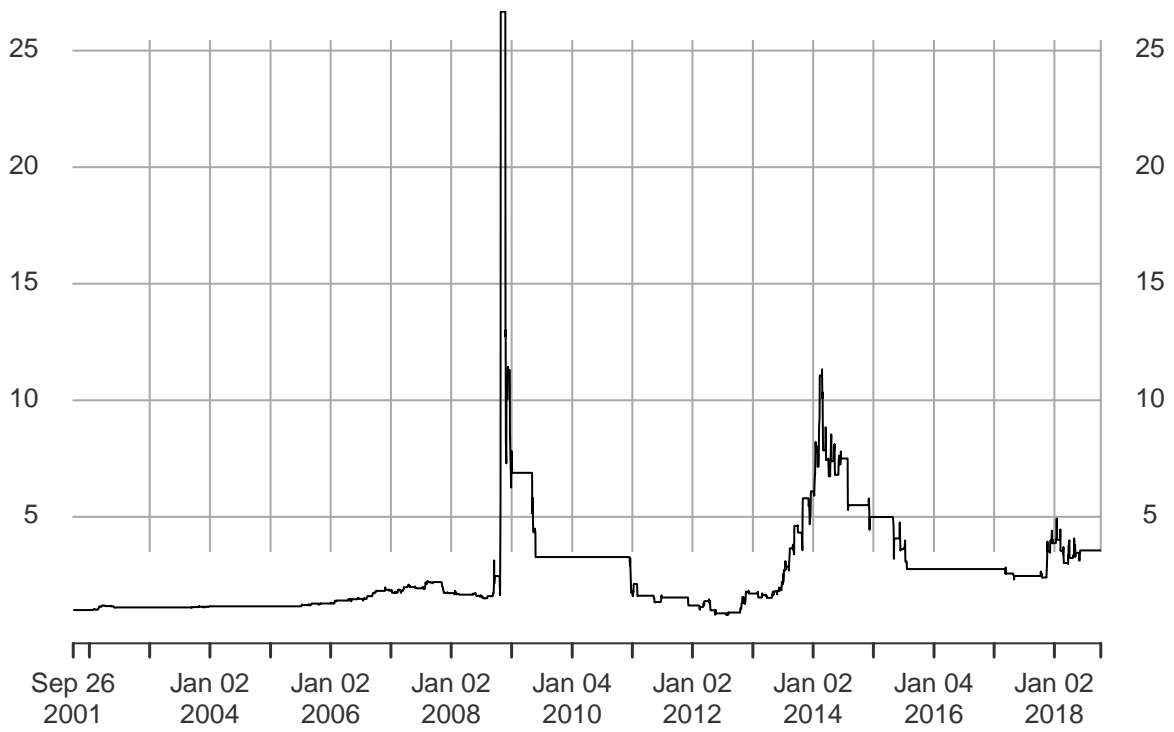
Returns of VOW

2001-09-26 / 2018-10-10

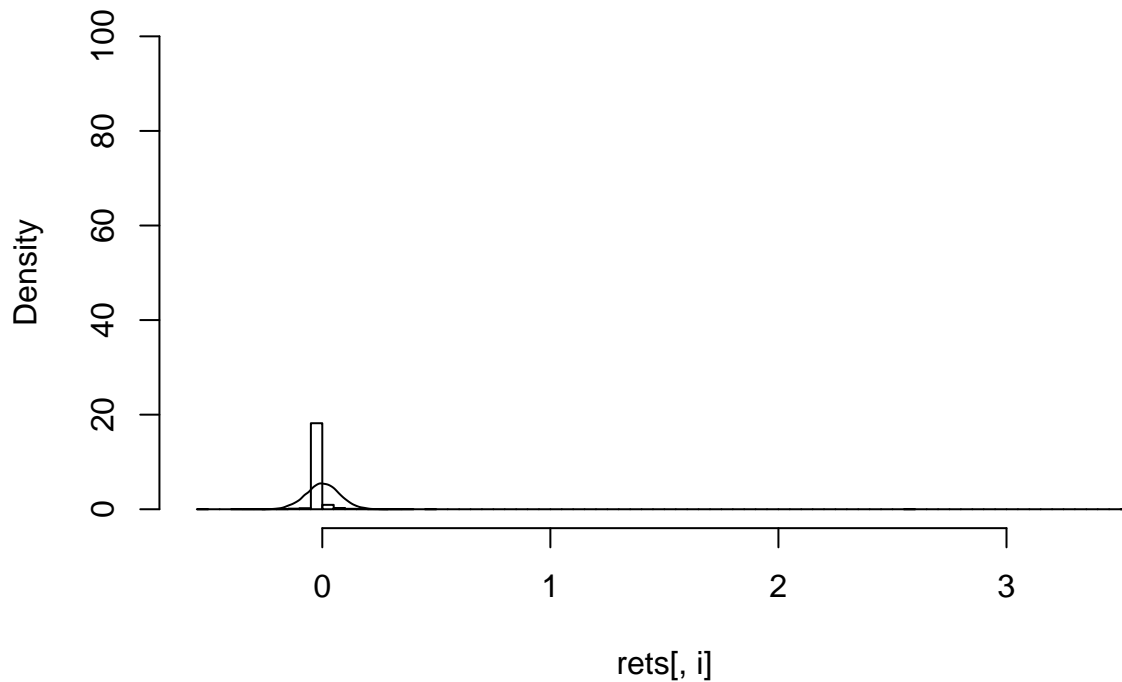


Equity curve of VOW

2001-09-26 / 2018-10-10



Histogram of Simple Returns of VOW



Value at Risk

The historical “Value at Risk” measures the risk of loss for investments. More specifically, it describes the maximum amount we would expect to lose per day with a confidence level of 99%, given an investment of 10000.

```
## [1] "Investment: 10000"
```

```
## [1] "Confidence Level: 0.99"
```

```
## [1] "Given a 10000 investment in BAY we would expect a maximum loss of 237.3 per day."
```

```
## [1] "Given a 10000 investment in DBK we would expect a maximum loss of 155.14 per day."
```

```
## [1] "Given a 10000 investment in HEI we would expect a maximum loss of 178.86 per day."
```

```
## [1] "Given a 10000 investment in TKA we would expect a maximum loss of 179.19 per day."
```

```
## [1] "Given a 10000 investment in VOW we would expect a maximum loss of 1030.36 per day."
```

Conclusion and Suggestions