
The Business of Quant

—

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Administrivia

- **Next Location:** 32-144 (Stata Center)
- Please sign in

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Guest Speaker: Ohm Srinivasan



Next Week:
David Mittelbush

The Goldman Sachs logo, consisting of the words "Goldman Sachs" in white text on a blue square background.

Recapping last week

- Trade-off between risk, return and capacity
- Source of your strategy's edge:
 - Informational, arbitrage, fundamental etc.
- Why you:
 - Brains, Brawn, Bravery
- Popular strategy ideas:
 - Factor investing
 - Predicting corporate performance
 - Anticipating flows

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

Thinking More about Flows

Is trading on flows and sentiments a zero-sum game ?

Is this less “socially good” than making money from bottom-up analysis ?

A model for how markets get more efficient

Fast-turnover Strategy → Medium-turnover Strategy → Slow-turnover Strategy

Fast-turnover Strategy → Slow-turnover Strategy

A Market Efficiency Example: News Sentiment

View:

- Overnight news on a stock will impact its price today

Strategy:

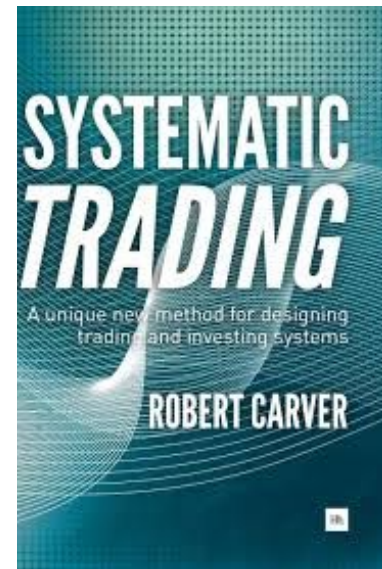
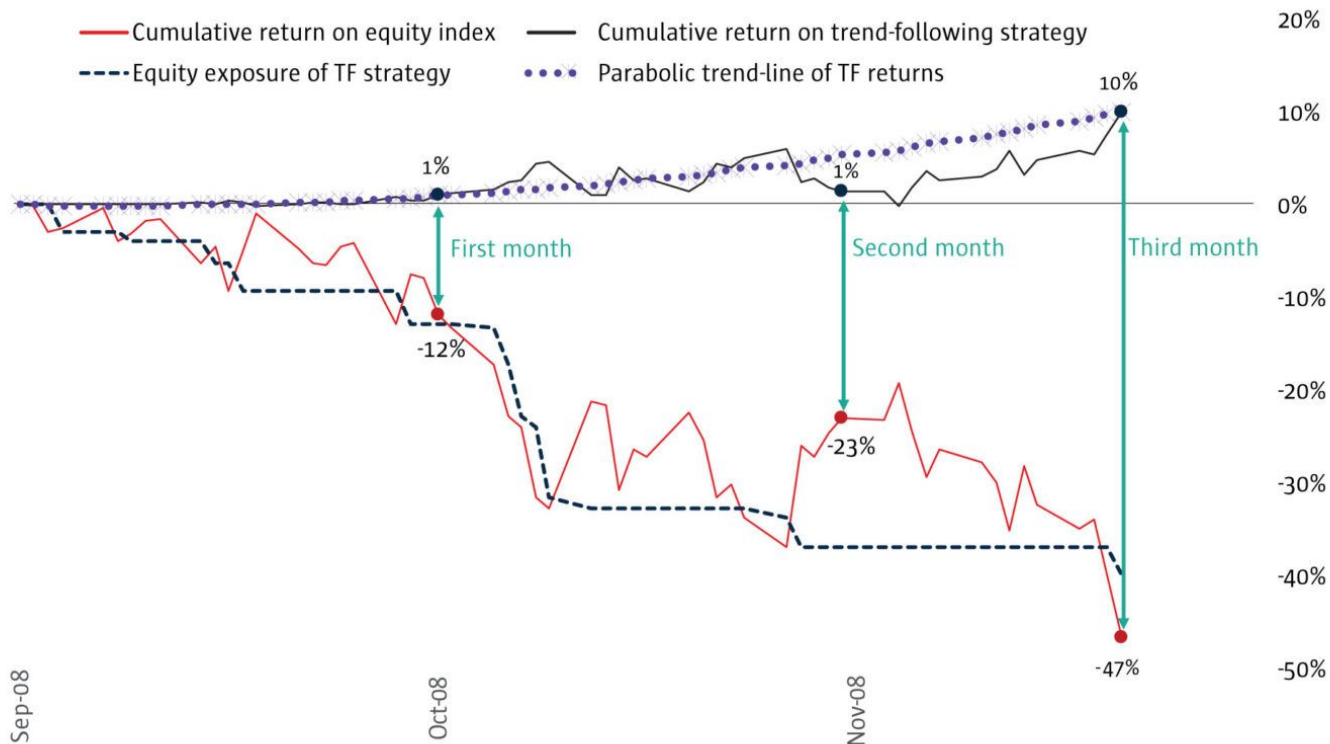
- Aggregate news sentiment score (4pm y'day - 9:20am)
- Compute signal (based on historical regression) and trade

Over the years, this has degraded:

- The regression goodness-of-fit has gotten a little weaker
- The actual profits have gotten a **lot** weaker

CTAs: Flow based futures trading

Cumulative return of the equity index and simplified trend-following strategy



Statistical “Arbitrage”

Relations between stocks follow some historical patterns:

- Co-integration and pairs trades
- Larger stock groupings (sector/factor)
- Supplier-consumer relationships

Can be both reversion and momentum, but the former is more common

Popular set of quant strategies

- Relatively short holding periods
- Good sharpe
- Good capacity

High Frequency Trading

Key characteristics:

- Lots of frequent trades
- Close all positions by end of day
- High Sharpe

The growth of HFT over the years

- Took off after decimalization in 2001 and as markets become electronic
- Replacing the old market-makers
- Ideas from other parts of quant (esp stat-arb) started filtering in
- Did fantastically well for many years (esp 2008). But more crowded now

Three kinds of themes at play in HFT...

HFT: Market-Making

Market-makers provide a service:

- always be willing to take the other side of a trade

They charge a payment for this service:

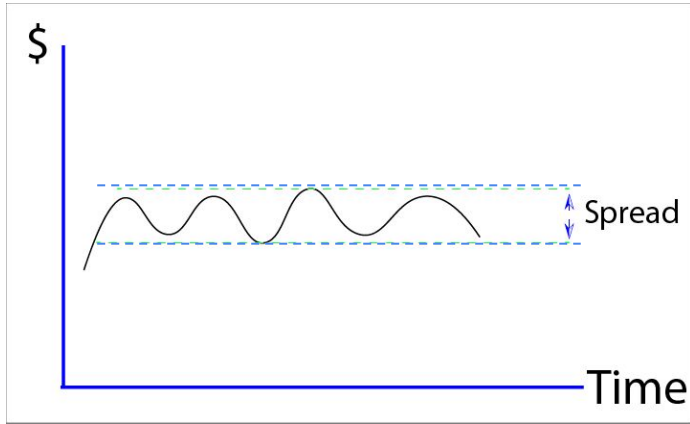
- Bid-ask spread

They have existed for a very long time:

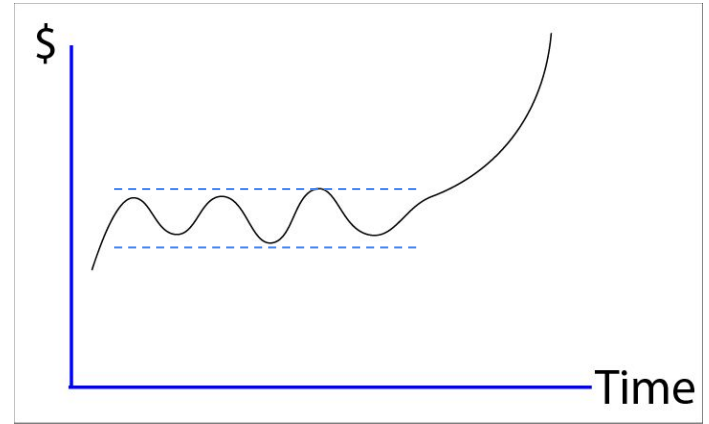
- Previously: floor brokers, specialists etc.
- Now: HFTs



Math & Technology in Market-Making



Good for a market-maker



Bad for a market-maker

210

205

201

199

195

190

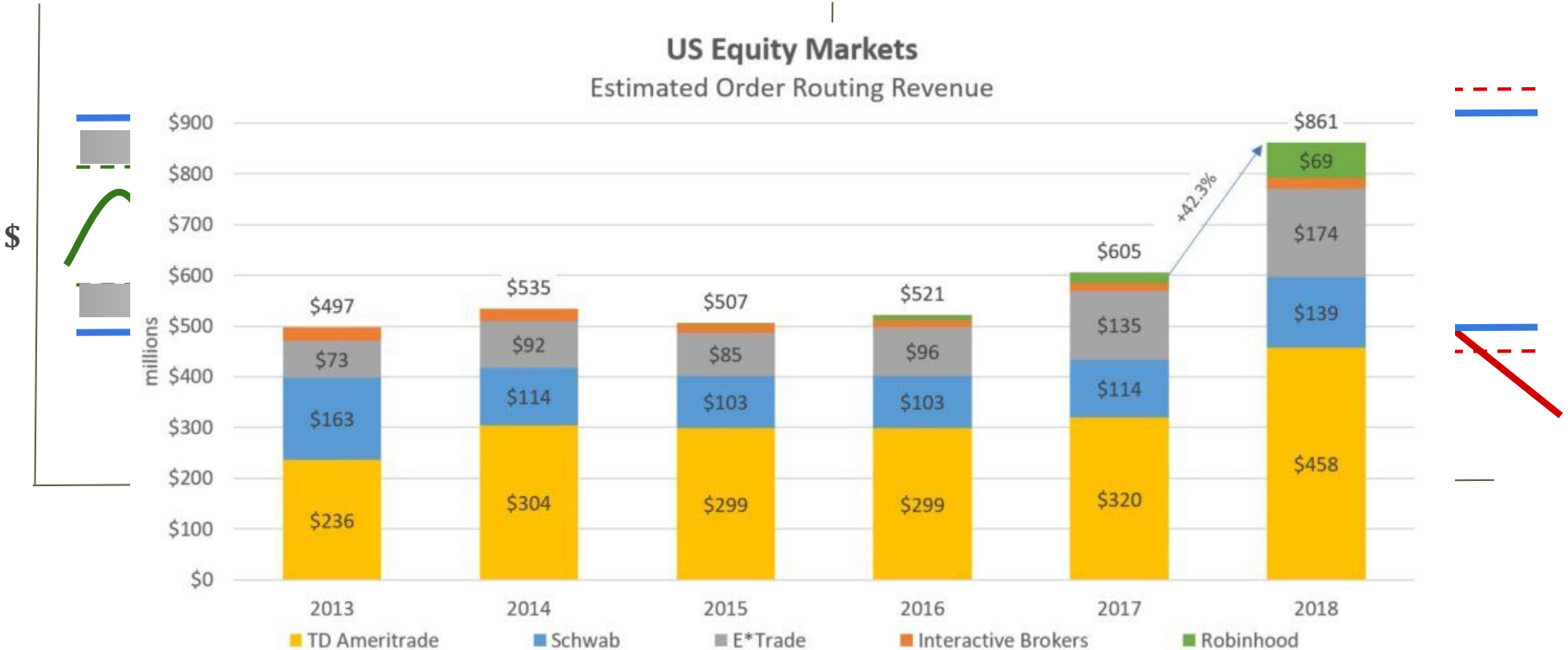
The Spread
(2.00)

Order Book: the last person in the queue sees the worst adverse selection

<https://www.saturn.network/blog/how-profitable-is-market-making-on-different-exchanges/>
<https://betterexplained.com/articles/what-you-should-know-about-the-stock-market/>

HFT brought you zero-fee trading

US Equity Markets
Estimated Order Routing Revenue



Source: Alphacution, SEC, company data

HFT: Structural/Arbitrage Based

- Index Arbitrage
 - Markets contain a lot of derived, second-order instruments
 - When trading independently, the two can get out of sync
 - Bringing them back into sync is profitable.

- Geographic or Asset-Class conversions
 - S&P500 futures in Chicago & SPY in New York
 - Dual-listed Canadian stocks
 - ADRs

Revisiting the Risk/Return/Capacity Trade-off

Strategy	Risk	Return	Capacity
T-bills	Dark Green	Red	Dark Green
S&P 500	Red	Light Green	Dark Green
Factor Investing			
Statistical Arbitrage			
High Frequency Trading			

Combining the Edges

Very few of these ideas are run in isolation



- Even with a Brawn or Bravery strategy, attempt to put a Brains edge

Mix longer and shorter horizon views:

- For longer turnover strategies, use shorter views for timing
- For shorter turnover strategies, use longer views as biases or “soft” pushes

The Gory Details:

Portfolio Optimization, Ops, Execution Costs

Probability	Scenario
	Win \$2
	Lose \$1
Total Expected Outcome $(50\% \times \$2) + (50\% \times -\$1) = \$0.50$	
Edge	$\frac{\$0.50}{\text{Odds}}$
Odds	Win \$2

Kelly Criterion

$$\text{Minimize } \mathbf{w}^T \Sigma \mathbf{w}.$$
$$\text{Subject to } \mu^T \mathbf{w} \geq \mu_b, \quad \omega^T \mathbf{w} = 1 \quad \text{and} \quad \mathbf{w} \geq \eta$$

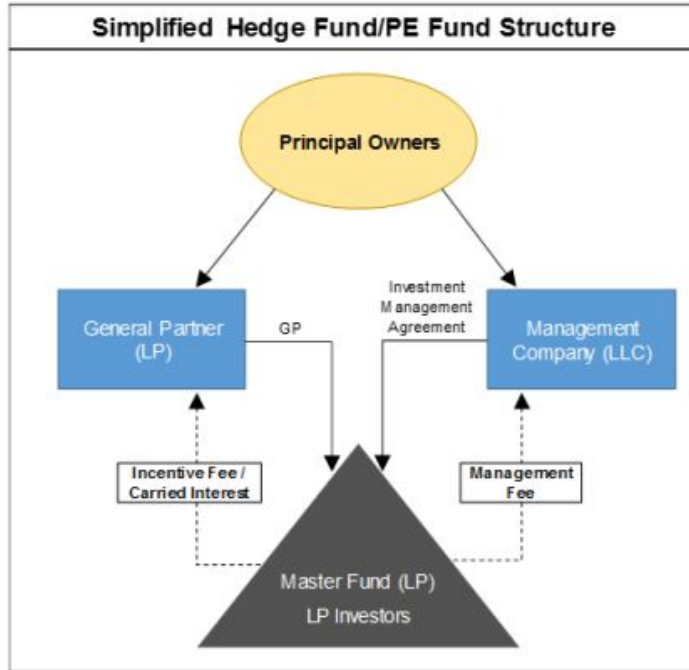
Mean Variance Optimization

Other concerns:

- Shorting costs
- Holding period vs transaction costs
- Operations

Building Quant Businesses

HF vs VC vs PE



Hedge Funds vs Private Equity / Venture Capital

- Public markets ↔ Private markets
- Management fee ↔ Carry
- Performance fee ↔ Carry
- Capital on 1st day ↔ Capital Calls
- Mark to market ↔ Mark to ???
- Liquid ↔ Illiquid