

Introduction to indicators

FINANCIAL TRADING IN R



Ilya Kipnis

Professional Quantitative Analyst and R
programmer

Why use indicators?

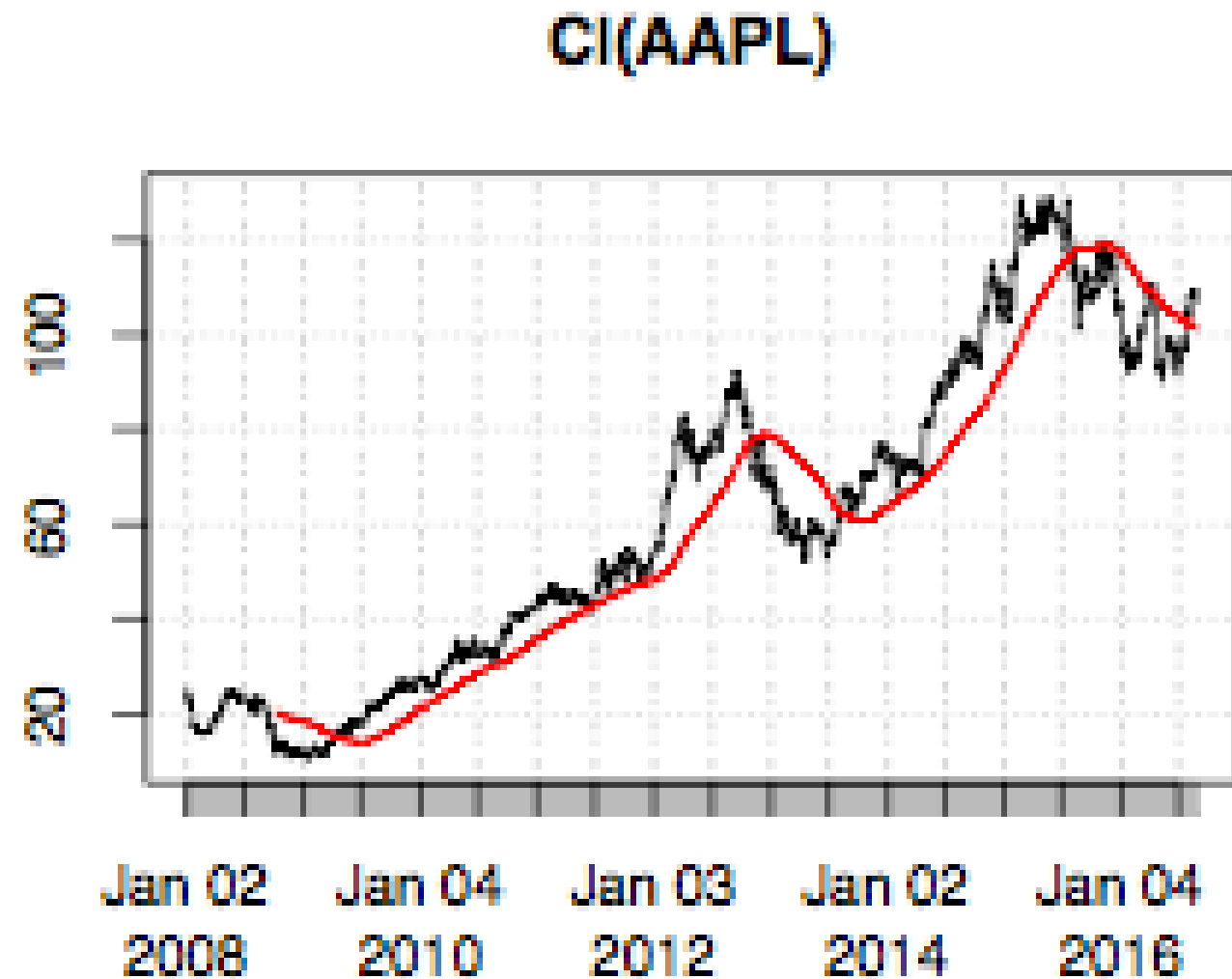
- Market data are exceptionally noisy
- In order to gain insights, you need to transform the data through indicators

What are indicators?

- Indicators are transformations of market data
- Indicators gain smoothness and incur a lag penalty compared to raw market data
- Indicators can range from short term to very long term

Indicator examples

- *Trend* indicators: eg 200-day moving average



Indicator examples

- *Oscillation* indicators
 - Generate a signal of when it may be a good time to enter in short term position
 - often, scale of 0 to 100, -2 to 2,...
 - wait until price has pulled back with eye on future profit

In this class

- Combination of:
 - basic moving average crossover
 - oscillation indicator

Let's practice!
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Indicator mechanics

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Five steps to calling indicators

1. Write the `add.indicator()` function
2. Supply the strategy name (ex. `strategy.st`)
3. Name the function for calculating the indicator (ex. “SMA”)
4. Supply the inputs for the function as a list
5. Provide a label to your indicator (ex. “SMA200”)

Using add.indicator()

```
# Call add.indicator() with strategy, name, arguments, and label
add.indicator(strategy = strategy.st, name = "SMA",
              arguments = list(x = quote(Cl(mktdata)),
                              n = 200), label = "SMA200"))
```

Another way to think about indicators

- Applying an indicator is similar to using the `apply()` command in R
- You pass in the name of a function along with arguments
- The key difference is the addition of a label for your indicators

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Indicator structure review

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Review: using add.indicator()

```
add.indicator(strategy = strategy.st, name = "SMA",  
              arguments = list(x = quote(CL(mktdata)),  
                               n = 200),  
              label = "SMA200")
```

Naming indicators

- Provide indicators with descriptive names
 - Ex. Name your 200 day simple moving average “SMA200”, not just “SMA”
- Keep indicator names simple

applyIndicators()

- creates intermediate dataset containing market data and indicators

```
test <- applyIndicators(strategy = strategy.st,  
                        mktdata = OHLC(LQD))  
  
head(test, n = 3)
```

```
      LQD.Open LQD.High LQD.Low LQD.Close SMA.SMA200  
SMA.SMA50 DVO.DVO_2_126  
2003-01-02 58.37216 58.37216 57.32224 57.49366      NA  
NA      NA  
2003-01-03 57.63829 57.82042 57.45616 57.82042      NA  
NA      NA  
2003-01-06 57.71864 57.79363 57.39724 57.79363      NA  
NA      NA
```


applyIndicators() cont.

```
tail(test, n = 3)
```

```
      LQD.Open LQD.High LQD.Low LQD.Close SMA.SMA200
SMA.SMA50 DVO.DVO_2_126
2015-12-23 113.9586 114.1979 113.8888    114.178    115.1378
115.0177      65.873016
2015-12-24 114.3400 114.5500 114.2000    114.550    115.1258
114.9885      92.857143
2015-12-28 114.3600 114.5600 114.2100    114.410    115.1147
114.9575      80.952381
```

- In quantstrat, indicator labels take the form of the original name, a dot and your label

Further indicator mechanics

- `HLC()` returns the high, low, and close as a xts object

```
head(HLC(LQD))
```

| | LQD.High | LQD.Low | LQD.Close |
|------------|----------|----------|-----------|
| 2002-07-30 | 52.35639 | 51.97142 | 52.03302 |
| 2002-07-31 | 52.48472 | 52.12541 | 52.35126 |
| 2002-08-01 | 52.92102 | 52.51038 | 52.86456 |
| 2002-08-02 | 53.02368 | 52.58738 | 52.97235 |
| 2002-08-05 | 53.20334 | 52.61818 | 52.84402 |
| 2002-08-06 | 52.69004 | 52.40772 | 52.66437 |

Further indicator mechanics

- Use `object[date/date]` with `HLC()` to subset xts objects

```
HLC(LQD["2012-01-01/2012-01-07"])
```

| | LQD.High | LQD.Low | LQD.Close |
|------------|----------|----------|-----------|
| 2012-01-03 | 97.05994 | 96.63424 | 96.77897 |
| 2012-01-04 | 97.01737 | 96.58316 | 96.85560 |
| 2012-01-05 | 96.85560 | 96.37881 | 96.43841 |
| 2012-01-06 | 96.90669 | 96.54058 | 96.81303 |

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