FINANCIAL TRADING IN R

Introduction to Indicators

Why Use Indicators?

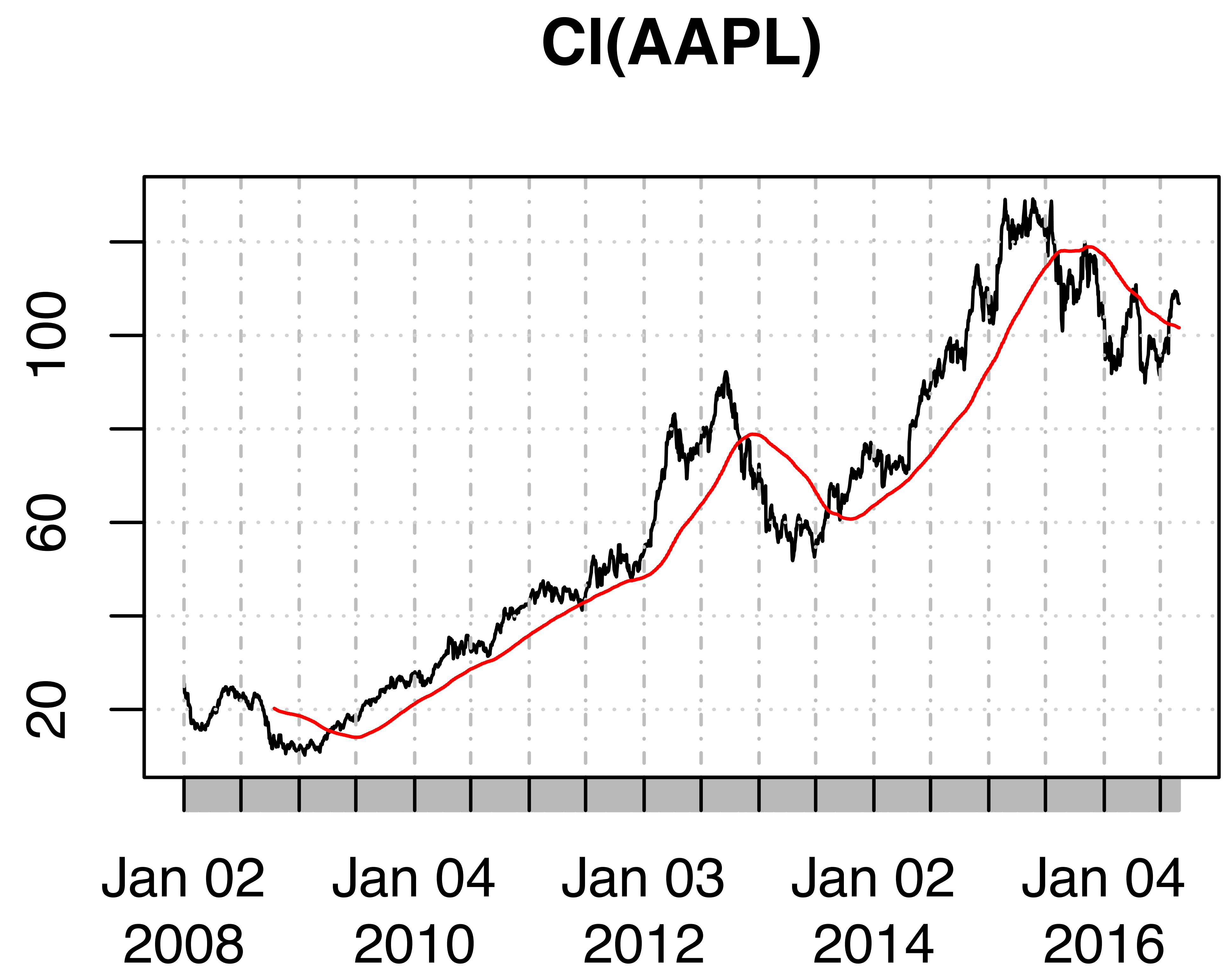
- Market data are exceptionally noisy
- In order to gain insights, you need to transform the market data through indicators

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!

Indicator Mechanics

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

Let's practice!

Indicator Structure Review

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 data set 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

> 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
```

Let’s practice!