The Business of Quant

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Administrivia

- **Location For the Next 2 Classes**: 32-144 (Stata Center)
- Please sign in

- Contacting the instructor: Rohit Singh (<u>rsingh@mit.edu</u>)

Guest Speakers!

Ohm Srinivasan
Managing Director
CIBC Private Wealth Management
Jan 24th, 2-2:30pm

David Mittelbusher
Managing Director
Goldman Sachs
Jan 31st, 2-2:30pm

Recapping Last Week

- Investing is about having a view

- Quant investing is all about having a precise view. Specifically,

    - Alpha

    - Risk

- Systematic views are good

    - Diversification

    - Calibrate your probabilities

- Shorting and leverage aren't dirty words
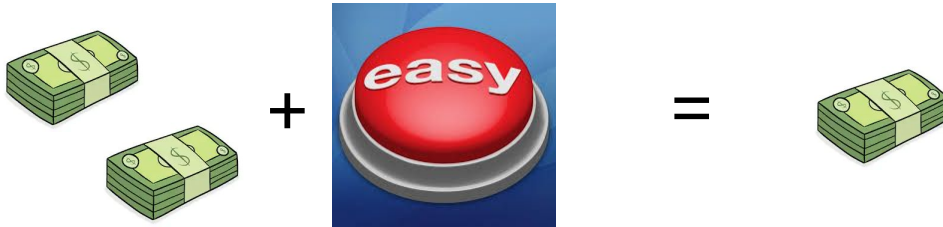
Building Quant Strategies

From Views to Strategies

- Views are ideas
- Strategies are action-plans
  - What, how much, when in, when out?

Can every view be implemented as a feasible strategy?

- Performance not good enough after costs
- Can't make a business out of it

Evaluating a Strategy as a Customer

Questions your customer will ask:
- How much money will I get back?
- What are the chances I'll take a loss?
- How much money can you handle?

The Customer's Dilemma

Pick any two (sometimes, just one)

- Risk
- Return
- Capacity

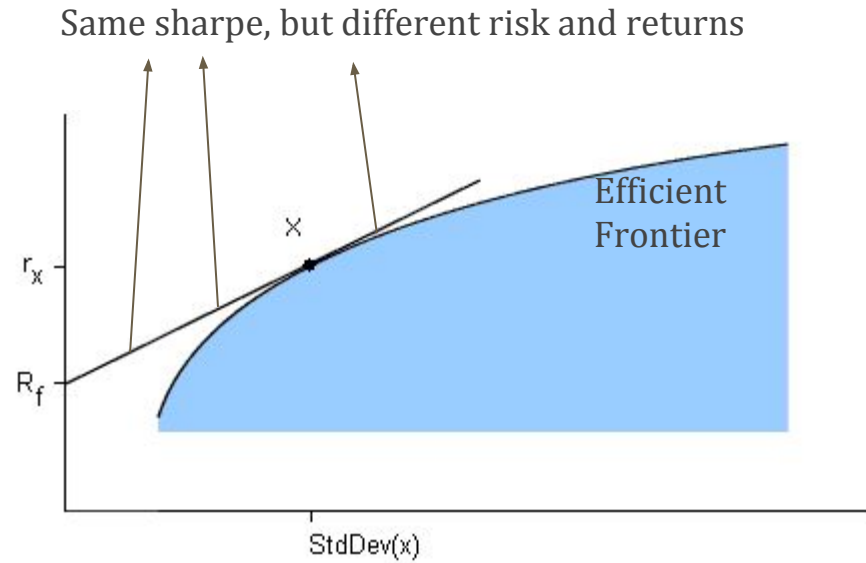| Strategy	Risk	Return	Capacity
T-bills	🟩	🟥	🟩
S&P 500	🟥	🟩	🟩
Factor Investing	?	?	?
Statistical Arbitrage	?	?	?
High Frequency Trading	?	?	?

The Sharpe Ratio

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

R_p = Return of portfolio

R_f = Risk-Free rate

σ_p = Standard deviation of portfolio's excess return

Same sharpe, but different risk and returns

Efficient Frontier

r_x

R_f

StdDev(x)

Missing piece: Correlation

- Your offering needs to fit into the customer's overall allocation

- Certain types of quant strategies explicitly aim to be diversifiers

- Might actually have to leave some alpha on the table…

Other missing pieces?

Taxes

The Fundamental Determinants of Performance

$$\frac{(\text{Return per bet}) \times (\text{\# of Simultaneous bets})}{(\text{Duration of each bet})}$$

Breaking Down a Strategy's Edge

Two way to look at this: 1) Source of the alpha   2) What separates you from others

Breaking Down the Edge: Source

- Fundamental

- Informational

- Structural (e.g., arbitrage or market-making)

- Risk re-distribution

- Flow

Breaking Down the Edge: Why You?

- **Brains**: You know something others do not

- **Brawn**: You are able to do something others can not

- **Bravery**: You are willing to do something others are not

Brains: Know What Others Don't

Find an alpha that only a limited set of participants (ideally, just you!) know of

Can be from a variety of sources:

- Fundamental
  - Low volatility, Accruals & Earnings Quality
- New data source
  - Credit card receipts, Satellite images
- Behavioral patterns
  - 13F filings
- Structural
  - Index rebalance
- Flow
  - Order book info

Pros & Cons of a Brains Edge

Pros

- Uncorrelated, typically
- Untapped capacity
- Feasible to get a higher Sharpe than peer strats
- Really fun to work on!

?

Cons

- Eventually dies out
  - Markets are efficient
  - Others might figure it out
- When it doesn't work, hard to explain to others

Brawn Edges: Do What Others Can't

Infrastructural Edge

- <u>Geographic connectivity</u>: arbitrage between distant places
  - Brazil vs US
  - FX market across geographies
  - Various crypto exchanges
- <u>Fast Connectivity</u>: be the first
  - Chicago to New York: SPY vs E-minis

Legal Edge

- Designated market-makers
- Local domicile regulations
  - China A-shares vs H-shares
  - India

Pros

- Won't necessarily go away
- Business model advantages

Cons

- Edge is public knowledge
  - Arms Race
- Rules might change

Bravery: Do What Others Will Not

- Take pain that others are not willing to suffer. Be rewarded for it

- Low Sharpe strategies

  - Value investing, with its risk of
    - Buying value traps and
    - Doing *really* badly when the market's doing badly

  - Small losses on many days, big gains on a few days
    - Out of the money put options buying

Pros / Cons ?

Popular Types of Strategies

Factor Investing

Efficient Market Hypothesis:

- Share prices reflect all available information
- Can't beat the market

Capital Asset Pricing Model:

$$R - R_f = \beta(R_m - R_f) + \epsilon$$

Fama-French Factor Model:

$$R - R_f = \beta_m(R_m - R_f) + \beta_s R_{SMB} + \beta_v R_{HML} + \epsilon$$

$$R - R_f = \beta_m(R_m - R_f) + \beta_s R_{SMB} + \beta_v R_{HML} + \beta_p R_{RMW} + \beta_i R_{CMA} + \epsilon$$

More Factors

- A big factor missing there: Momentum
- Value, Momentum and Size are still the most-believed factors

Major academic and private effort to discover new factors:
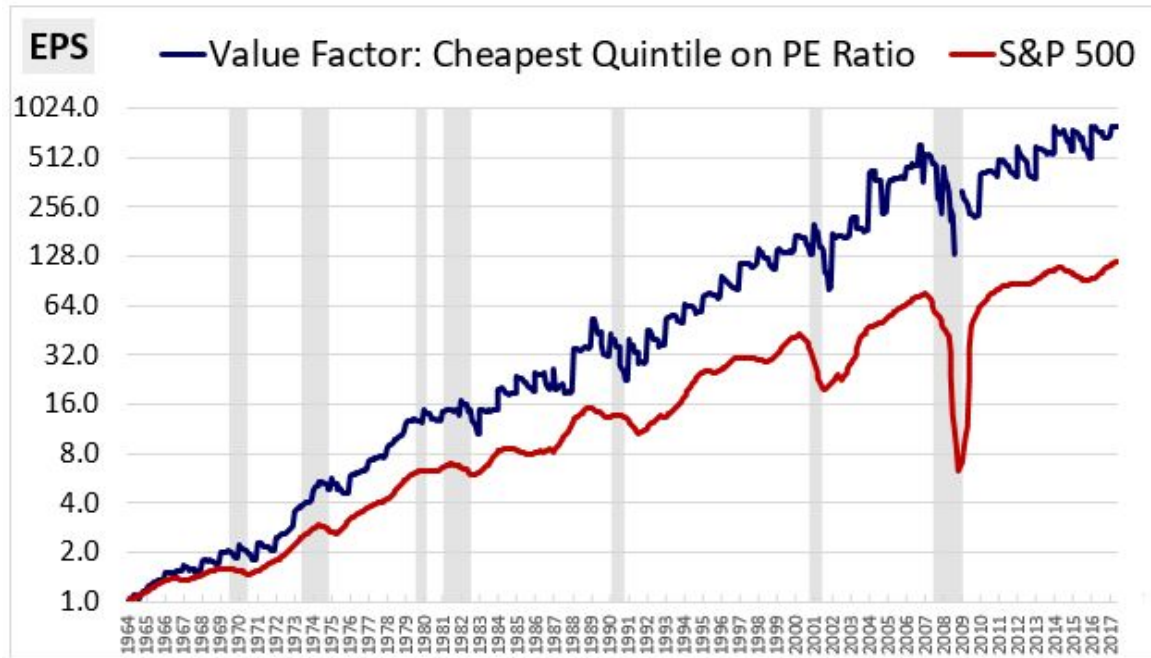
- Earnings quality
- Low volatility

But…

- Factor zoo?

Why Do Factors Work?

- Risk Premia: no pain, no gain
    - Equity risk premium
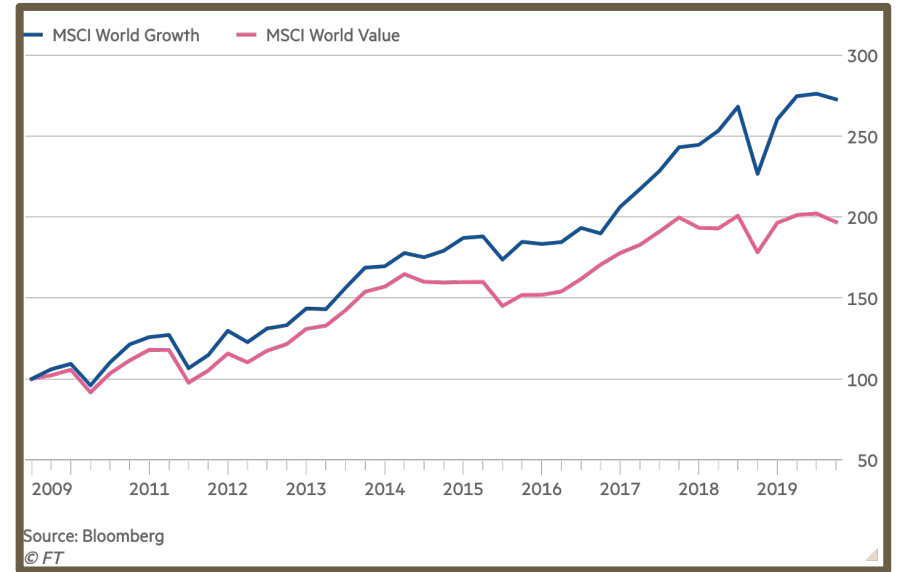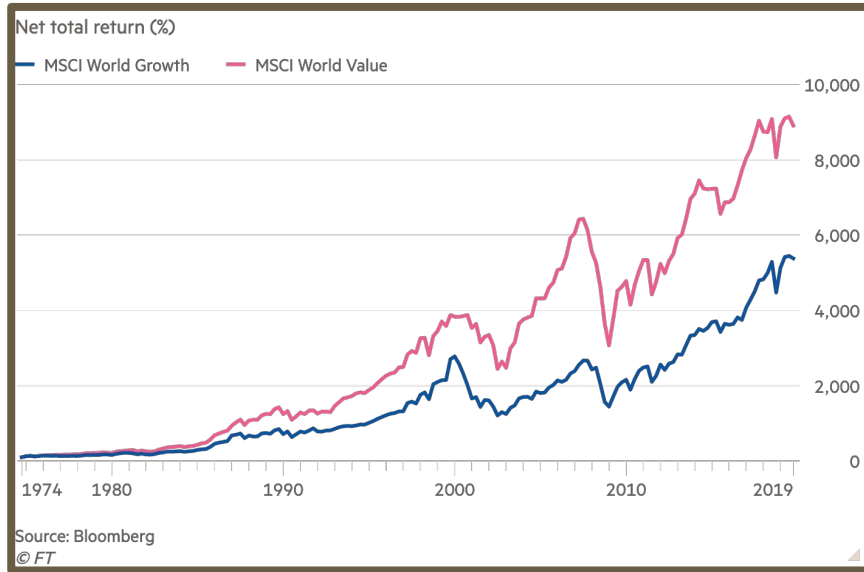   - Value: traps and bad periods
    - Size

- Behavioral
    - Momentum
    - Low volatility

Pros and Cons of Factor Investing

Historically, the Value factor has worked very well...

Pros and Cons of Factor Investing

...but let's dig in a bit more

Predicting Ops & Sales Metrics

- Some factors are based on company performance & fundamentals
  - Value
  - Earnings quality

- Many strategies try to read the tea leaves of the next quarter
  - Satellite images of parking lots or drilling rigs
  - Credit card receipts
  - Foursquare foot-falls

- Alternative data is huge now

  - Need to watch for the regulatory issues: don't get non-public info

Anticipating Flows

"Skate to where the puck is going"-   Wayne Gretzky

Figure out what the big guys will buy tomorrow and buy it today

- Index rebalance and smart-beta flow
- Hedge fund and mutual fund holdings reports (13F)
- Prime brokerage reports
- Short Interest

Why is it possible to figure out where flow will go?

Very common approach in shorter-duration quant strategies (e.g. HFT).

Following Sentiment

Buy now what everyone else will want to buy tomorrow

Sentiment ⟹ Flows ⟹ Price-Change

- News sentiment
- Analyst ratings
- **Surveys: Two Sigma's Top-ideas model**
- NLP on all kinds of things: earnings transcripts, videos etc.