example

YANG, Ze

January 20, 2016

1. Data Set

```
library(zgarchArb)
```

```
## Loading required package: xts
## Loading required package: zoo
##
## Attaching package: 'zoo'
##
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
##
## Loading required package: quantmod
## Loading required package: TTR
## Version 0.4-0 included new data defaults. See ?getSymbols.
## Loading required package: rugarch
## Loading required package: parallel
## Loading required package: PerformanceAnalytics
##
## Attaching package: 'PerformanceAnalytics'
##
## The following object is masked from 'package:graphics':
##
##     legend
##
## Loading required package: lattice
## Loading required package: latticeExtra
## Loading required package: RColorBrewer
```

```
raw = rawIFC1
head(raw)
```

```
##   Index WindCode Code     Date     Time     Open     High      Low
## 1     1  IFC1.CF IFC1 20150105 91500000 36190000 36286000 36138000
## 2     2  IFC1.CF IFC1 20150105 91600000 36198000 36202000 36136000
## 3     3  IFC1.CF IFC1 20150105 91700000 36178000 36186000 36146000
## 4     4  IFC1.CF IFC1 20150105 91800000 36164000 36180000 36132000
## 5     5  IFC1.CF IFC1 20150105 91900000 36164000 36190000 36164000
## 6     6  IFC1.CF IFC1 20150105 92000000 36180000 36186000 36164000
##      Close Volume     Turover MatchItems Interest
## 1 36200000  17658 19187434740     131088   131088
## 2 36176000   5915  6419413740     131143   131143
## 3 36164000   3919  4251244680     131231   131231
## 4 36166000   3396  3683940300     131672   131672
```

```
## 5 36182000   2732  2965293660     132217   132217
## 6 36182000   2053  2228039520     132602   132602
```

```
data = windM1Data()
```

```
## Warning in merge.xts(C1, C2, "inner"): NAs introduced by coercion
```

```
## Warning in merge.xts(C1, C2, "inner"): NAs introduced by coercion
```

```
str(data)
```

```
## List of 6
##  $ C1.xts   :An 'xts' object on 2015-01-05 09:15:00/2015-12-28 15:14:00 containing:
##   Data: num [1:64908, 1] 3620 3618 3616 3617 3618 ...
##   Indexed by objects of class: [POSIXct,POSIXt] TZ:
##   xts Attributes:
##  NULL
##  $ C2.xts   :An 'xts' object on 2015-01-05 09:15:00/2015-12-31 15:14:00 containing:
##   Data: num [1:61262, 1] 3664 3662 3662 3662 3666 ...
##   Indexed by objects of class: [POSIXct,POSIXt] TZ:
##   xts Attributes:
##  NULL
##  $ HS300.xts:An 'xts' object on 2015-01-05 09:30:00/2015-12-31 14:59:00 containing:
##   Data: num [1:58551, 1] 3568 3567 3568 3573 3576 ...
##   Indexed by objects of class: [POSIXct,POSIXt] TZ:
##   xts Attributes:
##  NULL
##  $ basis    :An 'xts' object on 2015-01-05 09:30:00/2015-12-28 14:59:00 containing:
##   Data: num [1:57827, 1] 38.8 43.3 46 40.8 34.7 ...
##  - attr(*, "dimnames")=List of 2
##   ..$ : NULL
##   ..$ : chr "e1"
##   Indexed by objects of class: [POSIXct,POSIXt] TZ:
##   xts Attributes:
##  NULL
##  $ diff     :An 'xts' object on 2015-01-05 09:15:00/2015-12-28 15:12:00 containing:
##   Data: num [1:60704, 1] 44.4 44.4 45.2 45.6 47.8 ...
##  - attr(*, "dimnames")=List of 2
##   ..$ : NULL
##   ..$ : chr "e1"
##   Indexed by objects of class: [POSIXct,POSIXt] TZ:
##   xts Attributes:
##  NULL
##  $ merged   :An 'xts' object on 2015-01-05 09:15:00/2015-12-31 15:14:00 containing:
##   Data: num [1:65466, 1:3] 3620 3618 3616 3617 3618 ...
##  - attr(*, "dimnames")=List of 2
##   ..$ : NULL
##   ..$ : chr [1:3] "C1" "C2" "inner"
##   Indexed by objects of class: [POSIXct,POSIXt] TZ:
##   xts Attributes:
##  NULL
##  - attr(*, "class")= chr "windM1Data"
```

2.1 Rolling ARMA-GARCH Model - Basis Spread

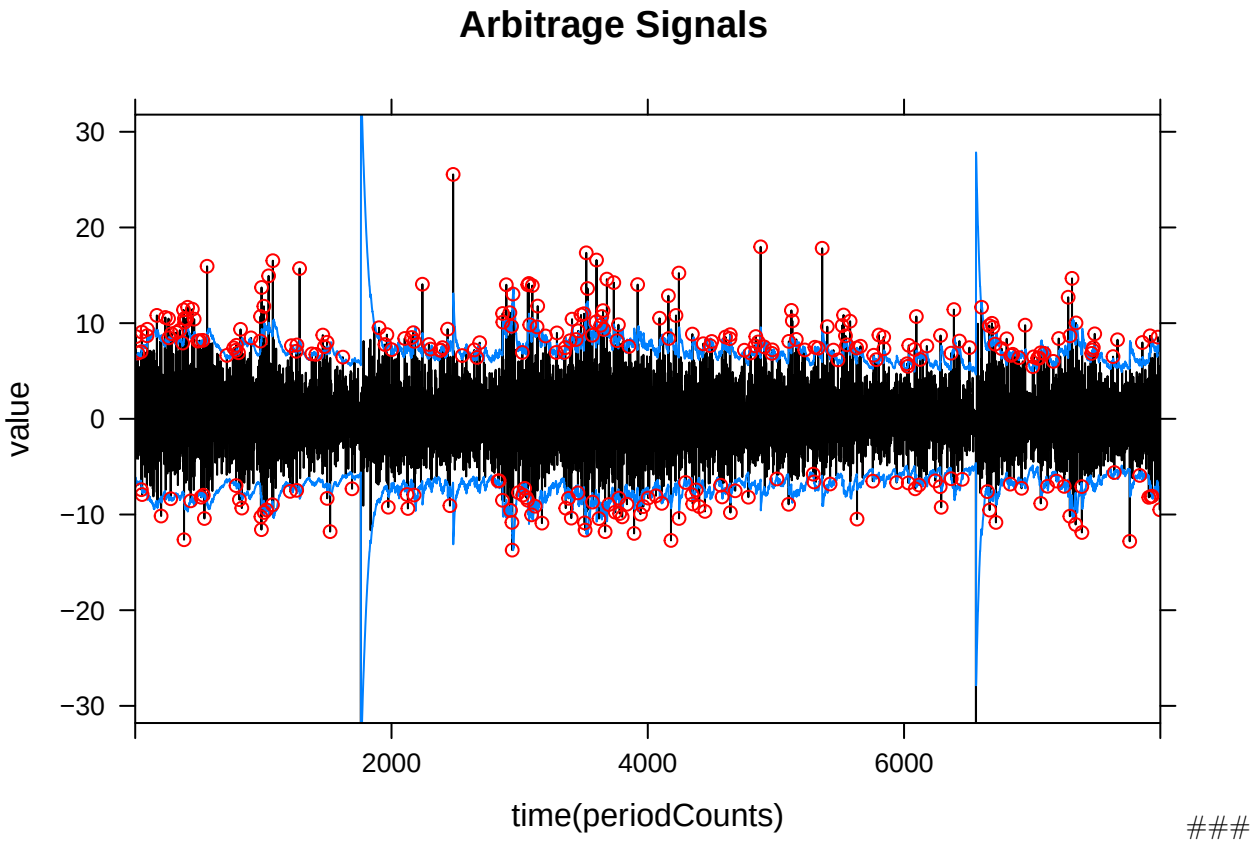
```
basis = tail(data$basis,10000)
zg.basis = zGARCHsignal(basis, 2000, 1000)
```

```
## [1] "[RollingModel]: Finished 1"
## [1] "[RollingModel]: Finished 2"
## [1] "[RollingModel]: Finished 3"
## [1] "[RollingModel]: Finished 4"
## [1] "[RollingModel]: Finished 5"
## [1] "[RollingModel]: Finished 6"
## [1] "[RollingModel]: Finished 7"
## [1] "[RollingModel]: Finished 8"
```

```
zg.summary = summary(zg.basis)
```

Arb Signals

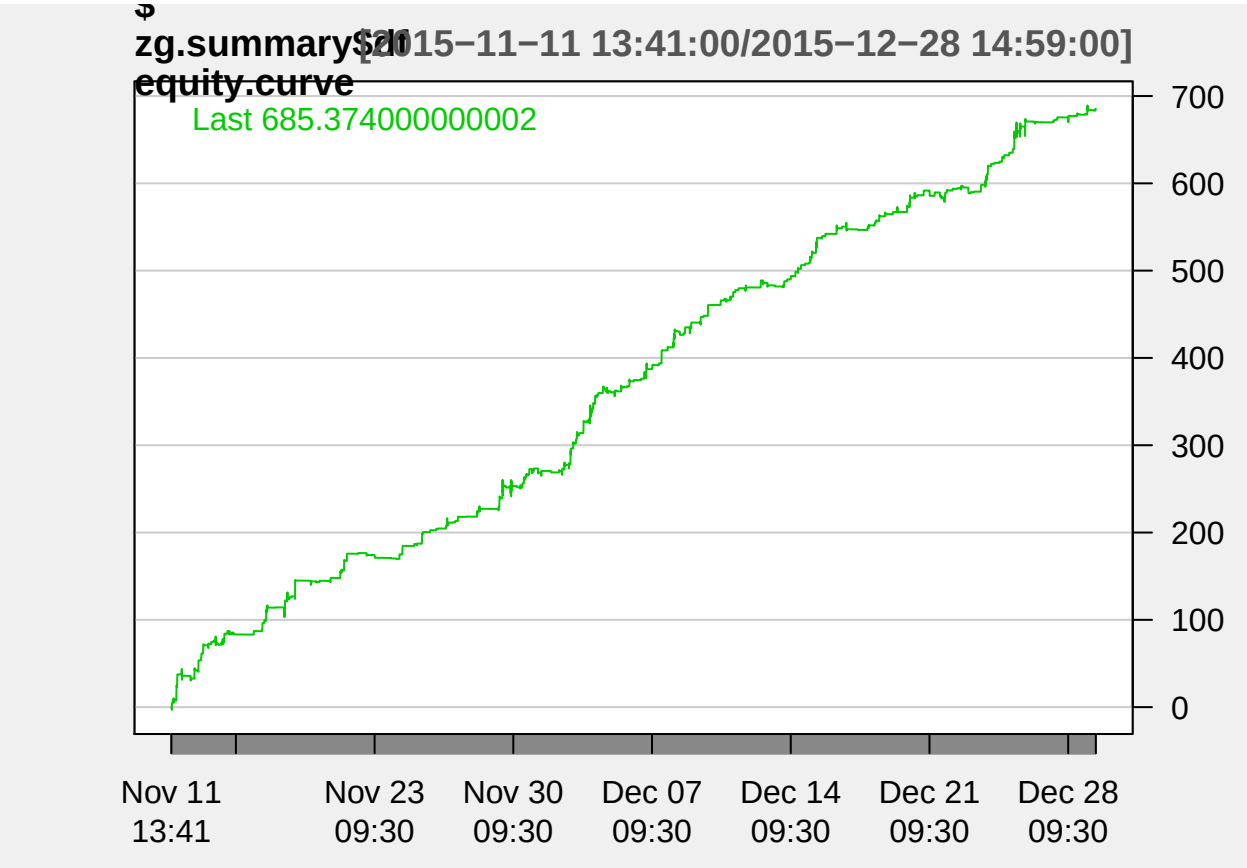
```
zg.summary$plot.signal
```



###

Equity Curve

```
chartSeries(zg.summary$df$equity.curve, theme = chartTheme('white'))
```



2.2 Rolling ARMA-GARCH Model - Calendar Spread

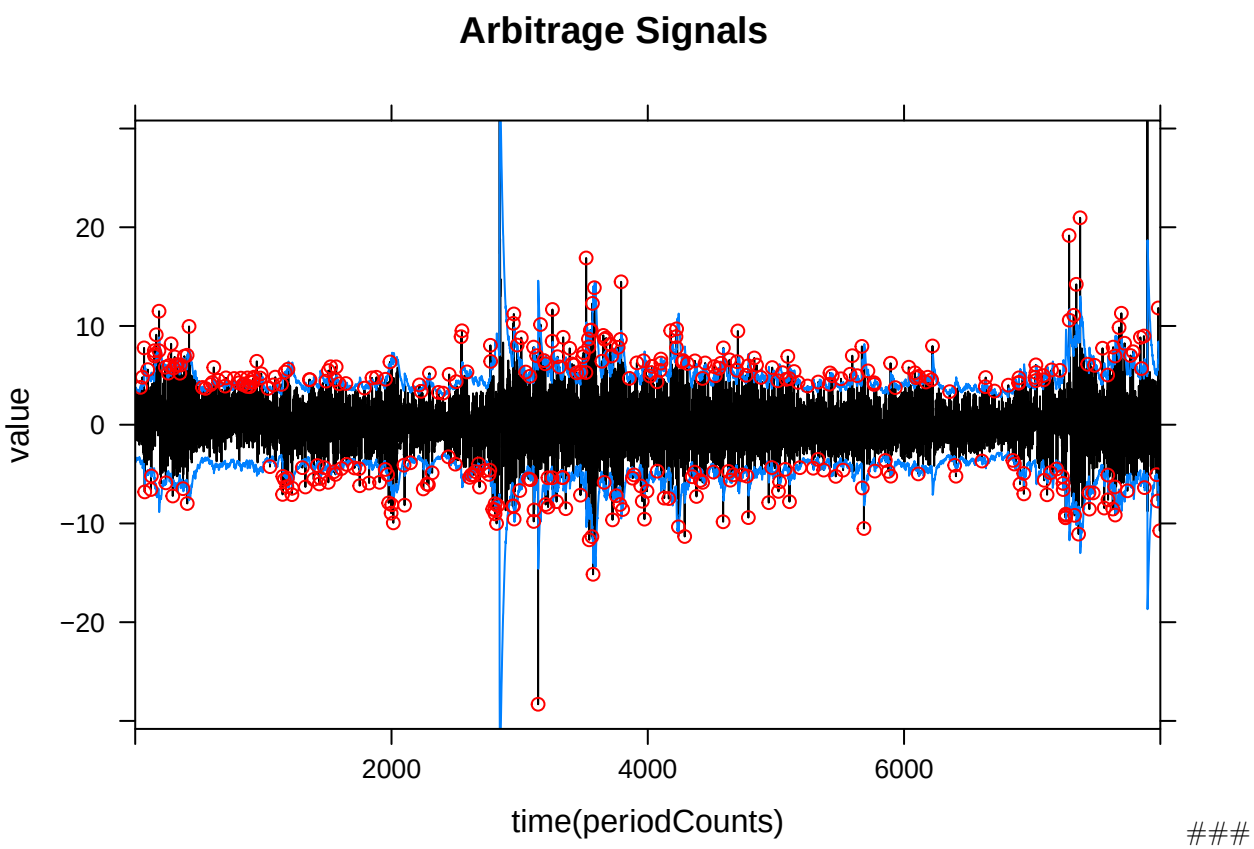
```
diff = tail(data$diff,10000)
zg.diff = zGARCHsignal(diff, 2000, 1000)
```

```
## [1] "[RollingModel]: Finished 1"
## [1] "[RollingModel]: Finished 2"
## [1] "[RollingModel]: Finished 3"
## [1] "[RollingModel]: Finished 4"
## [1] "[RollingModel]: Finished 5"
## [1] "[RollingModel]: Finished 6"
## [1] "[RollingModel]: Finished 7"
## [1] "[RollingModel]: Finished 8"
```

```
zg.summary.2 = summary(zg.diff)
```

Arb Signals

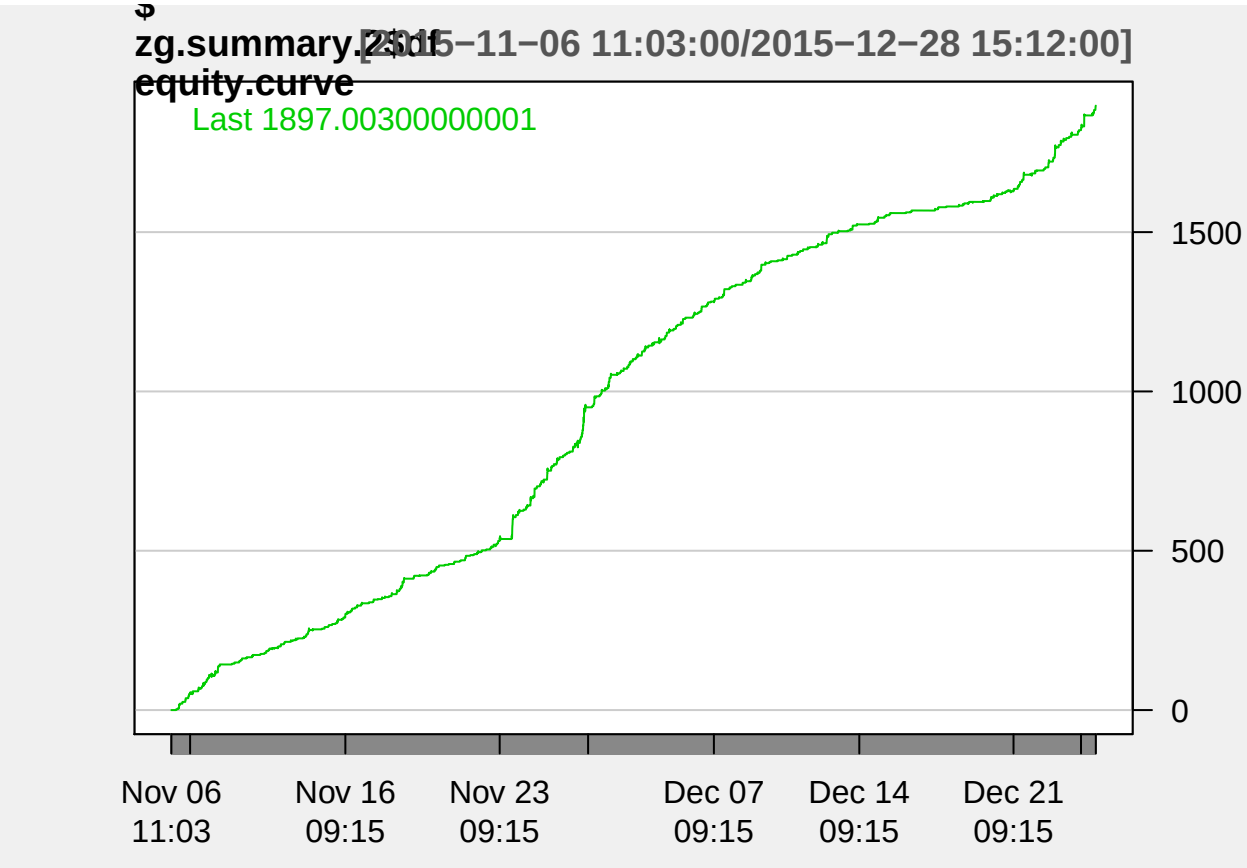
```
zg.summary.2$plot.signal
```



###

Equity Curve

```
chartSeries(zg.summary.2$df$equity.curve, theme = chartTheme('white'))
```



3 Backtest on Longer Horizon (Parallel Computation)