# **Trading Simulation**

blotter and the emerging toolchain in R

## **Trade Simulation Tool Chain**

Manage Data

**Evaluate** Data

Determine Trades

Size Trades

Calculate Performance

Analyze Performance

#### Types of Activities

Connect to database

Download historical data

Clean and align data

Graph prices and indicators

Calculate indicators

Transform prices

**Fstimate** volatility

Calculate trailing volume

Estimate pretrade pricing

Forecast return

Forecast risk

Evaluate rules

Generate signals

Optimize portfolio

Budget risk

Calculate target position

Calculate trade size

Evaluate trading costs Specify contract specs

Capture trades

Calculate positions

Calculate P&L

Aggregate portfolio

Calculate

risk

returns and

Compare to

benchmarks

attribution

Provide

Analyze risk

#### Example R Packages

quantmod indexes **RTAO** xts . . .

TTR signalextraction quantstrat quantmod

lspm Portfolio-Analytics

blotter Financial-Instrument Performance-Analytics

### **About blotter**

- Transaction/price framework
- Stores transactions
- Calculates positions and P&L
- Aggregates positions into accounts
- Strategy independent

- Multi-instrument portfolios
- Multiple currency portfolios (new)
- Alpha-stage code
- Not on CRAN yet, on R-Forge

## About the Faber Example

- A very simple trend following strategy:
  - Faber, Mebane T., "A Quantitative Approach to Tactical Asset Allocation." Journal of Risk Management (Spring 2007).
- Buy when monthly price > 10-month SMA.
- Sell and move to cash when monthly price < 10-month SMA.
- 10 years of monthly data, S&P Sector ETFs.
- No shorting, 'sell' goes to cash.
- Positions are fixed.

### Faber in R Code

```
currency('USD')
symbols = c("XLF", "XLP", "XLE", "XLY", "XLV", "XLI", "XLB", "XLK", "XLU")
for(symbol in symbols){ stock(symbol, currency="USD", multiplier=1) }
getSymbols(symbols, src='yahoo', index.class=c("POSIXt","POSIXct"),
from='1998-01-01')
for(symbol in symbols) {
    x<-qet(symbol)
    x<-to.monthly(x,indexAt='lastof',drop.time=TRUE)
    colnames(x)<-qsub("x",symbol,colnames(x))</pre>
    assign(symbol,x)
initPortf('longtrend', symbols=symbols, initDate='1997-12-31')
initAcct('longtrend', portfolios='longtrend', initDate='1997-12-31')
initOrders(portfolio='longtrend', initDate='1997-12-31')
s <- strategy("longtrend")</pre>
s <- add.indicator(strategy = s, name = "SMA", arguments = list(x =
quote(Cl(mktdata)), n=10), label="SMA10")
s <- add.signal(s, name="sigCrossover", arguments = list(data=quote(mktdata),
columns=c("Close", "SMA"), relationship="gt"), label="Cl.gt.SMA")
s <- add.signal(s,name="sigCrossover", arguments = list(data=quote(mktdata),</pre>
columns=c("Close", "SMA"), relationship="lt"), label="Cl.lt.SMA")
s <- add.rule(s, name='ruleSignal', arguments = list(data=quote(mktdata),</pre>
sigcol="Cl.gt.SMA", sigval=TRUE, orderqty=100, ordertype='market',
orderside=NULL, threshold=NULL), type='enter')
s <- add.rule(s, name='ruleSignal', arguments = list(data=quote(mktdata),</pre>
sigcol="Cl.lt.SMA", sigval=TRUE, ordergty='all', ordertype='market',
orderside=NULL, threshold=NULL), type='exit')
out <- try(applyStrategy(strategy='s' , portfolios='longtrend'))</pre>
updatePortf(Portfolio='longtrend')
```

#### Code Color Key:

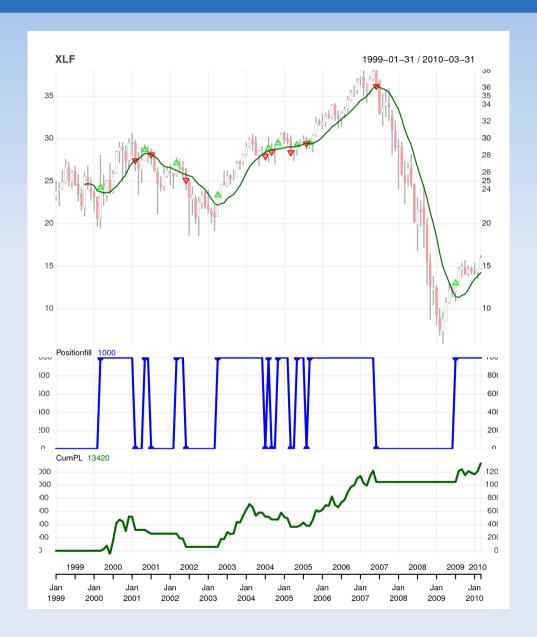
FinancialInstrument
quantmod
blotter
quantstrat
TTR
xts

#### Hidden:

xts TTR blotter

### No custom code

## Results



- A profitable demo!
  - \*new\* quantmod graphics
  - blotter for P&L, trade record

<pre>&gt; head(x\$XLF\$txn)</pre>									
	Txn.Qty	Txn.Price	Txn.	Value	Txr	n.Avg.Cost	Pos.Qty	Pos.Avg.Cost	
1997-12-31	0	0.00		0		0.00	0	0.00	
2000-03-31	1000	24.27		24270		24.27	1000	24.27	
2001-02-28	-1000	27.45	-	27450		27.45	0	0.00	
2001-05-31	1000	28.71		28710		28.71	1000	28.71	
2001-07-31	-1000	28.13	-	28130		28.13	0	0.00	
2002-03-31	1000	27.15		27150		27.15	1000	27.15	
	Gross.T	xn.Realized	l.PL	Txn.Fe	ees	Net.Txn.Re	ealized.P	L Con.Mult	
1997-12-31			0		0			0 0	
2000-03-31			0		0			0 1	
2001-02-28		3	180		0		318	0 1	
2001-05-31			0		0			0 1	
2001-07-31		-	-580		0		-58	0 1	
2002-03-31			0		0			0 1	

#### **About the Tool Chain**

- Many pieces are still in active development.
- Benefits from wide community involvement.
- Your participation is encouraged.
  - Sample code that can be generalized.
  - Feedback, bug reports, testing, examples, documentation...
- Use it at your OWN RISK.