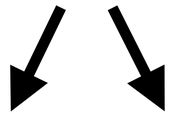
FINANCIAL TRADING IN R

Why do people trade?

What is trading?

- The act of BUYING or SELLING an asset



tangible product financial security

- Cash → product → cash (hopefully making a profit!)

Why Do People Trade?

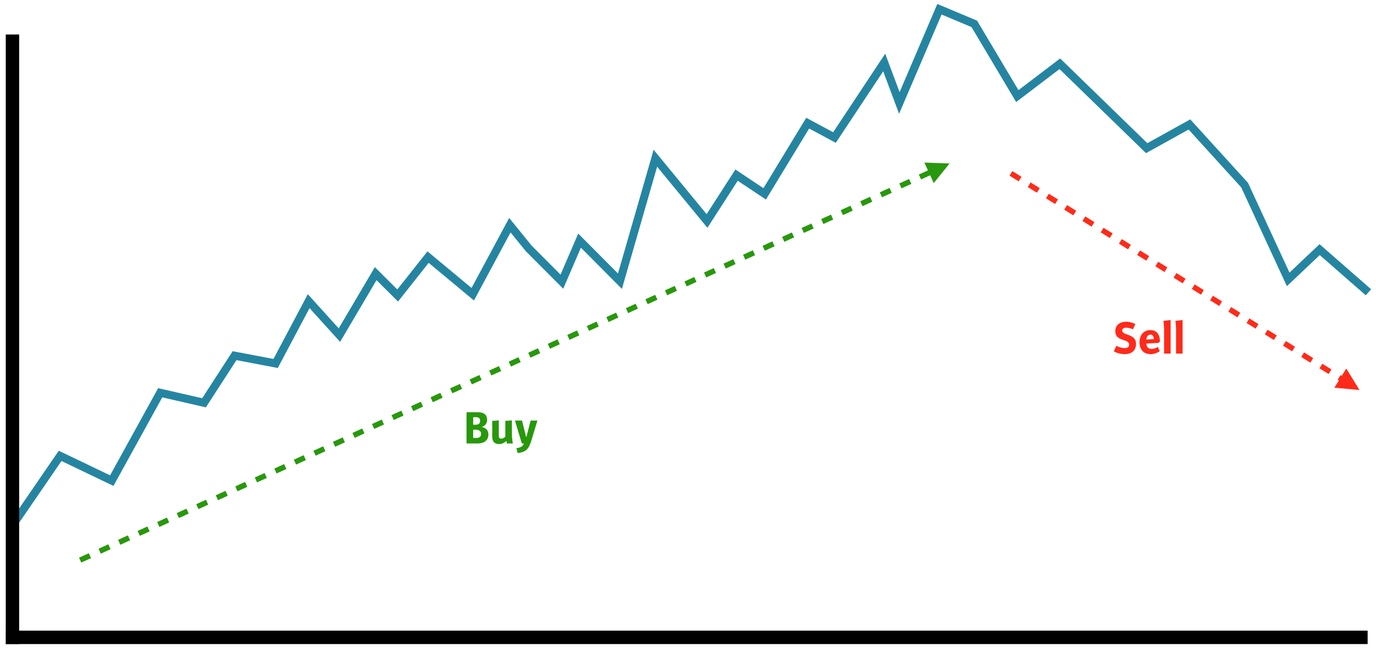
- To make a profit
- To take on, offload, and hedge financial risk
- To protect a company from commodity price movements

- **Systematic trading:** risk/reward payoff is favorable enough to bear the risk

Source: http://www.cntraveler.com/, https://qzprod.files.wordpress.com

Types of Trading

- **Divergence** (or momentum, trend trading): The movement of a quantity will continue in its current direction



- Ex. commodity trading advisors (CTA)

Types of Trading

- **Convergence** (or reversion, cycle trading): The movement of a quantity will eventually reverse

- Ex. Warren Buffett

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Pitfalls of Various Trading Systems

Pitfalls in trading system development

- Market data is a mix of fear, greed, and noise of millions
- “Past performance is not indicative of future results.”
- Overfit on past (in-sample) data means bad performance on future (out-of-sample) data

How to not overfit

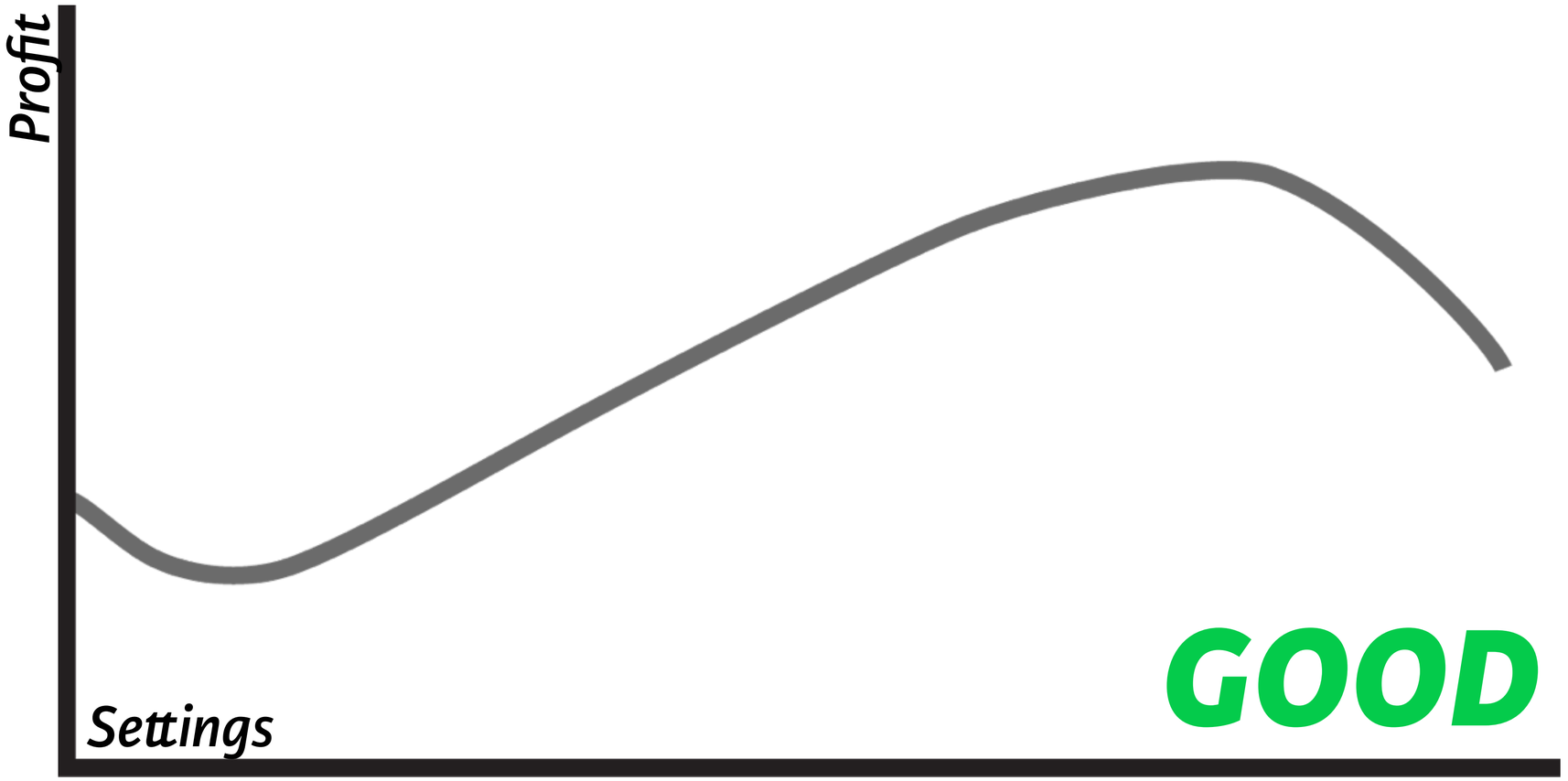
- Can cause a system to fail in the future
- Minimize the number of moving objects!
- GOOD strategy

How to not overfit

- Can cause a system to fail in the future
- Minimize the number of moving objects!
- BAD strategy

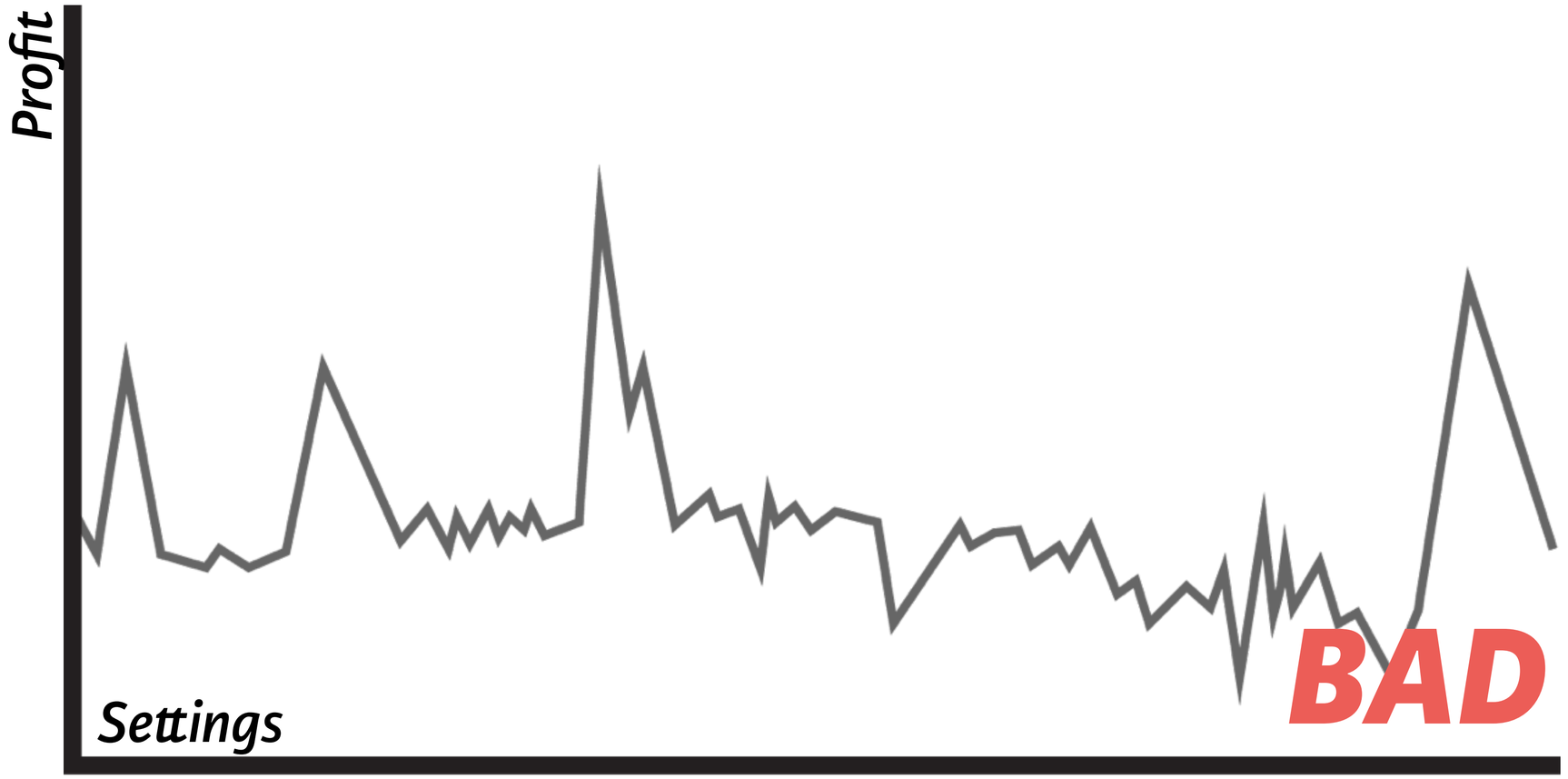
Stability with system settings

- System should behave similarly for similar settings levels



Stability with system settings

- System should behave similarly for similar settings levels



Hypothesis testing

- Perform hypothesis tests:
  - Relationship between an indicator & future returns?
  - Signal process to generates outperformance?
- Most of these are beyond the scope of the course, but keep them in mind

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Getting financial data

Obtaining data from Yahoo!

- Every trading system relies on data (often costly)
- Yahoo! Finance has free data
- Use the `getSymbols()` command in `quantmod`

2 ETFs in this course

- LQD:

```
getSymbols("LQD", from = "1990-01-01", src = "yahoo", adjusted = TRUE)
```

```
            LQD.Open LQD.High LQD.Low LQD.Close LQD.Volume LQD.Adjusted
2002-07-30   101.30   102.00  101.25    101.37      21200      52.16892
2002-07-31   101.80   102.25  101.55    101.99     272000      52.48799
2002-08-01   102.40   103.10  102.30    102.99     111700      53.00263
2002-08-02   102.90   103.30  102.45    103.20      29200      53.11070
2002-08-05   103.65   103.65  102.51    102.95     166500      52.98204
2002-08-06   102.50   102.65  102.10    102.60     430100      52.80192
```

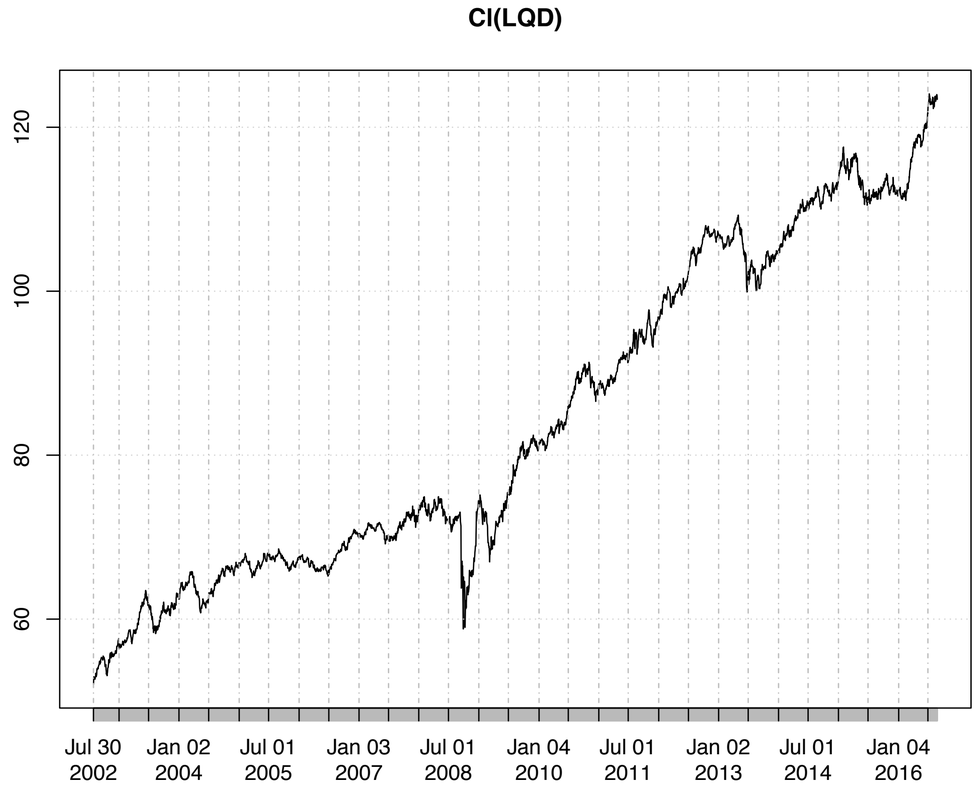
- SPY: see exercises

quantmod functions

- **Op()**: Opening day prices
- **Cl()**: Last price that was traded
- **Hi()**: Maximum value traded during the day
- **Lo()**: Minimum value traded during the day
- **Vo()**: Number of trades that day
- **Ad()**: Adjusted closing price, adjust for dividends & splits

Plotting Financial Data

```
> Plot data using the plot command
> plot(Cl(LQD))
```



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Adding indicators to financial data

Trading indicators

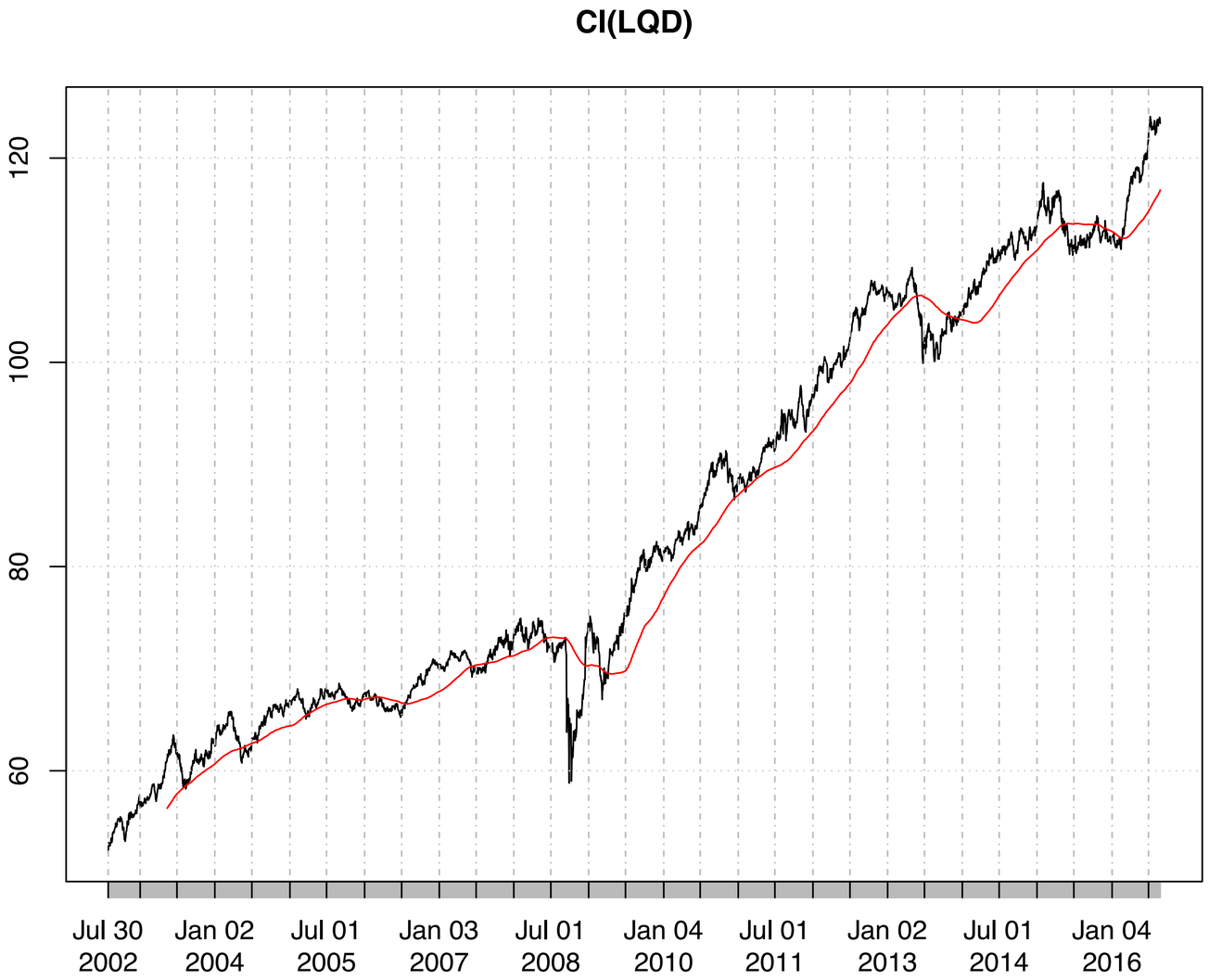
- TTR: toolbox of classical trading indicators
- Simple Moving Average (SMA)
- Popular for CTA's: 200-day moving average
  - Displays where prices have been over the past 10 months

Using SMA()

```
> # Compute a simple moving average (SMA) across 200 days
> sma <- SMA(x = Cl(LQD), n = 200)

> # Add the SMA line to your plot of LQD closing price
> plot(Cl(LQD))
> lines(sma, col = "red")
```

The trend line



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