Lecture 5

Short Selling

Columbia Business School

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Lecture Overview

- The Four Necessities
- Short Templates
- Unified Shorting Framework
- Screening and Idea Sourcing
- Catalysts and Timing
- Primary Research Methods

So now, let us discuss once again:
How Do Shorts "Work"?

- At the core of any short idea, there is a variant perception that the stock price is too high
- Why is the stock price too high? Because the "market" has wrong information on either the fundamentals OR the multiple:
  - Fundamentals
    - Accounting vs economic reality
      - Accounting distortions
      - Hidden liabilities/ equity claim worth less
    - Sustainable vs temporary
      - Regulatory change
      - Competitive entrant
      - Macro event/ pull-forward
    - Agency
      - Management will self-enrich
      - Management will mal-invest
  - Multiple
    - Growth rate
      - Market size, competition
    - Discount rate
      - Lower likelihood of success- biotech, mining
    - Capital structure
      - Misunderstood share count or liabilities (EV)

But this is not enough to short a stock! Remember, you need “The Four Necessities”

- The borrow needs to be low cost, plentiful, and stable such that the dynamics of stock loan do not cause the trade to fail
- The “market” has to agree with you before the shares appreciate enough to cause you to exit the position at a loss, or the negative rebate makes the total return unattractive– timing matters
- So each of these are necessary, and none alone are sufficient

1) Fundamentals and/or multiple are incorrect (variant perception)
2) This will cause current shareholders to sell (they agree with your argument)
3) There is stock borrow available that is low cost, plentiful and stable
4) This will happen in a timeframe that is acceptable for your risk framework

Fortunes have been lost when only one or two of these attributes are present!

Review of case studies

Category	Short Strategy That Worked	Short Strategy That Didn't Work
B2C Competition	Weak brands, strong entrants	Hypergrowth, price competition
B2B Competition	Commodity markets, economic incentives	Captive distribution, strong moats
Channel Stuffing	Medium-term trade based on unsustainable trends, "cockroach" theory	Long-term short despite solid business
TAM Analysis	Easily-definable TAM that was already captured	Potential for TAM expansion, long runway
Secular Decliners	High operational or financial leverage, LSD to –LSD growth	Low multiples and good cash flow, ability to be "last man standing"
Growth	Avoiding 10x; finding false growth	Shorting based on valuation
Technical	Finding forced sellers or unlocks	Ignoring fundamentals
Fraud	Waiting for the first leg down, activist involvement	Getting in early with no catalyst
Bubbles	Verifying ease of competitive entry, capital inflow	Mistaking secular growth for bubble
Roll-ups	Poor industrial logic, significant debt financing, few remaining targets	Good synergies, heavily fragmented, cash flow pays for M&A

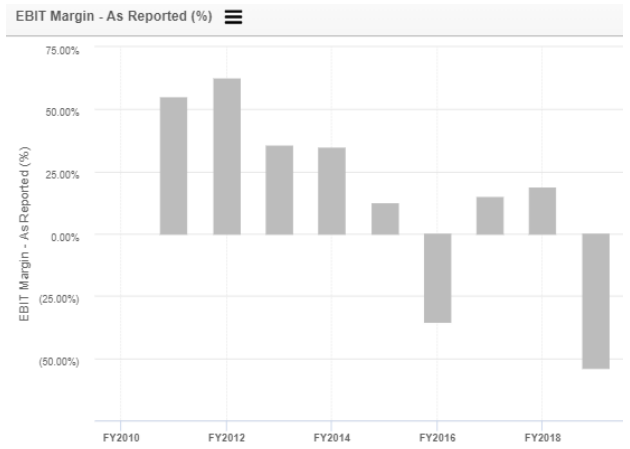
Shorting Templates

- Many of the following templates are subsets of other thematic short approaches
  - These should be higher probability/ higher alpha generation than the overall theme
  - The idea here is to give some scaffolding to the shorting process, which will allow you to add alpha immediately while also ultimately developing deeper skills
- A good shorting template will combine the following:
  - An unsustainable margin structure or revenue growth trajectory
  - Appreciation and refutation of the long thesis, even if it is as simple as “momentum-driven quant funds are buying the stock”
  - Industrial logic that explains why corporations, acting in their own self-interest, will work to close that gap
  - Line of sight into the timing of the reversal
  - A plausible explanation of the maximum possible loss from the trade

Template #1: Margin Mean Reversion (B2B)

- This template combines:
  - An industrial company earning super-normal margins
  - A customer (usually a business) that has a strong incentive to reduce its costs
    - The product being sold is a significant part of the cost structure
  - Guaranteed competitive entry (no patent protection)
  - Valuation that reflects more than 1-2 years of excess earnings
- Examples:
  - Solar panels (2008)
  - SSD (2010)
  - Lithium (2012)
  - Frac Sand (2015)

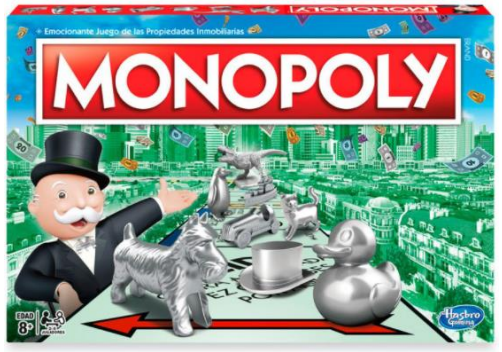
Frac sand



Frac sand margins (HCLP)

Template #2: Monopoly competition (B2B)

- This template combines:
  - A monopoly or duopoly product
  - Significant competitive offerings that are likely to be near-substitutes
  - Competitors that are willing to sell at lower margins/ losses in order to build the business
    - Multiple competitors are necessary– a single competitor is too risky
- Examples:
  - IPGP (2021)
  - PRLB (2021)

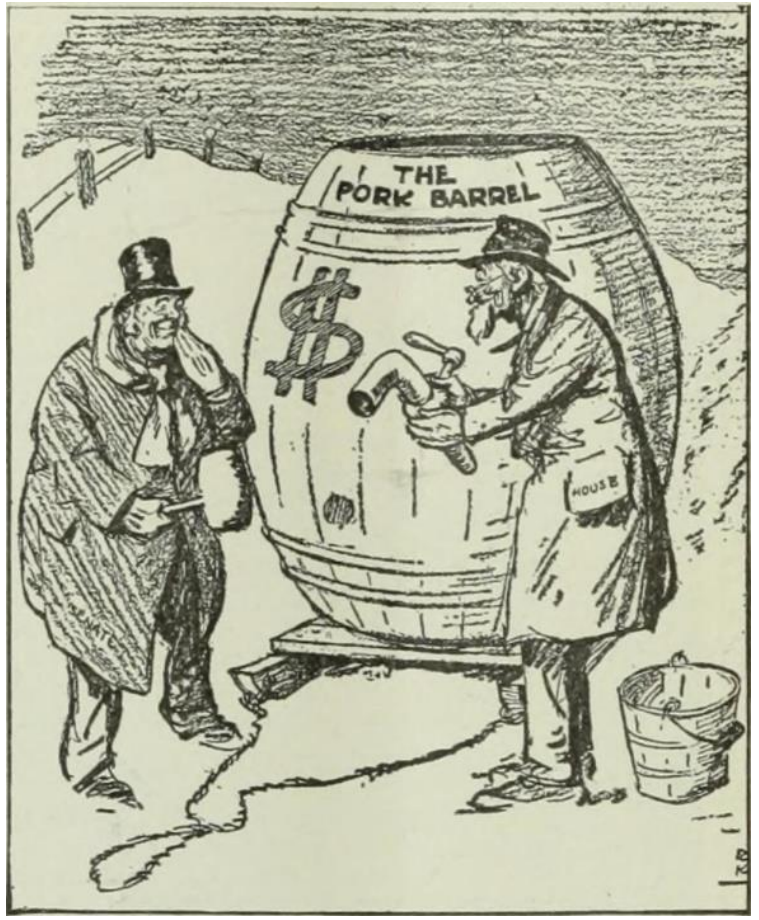


Template #3: No Longer Too Small

- This template combines:
  - A company that is overcharging for a product or service that has been “too small to matter” for the customer
  - Growth in the company’s business that brings this situation to the forefront
  - Regulatory or competitive solutions that allow customers to avoid the cost
  - Frequently occurs in healthcare
- Examples:
  - ARTC (2008)
  - VRX (2015)
  - ZYXI (2021)

Template #4: Regulatory Incentives

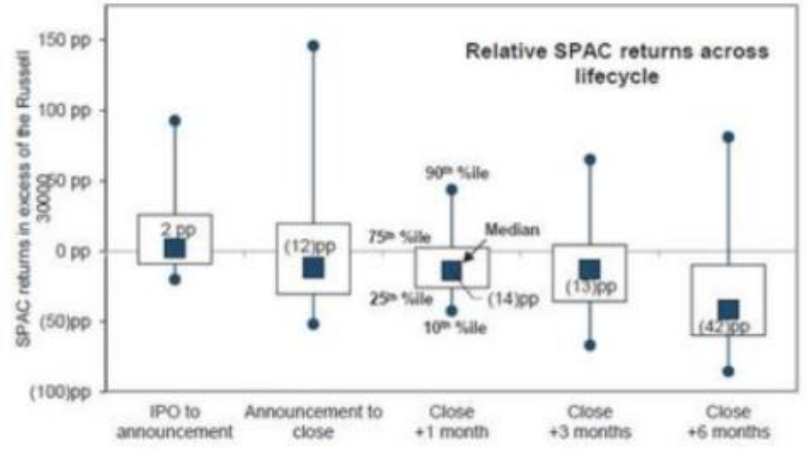
- This template combines:
  - Significant increase in productive capacity due to regulatory subsidies leading to low/negative cost of capital
  - Line of sight to the expiration of the subsidies
  - Oversupply and margin pressure once a free market emerges
- Examples:
  - Subprime mortgages (2007)
  - LED capacity (2012)
  - Medicare Advantage (2019)
  - COVID beneficiaries (2021)
  - EV charging networks (2022)



Template #5: The Gold Rush

- This template combines:
  - Massive amounts of capital raised from retail investors
  - The capital being siphoned into unproductive or fraudulent uses
  - Frequently, some aspect of lax regulation
  - Lower quality companies/frauds that are likely to underperform relatively quickly
- Examples:
  - Chinese RTO's (2012)
  - SPACs (2020)
  - Biotech (2020)
  - Bitcoin (2021)
  - AI (2023)?

Exhibit 2: Returns in excess of the Russell 3000 of 161 SPACs that have closed a merger since the start of 2020
as of September 14, 2021



Source: Dealogic, Goldman Sachs Global Investment Research

Template #6: Finite TAM

- This template combines:
  - An extraordinarily high multiple
  - A TAM that is finite and calculable
  - High degree of difficulty for the company to expand the TAM
  - Other aspects of the business that are likely to disappoint
- Examples:
  - Restaurants
    - BJRI (2012), WING (2023)
  - Retailers
    - CWTR (2007), FIGS (2021)

Template #7: Unsustainable Yield

- This template combines:
  - Unsustainable dividend yield that is likely to have attracted unsophisticated investors
  - Declining fundamentals that will be incapable of sustaining the dividend
  - A projected dividend cut within the next few years
- Examples:
  - NEW, NFI (2005)
  - FTR (2017)
  - BPT (2018)
  - IEP (2023)

Template #8: Mosaic Theory

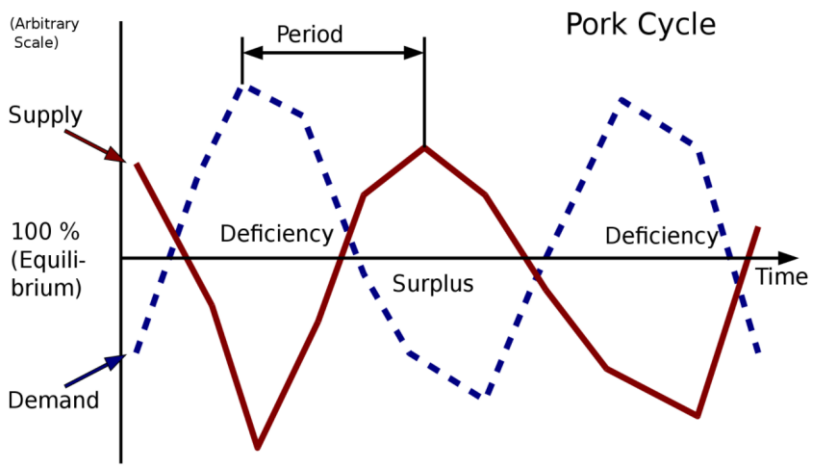
- This template combines:
  - High inventory/low turns
  - Poor cash flow conversion
  - Insider selling
  - Related-party transactions
  - A defined catalyst
  - Unsustainable revenue growth or margin expansion
  - High absolute and relative valuations
- There should be at least 5 of these attributes present
- Examples:
  - Lots!

Template #9: Frauds After the Break

- This template combines:
  - A company known to be fraudulent
  - Exposure of the fraud
  - An initial stock decline of 25-50%
  - Equity that is likely worthless
- Examples:
  - VRX (2016)
  - WDI (2020)
  - XL (2022)

Template #10: Cyclicals with Normalization

- This template combines:
  - A cyclical industry that currently has above-average economic returns
  - Significant and certain capacity additions
  - No meaningful change to the historical industry structure
  - Acceptable returns to mid-cycle valuation metrics assuming excess earnings for some period
- Examples:
  - Homebuilders (2005)
  - Ethanol (2008)
  - Animal proteins (various times)
  - Building products (2023)



SEB pork segment margins

Template #11: Decliners That Aren't Universally Regarded As Such

- This template combines:
  - Low quality businesses that are somewhat "below the radar"
  - Moderate earnings multiples but likelihood of earnings declines
  - Financial leverage, if possible
  - Fixed business structures that make reinvention difficult
- Examples:
  - BFAM (2021)
  - CCL (2021)

Template #12: Fads With No Brand Extensions

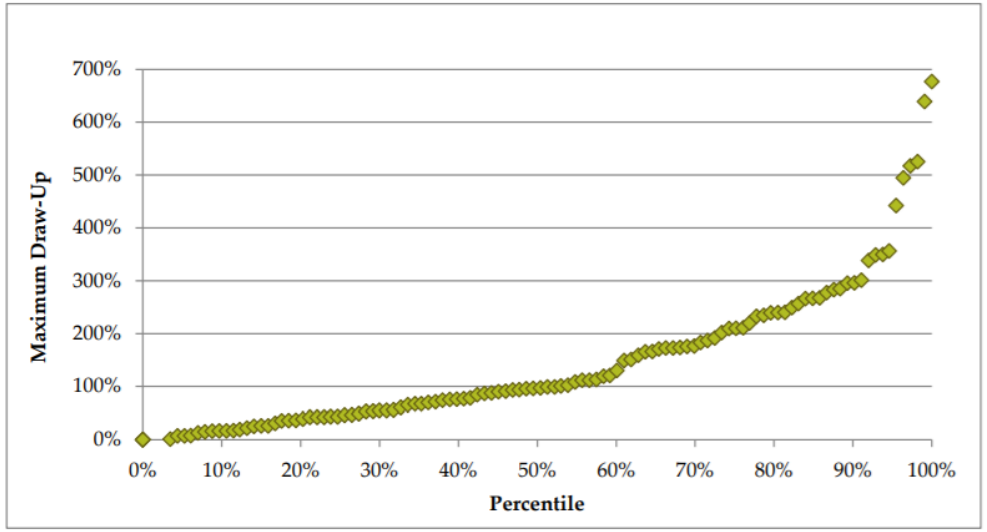
- This template combines:
  - A clear fad with evidence of consumer disengagement
  - A lack of plausible brand extensions
  - Valuations that indicate expected long-term growth
- Examples:
  - GPRO (2015)
  - FIT (2015)
  - CRCT (2021)

Template #13: Missed Earnings

- This template combines:
  - A stock price that has increased into the earnings date
  - Earnings disappointments (usually guidance, not current quarter) that are not forecastable through data services
  - Importance of current quarter's results to future prospects
  - Remember: aggressive/fraudulent companies rarely "miss" quarterly earnings, but the Q4 audit can be a productive catalyst
- Examples:
  - SAM (2021)
  - Numerous others

Template #14: Zeroes That Are Already Zero

- This template combines:
  - Market cap of > $100M for companies that are already bankrupt or highly likely (>99%) to file
  - Misplaced option value from retail investors
  - Capacity to endure large “draw-ups”
- Examples:
  - JCP (2019)
  - GTT (2021)



This chart shows the average “draw-up” of 114 shorts that eventually went to zero, from a hedge fund that specialized in this kind of short. The median increased was 96%, and the average 143%.

Template #15: Manipulated Stock Prices

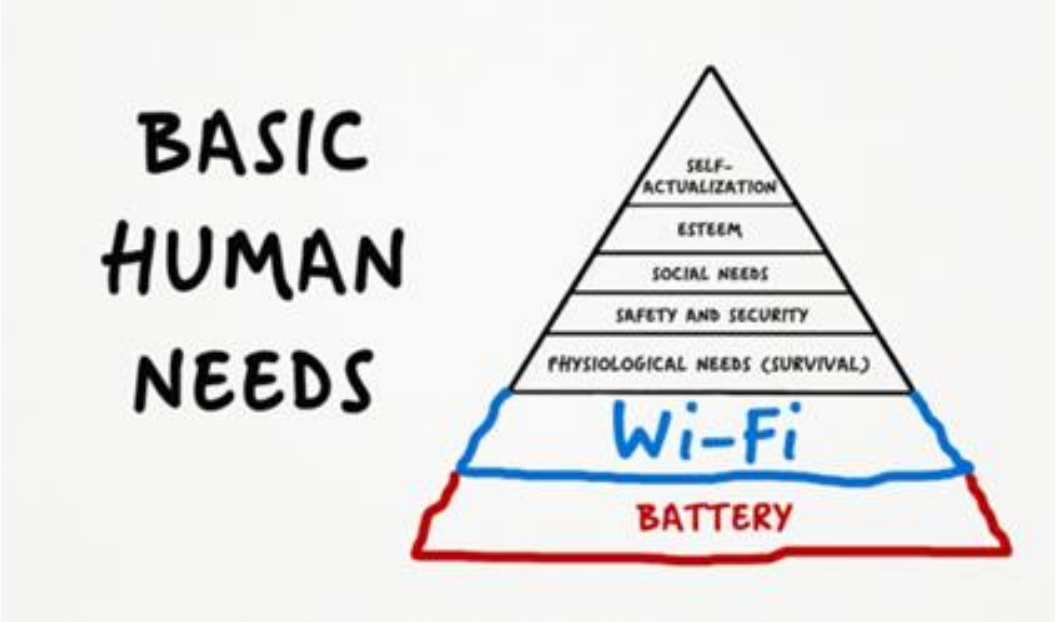
- This template combines:
  - A constrained float, frequently due to the IPO of a small portion of total shares
  - A valuation that indicates that the market mechanism for determining price is broken
  - Increased supply of shares expected within the next 3 months
  - Tolerable borrow dynamics/cost
- Examples:
  - CRCT (2021), FIGS (2021), DOCS (2021)

Unified Shorting Framework

AKA, 7 Steps to Short Selling Greatness

We begin at the beginning…

- **Rule 1: Remember the 4 necessities**
  - Fundamentals and/or multiple are incorrect
  - This will cause current shareholders to sell (they agree with your argument)
  - There is stock borrow available that is low cost, plentiful and stable
  - This will happen in a time frame that is acceptable for your risk framework



Not the same necessities…

Avoid Big Losses

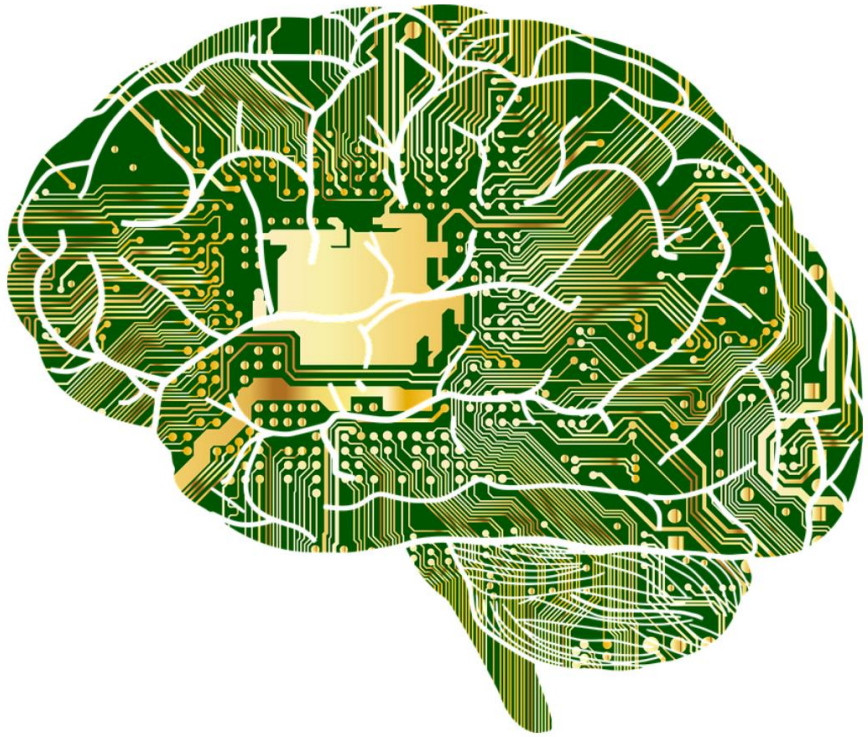
- **Rule 2: Avoid the right tail**
  - We have seen that simply shorting everything except the top 5-10% of performers can generate substantial alpha
  - This is “easier said than done”, but it’s still incredibly important:
  - **Don’t short anything that can credibly grow 10x from its current size!**

Remember Short Interest

- **Rule 3: Explicitly incorporate short interest into your analysis**
- This does not mean to avoid all high short-interest stocks
- Instead, what it means is to:
  - A) Calculate true level of short interest and stability of the lending base, **as we will discuss next lecture**
  - B) Determine if the level of short interest is consistent with your risk model
  - C) Decide why others are short this idea, whether you are short for the same or different reasons, and whether it matters
  - D) Determine if the downside is great enough to offset the buying pressure from short covering
- Some high short interest stocks will be very attractive, as the business model is likely challenged and existing shorts have “diamond hands”, while others will be too risky

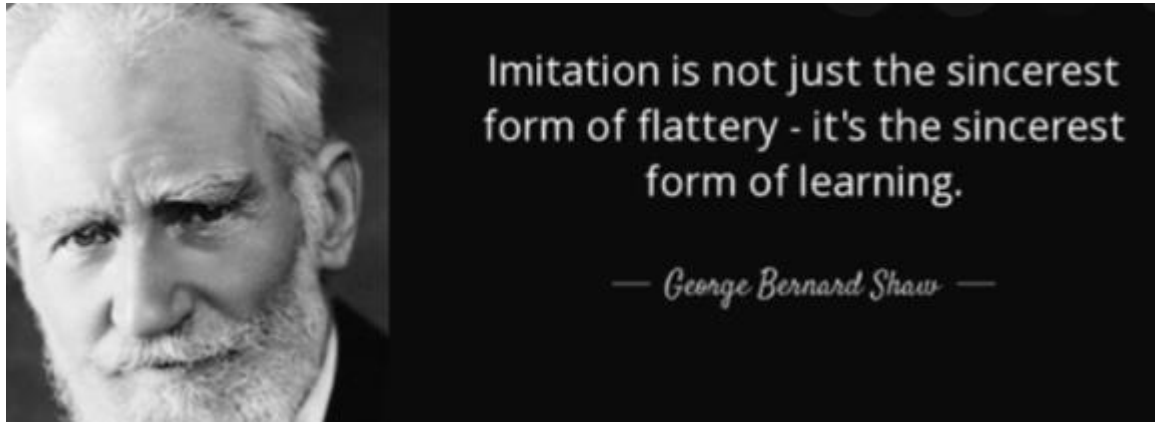
Beginner Shorting: Use Templates

- **Rule 4: Try to find shorts that fit within our templates**
  - We have discussed 15 templates that have historically provided high-percentage short opportunities
  - These templates generally encompass some element of technical or fundamental mean reversion
  - Mean reversion is a trusted and consistent process, though timing is not as consistent
  - Remember that there are no “called third strikes” in investing, so wait for the “fat pitch”



Intermediate Shorting: Use Others' Ideas

- **Rule 5: Borrow, selectively**
  - Read as many short idea pitches as possible from activists, VIC, SumZero, and other sources
  - Using the framework that we discussed, separate the high-quality short ideas from the rest
  - This process will not only generate actionable ideas, but will improve your investment acumen and process
  - You need to spend many years evaluating pitches to gain the necessary experience
  - It may seem easier to use others' ideas than use your own, but in practice it is remarkably difficult to make money on other people's ideas



Advanced shorting: Broaden Your Horizons

- **Rule 6: When ready, diversify among a wide variety of short themes**
  - Drawn from our case studies, these include frauds with an activist angle, bubbles that are deflating, technical dislocations, competitive intrusions, secular decliners, “fake” growth with limited TAM, etc.
  - Remembering what doesn’t work with these is as important as remembering what does
  - A well-diversified short portfolio includes many different types of shorts to avoid factor risk
  - It may take many years, and lots of practice, to become proficient in all these areas of shorting, but it is worth the effort!

Risk, risk, risk, then reward

- **Rule 7: Remember risk before reward**
  - We end where we began– avoid large losses, and statistically you will lock in positive alpha
  - Have a large short portfolio, with diversification around:
    - Sectors
    - Market caps
    - Short factors
    - Growth/value factors
  - Active portfolio management is a necessary part of short selling

Short Interest Calculations

Short interest

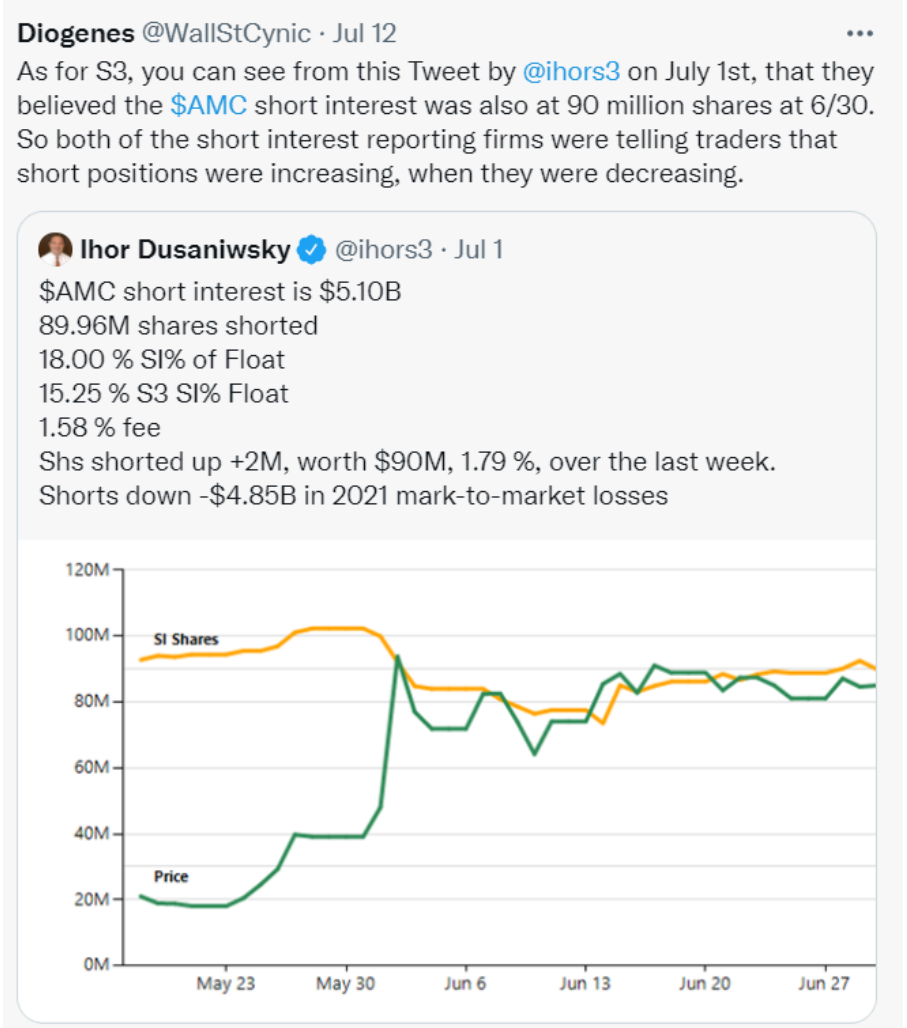
- Short interest represents the number of shares borrowed from long holders and re-sold into the market
- This statistic is helpful for several reasons:
  - For individual stocks, it gives some idea of the cost of borrowing the stock
  - For individual stocks, it gives some idea of the risk of a short squeeze
  - For individual stocks, it gives some idea of the popularity of the short thesis
  - For the market overall, it gives some idea of fund positioning
  - For the market overall, it gives some idea of pent-up buying demand
- It is however misleading for several reasons also:
  - It can be biased upwards by non-fundamental shorting (convertible arbitrage, ex-dividend trades, ASR dynamics– let's call them "hedged short shares")
  - The denominator (float) is imprecise
  - It ignores the likelihood of recall

“On special”

- The “general collateral” rate (GC) is usually the Fed Funds rate (FF) less a spread
  - Currently, FF is 400 bps and the spread is 20-30bps for a large hedge fund, 50-75 bps for individual traders
- Stocks that cost more to borrow than GC are said to be “on special”
- It is a relatively simple supply and demand equation
  - When demand is much less than supply (the vast majority of the time), then lenders compete to loan the stock and borrow rates are low
  - When demand is near supply, then rates increase (1-10%) to reflect the scarcity value as well as the costs of managing an unstable supply base
  - When demand is much greater than supply, then rates can skyrocket (10-200%)
- High short interest (shares shorted as a % of available lendable supply) stocks usually behave differently than low short interest stocks

Calculating short interest

- The most common calculation used is reported short interest divided by float
  - Float is assumed to be total basic shares outstanding less restricted shares– shares owned by corporate insiders, corporate cross-holdings, and government entities
- However, this is a blunt instrument. What we are really trying to understand consists of two separate questions:
  - **What is the likely supply of lendable stock**, and how close is that to the current and anticipated demand for lendable stock?
  - What is the amount of freely tradeable stock, and **how large is the existing short interest compared to that quantity**?
- Third party services such as DataExplorers (now owned by IHS) will provide “short utilization” calculations that aggregate short availability from various stock loan “feeds” (institutional lenders)
  - This is likely to be the most accurate picture of available stock but is still an estimate (and this estimate can be off– see sidebar)
  - Of course, the supply curve slopes upwards, so higher lending rates will (should) entice lenders to provide more stock



Short utilization

- Without paying Data Explorers or S3, it is still possible to employ a “back of the envelope” approach using the list of shareholders. Here is the math:
  - Large ETF custodians (Vanguard, Blackrock) will lend 80-90% of their shares
    - They are trying to maximize their lending revenues in a low-fee business
  - Other custodians (State Street, Bank of New York) will lend 70% of their shares
    - While these custodians represent a variety of underlying investors (pensions, insurance companies, long-only) , many will agree to lend out their shares for extra income
  - Prime brokers (JP Morgan, Morgan Stanley, Goldman) will also lend 70% (as well as hedge funds who tend to use these prime brokers)
  - Active managers vary considerably
    - Fidelity lends out most of their shares; Capital Group lends out none
  - Quantitative funds generally do not lend out their shares
    - Renaissance Institutional (RIEF) is the exception
  - Corporate insiders do not lend out their shares

Short capacity calculation

- This is a list of CROX holders from 3/31/21
- Blackrock, Dimensional and Vanguard are ETF providers– assume 80% is lent out
- State Street, Goldman and Northern Trust are custodians– assume 70%
- FMR assume 90%
- Insiders lend 0%, and other active managers assume 50%

HOLDER	TYPE	SECURITY TYPE	NUMBER OF SHARES	% OF OUT-STANDING
BLACKROCK INC.	Investment Advisor	Shrs	11,059,579	16.96%
FMR LLC	Investment Advisor	Shrs	7,465,961	11.45%
VANGUARD GROUP INC	Investment Advisor	Shrs	6,760,078	10.36%
STATE STREET CORP	Investment Advisor	Shrs	2,008,225	3.08%
SAMLYN CAPITAL, LLC	Unclassified	Shrs	1,732,339	2.66%
DIMENSIONAL FUND ADVISORS LP	Investment Advisor	Shrs	1,725,177	2.64%
GOLDMAN SACHS GROUP INC	Investment Advisor	Shrs	1,483,518	2.27%
GEODE CAPITAL MANAGEMENT, LLC	Investment Advisor	Shrs	1,181,116	1.81%
REES ANDREW	Director	Shrs	1,084,935	1.66%
LORD, ABBETT & CO. LLC	Investment Advisor	Shrs	1,083,561	1.66%
POLARIS CAPITAL MANAGEMENT, LLC	Unclassified	Shrs	839,455	1.29%
DEUTSCHE BANK AG\	Investment Advisor	Shrs	837,124	1.28%
RENAISSANCE TECHNOLOGIES LLC	Investment Advisor	Shrs	821,709	1.26%
NORTHERN TRUST CORP	Investment Advisor	Shrs	815,251	1.25%
CITADEL ADVISORS LLC	Hedge Fund Manager	Shrs	770,273	1.18%

CROX, continued

- 52% of the top 76% is lent out
- Assume half of the remaining 24% is lent out
- So, ~64% of the shares will be lent out, of 65M basic shares. Thus, there are 41.6M shares in the lending pool, plus ~ 70% of the shares that have been shorted = 44.1
- 3.6M shares borrowed / 44.1 total shares outstanding = 8.2% effective short interest
  - Reported SI/float was 5.7%

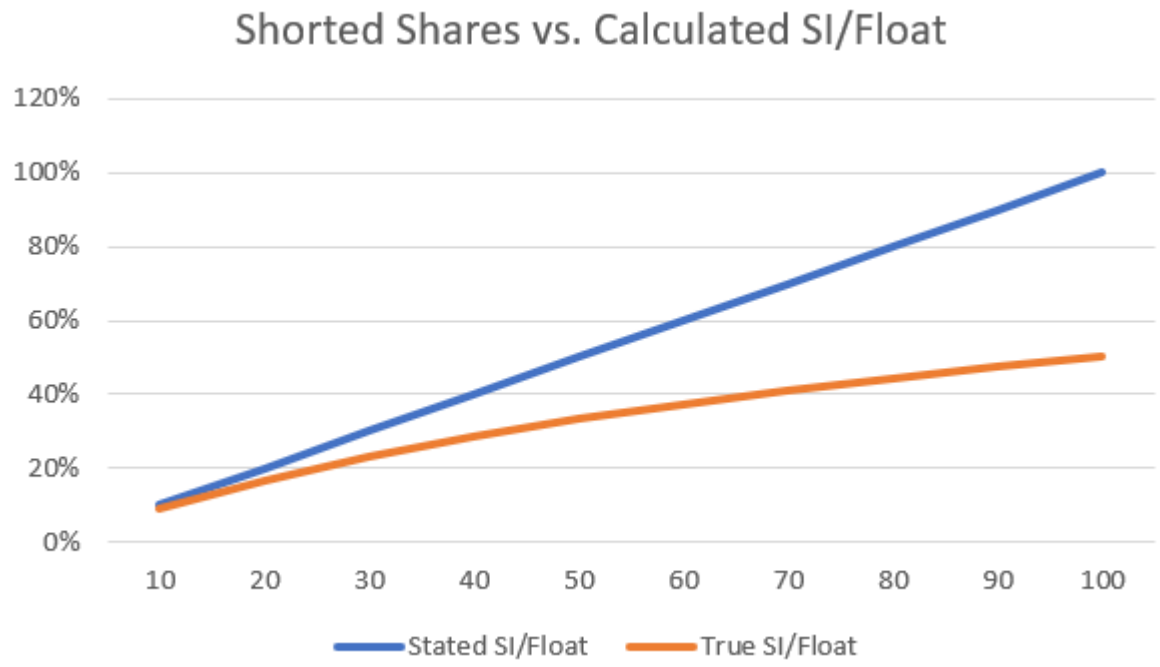
Institution	Type	% Shares	Lent out	Available
BLACKROCK INC.	Investment Advisor	17.0	80%	13.6
FMR LLC	Investment Advisor	11.5	90%	10.3
VANGUARD GROUP INC	Investment Advisor	10.4	80%	8.3
STATE STREET CORP	Investment Advisor	3.1	70%	2.2
SAMLYN CAPITAL LLC	Unclassified	2.7	50%	1.3
DIMENSIONAL FUND ADVISORS LP	Investment Advisor	2.6	80%	2.1
GOLDMAN SACHS GROUP INC	Investment Advisor	2.3	70%	1.6
GEODE CAPITAL MANAGEMENT LLC	Investment Advisor	1.8	50%	0.9
REES ANDREW	Director	1.7	0%	-
LORD ABBETT & CO. LLC	Investment Advisor	1.7	50%	0.8
POLARIS CAPITAL MANAGEMENT LLC	Unclassified	1.3	50%	0.6
DEUTSCHE BANK AG\	Investment Advisor	1.3	70%	0.9
RENAISSANCE TECHNOLOGIES LLC	Investment Advisor	1.3	70%	0.9
NORTHERN TRUST CORP	Investment Advisor	1.3	70%	0.9
CITADEL ADVISORS LLC	Hedge Fund Manager	1.2	50%	0.6
NUVEEN ASSET MANAGEMENT LLC	Investment Advisor	1.2	50%	0.6
PRINCIPAL FINANCIAL GROUP INC	Investment Advisor	1.1	50%	0.6
PRICE T ROWE ASSOCIATES INC /MD/	Investment Advisor	1.1	50%	0.5
TWO SIGMA ADVISERS LP	Unclassified	1.1	0%	-
INVESCO LTD.	Investment Advisor	1.1	50%	0.5
BANK OF NEW YORK MELLON CORP	Investment Advisor	1.0	70%	0.7
JUNTO CAPITAL MANAGEMENT LP	Unclassified	1.0	50%	0.5
MORGAN STANLEY	Investment Advisor	0.9	70%	0.7
CHARLES SCHWAB INVESTMENT MANAGEMENT INC	Unclassified	0.9	50%	0.5
WOODSON CAPITAL MANAGEMENT LP	Unclassified	0.9	50%	0.5
WELLS FARGO & COMPANY/MN	Investment Advisor	0.9	50%	0.5
AMERICAN CENTURY COMPANIES INC	Investment Advisor	0.8	50%	0.4
SUMMIT PARTNERS PUBLIC ASSET MANAGEMENT LLC	Unclassified	0.8	50%	0.4
PRUDENTIAL FINANCIAL INC	Investment Advisor	0.8	50%	0.4
TWO SIGMA INVESTMENTS LP	Unclassified	0.8	0%	-
DRIEHAUS CAPITAL MANAGEMENT LLC	Hedge Fund Manager	0.8	70%	0.5
total		75.9		52.1

Measures of short intensity

- Traditional metrics
  - Shares short/ shares outstanding
  - Shares short/ shares in float
  - Shares short/ average daily volume
- Better metrics
  - Shares short less hedged short shares / (shares in float + shares short)
  - Shares short less hedged short shares / lending capacity less hedged shares
  - Shares short less hedged short shares / fundamental average daily volume
- Short utilization metrics derived from lending feeds
- Remember to strip out short positions from convertible bonds, ASRs, and other corporate actions, as well as incorporate put/call net delta hedging, when necessary
  - This may take some legwork to understand the underlying dynamics

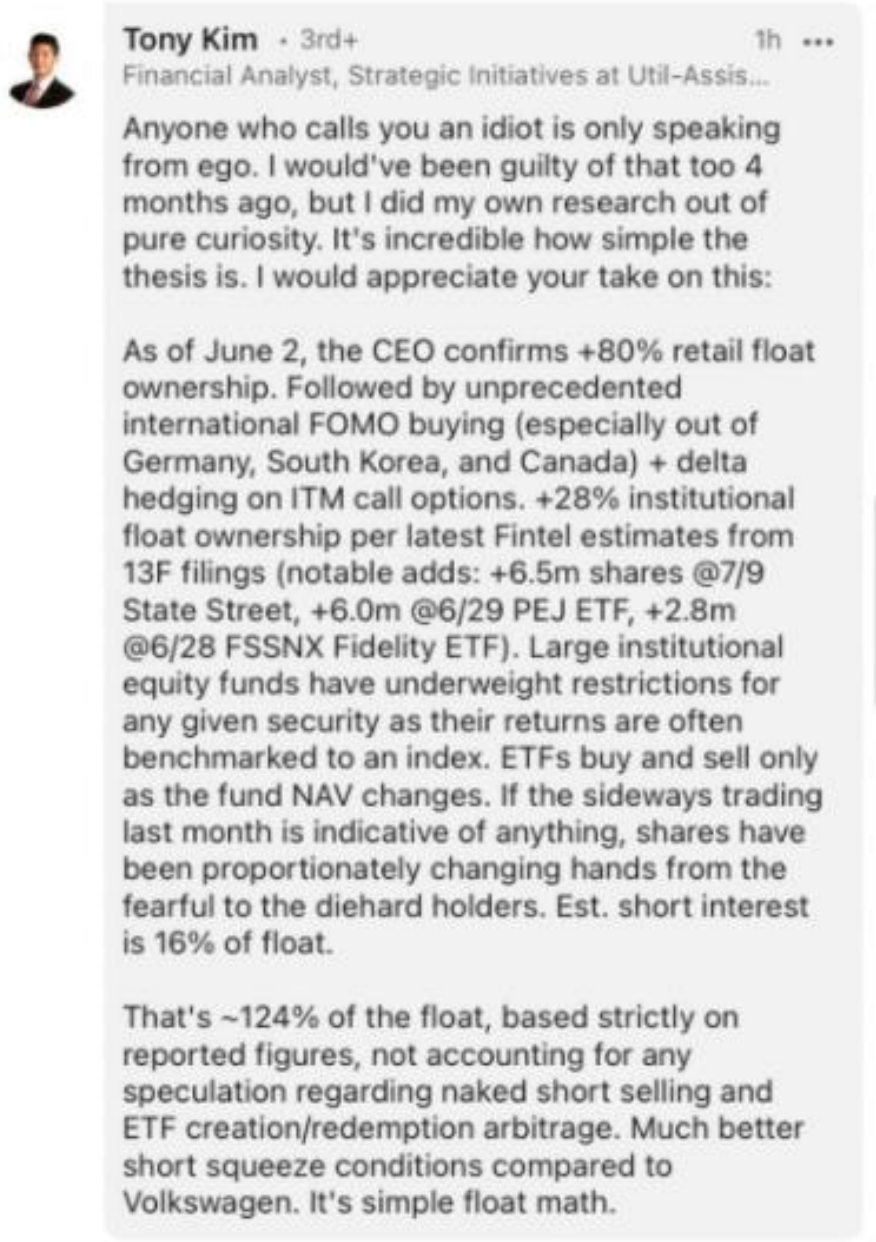
True SI/float

- As borrowed stock is shorted and lent back out, the effective float increases
  - This is somewhat akin to fractional reserve banking
- This is tautological but it bears saying:
  - **For every share that is shorted, there is another share purchased**
- Remember, shares that are shorted need to be bought back (**potential demand**), while shares that are owned (float + shares short) can be sold (**potential supply**), and we are comparing these two quantities



Here's how Twitter's "math" works

- We understand that short interest calculations can be somewhat tedious, and are usually unnecessary when short interest is low
- However, it is important to understand the theory behind the calculations to avoid making spurious conclusions like Mr. Kim



Tony Kim · 3rd+ 1h •••
Financial Analyst, Strategic Initiatives at Util-Assis...

Anyone who calls you an idiot is only speaking from ego. I would've been guilty of that too 4 months ago, but I did my own research out of pure curiosity. It's incredible how simple the thesis is. I would appreciate your take on this:

As of June 2, the CEO confirms +80% retail float ownership. Followed by unprecedented international FOMO buying (especially out of Germany, South Korea, and Canada) + delta hedging on ITM call options. +28% institutional float ownership per latest Fintel estimates from 13F filings (notable adds: +6.5m shares @7/9 State Street, +6.0m @6/29 PEJ ETF, +2.8m @6/28 FSSNX Fidelity ETF). Large institutional equity funds have underweight restrictions for any given security as their returns are often benchmarked to an index. ETFs buy and sell only as the fund NAV changes. If the sideways trading last month is indicative of anything, shares have been proportionately changing hands from the fearful to the diehard holders. Est. short interest is 16% of float.

That's ~124% of the float, based strictly on reported figures, not accounting for any speculation regarding naked short selling and ETF creation/redemption arbitrage. Much better short squeeze conditions compared to Volkswagen. It's simple float math.

Now the other side of the equation

- Once we know what percent of available shares are shorted, we should have some opinion about the stability of those shorts– will the short positions be covered (by choice or due to buy-ins)?
- Stability is derived both from the commitment of existing shorts to the position as well as the likelihood of lenders withdrawing their stock from the lending pool
- Historically, “secular decliner” shorts had the most stable short demand, as shorts assumed these shorts could be traded to zero (and thus, always have 100% potential downside)
  - This assumption was violated in January 2021, as well as several other times in the last decade
  - These shares theoretically never need to be covered, though, since the equity will be delisted eventually
- Existing “short squeeze” indicators, such as this one from Markit, focus heavily on the likelihood of shorts covering due to losses in the position

The following set of capital constraint indicators are constructed from transaction-level data to assist with identifying potential short squeezes:

Out-of-the-money Percent (OTM%) – the sum of shares for short positions that are experiencing losses based on their PnL divided by the total shorted quantity. Names with a high percent of short sellers out-of-the-money are expected to be at risk of a short squeeze.

Out-of-the-money Percent - 20-day maximum – the maximum OTM% over the prior 20 trading days. The 20-day maximum value removes the effect of short-term price movement and identifies the “worst case” scenario for short sellers.

Short Position Profit Concentration – the distribution of a stock’s short loan position profit/loss based on a predefined set of bins.

Earnings announcement events – short squeezes happen more frequently around earnings announcement dates. We use this as an indicator to increase the probability of a squeeze five weekdays prior to an earnings announcement and three weekdays following the announcement.

Positive news events – Using RavenPack news events we identify potential positive news events that can trigger a short squeeze. Event types include merger and acquisition, earnings, trading and other positive events, as described in the methodology section.

Abnormal trading volume – we find cases where abnormal trading volume levels paired with positive price movement are indicative of a positive event known to market participants which can trigger a short squeeze.

How about buy-ins and recalls?

- In practice, recalls are very rare for institutional investors
  - Buy-ins (Rule 204a of Reg SHO) happen on a T+3 basis with settlement occurring on a T+2 basis, so prime brokers usually have time to find new supply
- Instead, borrow costs are repriced higher in times of high short demand
  - Passive holders are sophisticated lenders (these fees are a major revenue source for index ETF sponsors– “low fee” ETFs have to make their money somehow!), and frequently reprice higher based on utilization metrics
  - Prime brokers leave slack in the lending pool, and can almost always extract more shares from their clients by offering attractive rates

Lots of unknowns here, so what is known?

- Knowing the exact holders and their lending policies would give an accurate picture of the stability of the short lending pool, but this isn't possible
- However, we do know that index funds will lend ~80-90% of their shares, and will not recall them (though they frequently reprice them upwards)
- Index funds own ~ 25% of many US equities with market caps over $1B
  - So, >20% of the float of these should be available in a stable lending pool
- A reasonable framework is therefore:
  - If companies are not widely owned by index ETFs, fully research and understand float dynamics and short utilization
  - Stay away from situations where > 20% of float is shorted, even if owned by index ETFs
  - Stay away from those rare situations where an individual or hedge fund owns a large and increasing number of shares of a heavily-shorted stock and could potentially withdraw those shares from the lending pool

OK, now that we know how to calculate SI…

- Before the Gamestop squeeze, there was a generally accepted dynamic
  - High short interest stocks underperform the market (are positive alpha shorts)
  - But… the negative rebate might make shorting these stocks unprofitable
- I performed the following analysis for my investor letter in 2011:

	2q11	1q11	4q10	3q10	2q10	1q10	4q09	3q09		average
NASDAQ	-10.2%	-14.5%	-22.4%	-8.4%	-8.4%	-9.1%	-0.2%	-7.1%		-10.1%
NYSE	-9.0%	-9.8%	-11.5%	-4.2%	-4.8%	4.8%	-7.1%	3.3%		-4.8%

- Highest tranches added the most alpha:

SI/Float		10-20%	20-30%	> 30%
Excess Return		(5.29)	(9.45)	(14.54)

- Borrow costs consumed most of it:

SI/Float		10-20%	20-30%	> 30%
Cost to Borrow		4.6%	9.4%	21.0%

- Stocks with over 10% short interest generated a small amount of alpha
- It's not fair (remember, life is not fair!) but stay away from heavily shorted stocks that have only marginal downside potential

Idea screening

Screening topics

- Using Bloomberg for screening
- Types of screens
  - Accounting
  - Stock performance
  - Event
  - Descriptive

Bloomberg 30 second tutorial

- EQS = Equity Screening
- SPAX = SPAC monitor
- NI IBS or <company> CN WSA or <company> GPTR = insider selling
- FA = Financial Analysis
- Discussion of some common issues that arose during Beneish exercise

Accounting screens

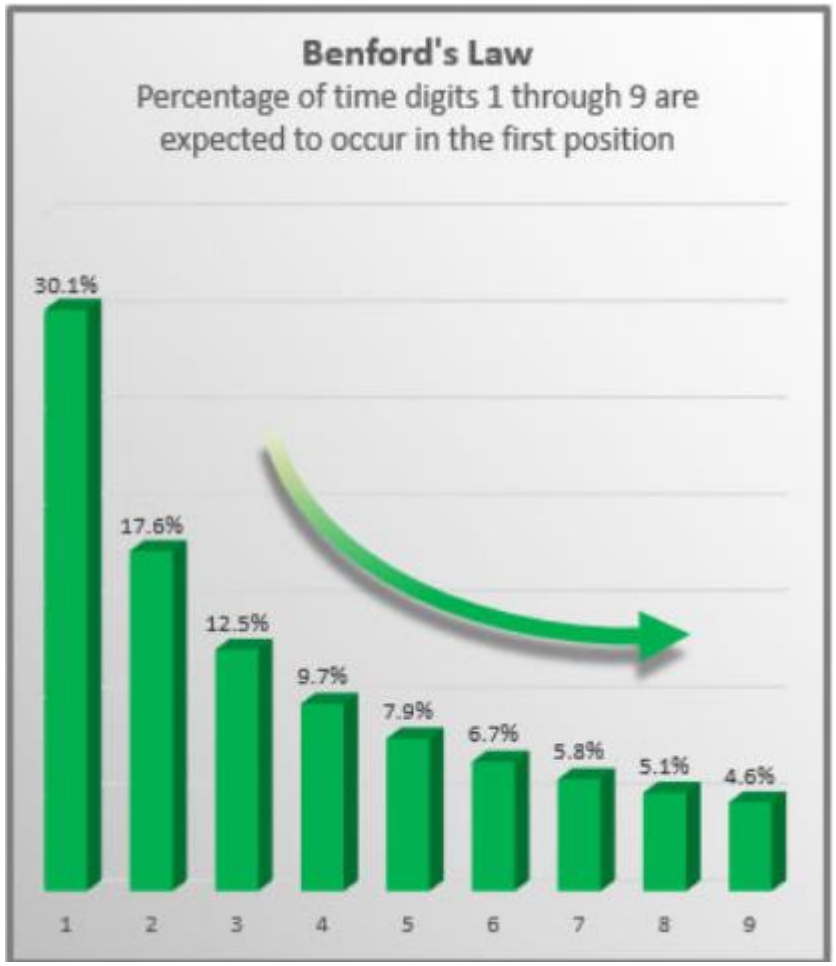
- The basics
  - A/R growth >> revenue growth, so DSO ↑ ↑ ↑
    - Also, unbilled receivables growth
  - Inventory growth >> COGS growth, so DSI ↑ ↑ ↑
- The letters
  - Altman Z score
  - Beneish M score
  - Montier C score
    - https://www.stockopedia.com/content/montiers-c-score-are-your-favourite-stocks-cooking-the-books-63863/
- The cashflow
  - OCF - Capex
  - OCF – SBC - Capex

Academic papers and “scores”

- Like quantitative investors, academics have tried to use financial information to predict future stock performance
- Various “scores” have been developed that use changes in income statement, balance sheet and cashflow statement metrics to predict future underperformance
- Most of these metrics are simply capturing “levers” that management teams pull if they are “stretching” to produce strong growth or margins
- There are a variety of these models, among them are Beneish, Dechow, Piotroski, Lev-Thiagarajan, Vladu, Robu and Hasan
  - Feel free to check them all out if you like! Citations are here: https://www.mdpi.com/2227-9091/9/6/116/htm#B27-risks-09-00116

Benford's Law

- Amiram, Bozanic & Rouen (2015) show that Benford's Law violations are predictive of financial misstatements
- The deviation from expected values correlates with Beneish's M-Score and other accruals-based manipulation frameworks
- Firms also seem to manipulate their reported financials when they are close to breakeven net income



The Beneish M-Score

- The original paper (1999) looked at a sample of 74 companies that were confirmed earnings manipulators between 1982 and 1992 (49 from SEC enforcement actions and 25 from news reports that also subsequently restated)
- He found that this sample grew much faster than the average company (58% vs. 13%)
- He then constructed a regression to examine various factors common to the manipulating sample, based on 1982-88 data, choosing potential factors based on the findings of earlier academic literature
  - So, he did not take the data and find explanatory variables, rather he assumed the variables and then ran a regression
- Even though he found that 3/8 coefficients were not statistically significant, he left all 8 variables in his final formula
- Finally, he solved for a threshold value (-1.78) that would minimize Type II (false negative) vs Type I (false positive) error

$$DSRI = \frac{\text{Receivables}_t[2]/\text{Sales}_t[12]}{\text{Receivables}_{t-1}/\text{Sales}_{t-1}}.$$

$$GMI = \frac{(\text{Sales}_{t-1}[12] - \text{Cost of goods sold}_{t-1}[41])/\text{Sales}_{t-1}[12]}{(\text{Sales}_t[12] - \text{Cost of goods sold}_t[41])/\text{Sales}_t[12]}.$$

$$AQI = \frac{(1 - \text{Current assets}_t[4] + \text{PP\&E}[8])/\text{Total assets}_t[6]}{(1 - \text{Current assets}_{t-1} + \text{PP\&E}_{t-1})/\text{Total assets}_{t-1}}.$$

$$SGI = \frac{\text{Sales}_t[12]}{\text{Sales}_{t-1}}.$$

$$DEPI = \frac{\text{Depreciation}_{t-1}[14-65]/(\text{Depreciation}_{t-1} + \text{PP\&E}_{t-1}[8]}{\text{Depreciation}_t/(\text{Depreciation}_t + \text{PP\&E}_t)}.$$

$$SGAI = \frac{\text{Sales, general, and administrative expense}_t[189]/\text{Sales}_t[12]}{\text{Sales, general, and administrative expense}_{t-1}/\text{Sales}_{t-1}}.$$

$$LVGI = \frac{(\text{LTD}_t[9] + \text{Current liabilities}_t[5])/\text{Total assets}_t[6]}{(\text{LTD}_{t-1} + \text{Current liabilities}_{t-1})/\text{Total assets}_{t-1}}.$$

$$TATA = \frac{\begin{array}{l}\Delta\text{Current assets}_t[4] - \Delta\text{Cash}_t[1] - \Delta\text{Current liabilities}_t[5] \\ - \Delta\text{Current maturities of LTD}_t[44] - \Delta\text{Income tax payable}_t[71] \\ - \text{Depreciation and amortization}_t[14]\end{array}}{\text{Total assets [6]}}.$$

Beneish's second paper

- A follow-up paper written in 2007 but finalized in 2013 focused on the ability of the model to detect fraud and found the following:
  - The M-score does a better job of predicting (negative) returns than just using accruals
  - The model does a good job identifying "fast-growing companies that have recently experienced some economic headwind"
  - The model identifies companies whose accruals persist throughout time and are unlikely to reverse
- Applying the model to famous frauds (Cendant, Enron, Qwest, etc.), they found that 12 of 17 of these were predicted by the model over a year ahead of public exposure
- While the model did well in predicting negative returns in the 1990s, most of this predictive value was removed in the 2000s, post SarbOx/Reg FD

We end on a cautionary note. Looking ahead, it appears likely that as the methods for earnings manipulation detection become more sophisticated, so too will the techniques of the perpetrators. For example, the evidence in Kama and Melumad (2011) shows that in recent years (since the Sarbanes–Oxley Act), U.S. companies seem to have adopted new methods—such as the strategic factoring of receivables—to mask the effect of their earnings manipulation. In the case of the Beneish model, the factoring of receivables will directly affect the usefulness of the DSR variable. Over time, one should reasonably expect evolving adaptations of this nature to diminish the overall efficacy of the model with respect to return prediction. Our weaker results in the second subperiod suggest that this process has already begun.

Previous classes were asked to run Beneish screens and determine if high M-Scores were still predictive

- Instead of reproducing Beneish's results, they found that there is currently no predictive value to the M-Score
- Screens are an interesting starting point, but shorting stocks based purely on a screen's results is unlikely to generate alpha
- There is much less free money lying around!

company	M-Score	alpha
CROCS INC	2.66	441
QUIDEL CORP	1.79	166
ADVANCED MICRO DEVICES	1.00	482
CALIX INC	0.16	374
BIO-RAD LABORATORIES -CL B	0.03	231
ENPHASE ENERGY INC	(0.20)	3,823
APPFOLIO INC - A	(0.61)	131
MEDIFAST INC	(0.63)	112
AAON INC	(0.67)	98
R1 RCM INC	(0.94)	160
OLLIE'S BARGAIN OUTLET HOLDI	(0.97)	35
VIEWRAY INC	(1.11)	1
NVIDIA CORP	(1.20)	512
LGI HOMES INC	(1.20)	248
ENCORE WIRE CORP	(1.43)	71
TELLURIAN INC	(1.46)	(57)
STRATEGIC EDUCATION INC	(1.46)	(30)
POOL CORP	(1.55)	234
SUNPOWER CORP	(1.56)	635
COOPER COS INC/THE	(1.63)	60
FLEX LTD	(1.63)	137
SQUARE INC - A	(1.71)	398
NETFLIX INC	(1.76)	94
average		**363**

Dechow's F-Score

- Dechow et al (2011) developed an "F-score" using as a dataset 676 firms forced to restate by SEC between 1982 and 2005
- They focus on accruals (receivables and inventory), asset quality, return on assets and high revenue growth
- Some new predictive variables they report are:
  - Abnormal reduction in the number of employees is predictive
  - Operating leases are used more frequently
  - Assumed pension asset returns are higher
  - Manipulating firms raise equity more aggressively, but not debt
- Similar to Beneish, they then choose a threshold values to minimize Type 1/Type 2 error ratio (> 1 is "above normal" risk, > 2.5 "high")

Remember the context

- Many more SEC actions (AAERs) were brought in the 2000-2004 period, indicative of the frothy market environment
- It therefore makes sense that most restatements were of revenue, as incentives to overstate revenue were greater than to overstate profitability
- Technology firms were > 20% of misstating firms, though only ~ 10% of total firms
- That's not why we wanted to bring up this paper, though…

Panel C: Frequency of AAERs by year

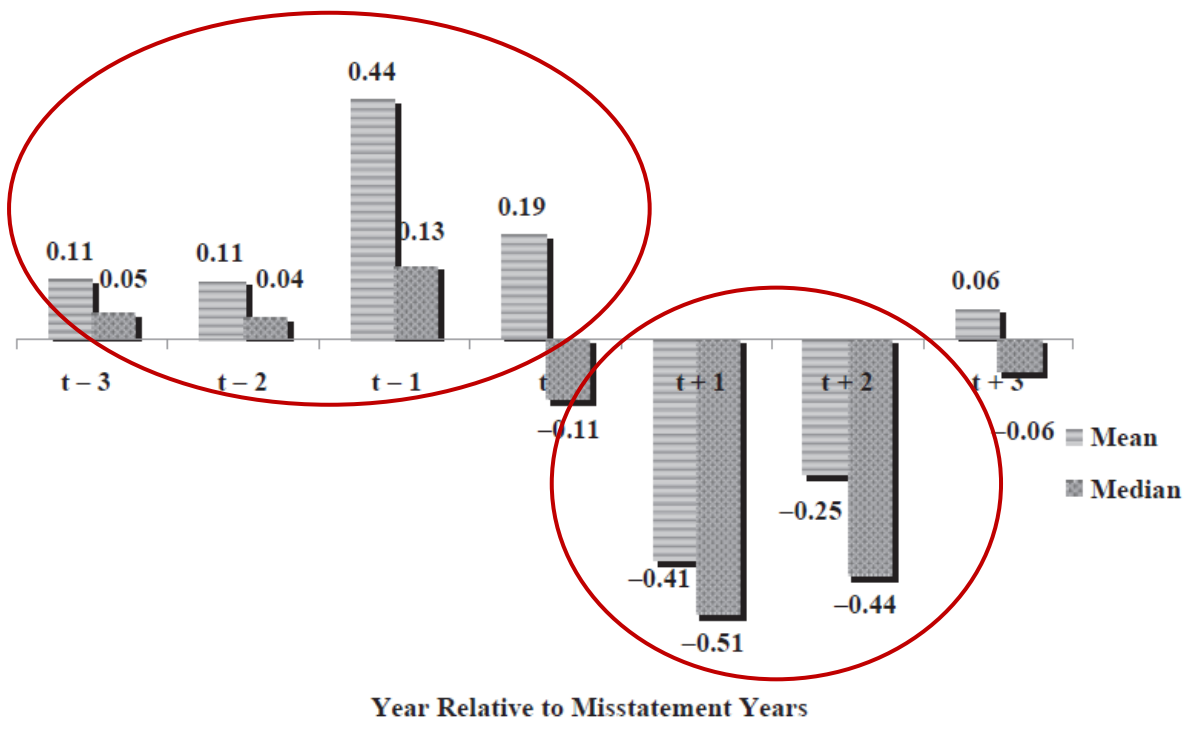
AAER release date	Number of AAERs	Percentage	AAER release date	Number of AAERs	Percentage
1982	2	0.1	1994	120	5.5
1983	16	0.7	1995	107	4.9
1984	28	1.3	1996	121	5.5
1985	35	1.6	1997	134	6.1
1986	39	1.8	1998	85	3.9
1987	51	2.3	1999	111	5.1
1988	37	1.7	2000	142	6.5
1989	38	1.7	2001	125	5.7
1990	35	1.6	2002	209	9.5
1991	61	2.8	2003	237	10.8
1992	78	3.6	2004	209	9.5
1993	76	3.5	2005	94	4.3
			Total	**2190**	**100.0**

Type of misstatement	Percent of 676 misstatement firms (1)
Misstated revenue	54.0
Misstatement of other expense/ shareholder equity account	25.1
Capitalized costs as assets	27.2
Misstated accounts receivable	19.1
Misstated inventory	13.2
Misstated cost of goods sold	11.4
Misstated liabilities	7.4
Misstated reserve account	5.9
Misstated allowance for bad debt	4.3
Misstated marketable securities	3.6
Misstated payables	1.6

Earnings manipulators do great… until they are caught

- Firms that manipulate earnings outperform the market until the misstatements are revealed
- And continue to underperform for at least another year after that
- We will come back to this point in future classes– keep it in mind!

Figure 1 Annual market-adjusted stock returns surrounding misstatement years.



Stock Performance

- Just look at the chart– has the price outstripped the performance
  - If earnings growth has been commensurate with the stock price, then move on!
- Multiples
  - EV/EBITDA and/or EV/Sales 2x average of past 5 years
- Short Interest
  - SI between 5% and 15%
  - SI increasing rapidly

Events

- Stock unlocks, usually 180 days post IPO
  - Screen: IPO date
- Index exclusions (SP500, R2K)
  - Screen: market cap changes, May/June R2K rebalance period
- Auditor changes

Descriptive

- Search for new examples of “red flag” phrases
  - https://staging.newconstructs.com/wp-content/uploads/2010/08/BarronsRedFlags.pdf
  - This paper (https://www.researchgate.net/profile/Bill-Mcdonald/publication/232968289_Barron%27s_Red_Flags_Do_They_Actually_Work/links/5772a80d08ae07e45db24198/Barrons-Red-Flags-Do-They-Actually-Work.pdf) found no short-term effect around filings but predictive value for frauds
- Suspicious auditors
  - Outside of the top 5, be suspicious!
  - https://blog.auditanalytics.com/who-audits-public-companies-2020-edition/#:~:text=As%20mentioned%20by%20Accounting%20Today,up%20from%2063.8%25%20in%202018.
  - Look for a large company with a small auditor

Table 1
Descriptive Statistics for the 1994-2008 Sample of 51,115 10-Ks

	% of 10-Ks with at least one occurrence	% of 10-Ks with more than one occurrence	# of 10-Ks with at least one occurrence
Corporate Governance			
related party transaction	33.17%	10.24%	16,624
consulting relationship(s)	1.33%	0.26%	668
Earnings			
change in estimated useful life	0.38%	0.09%	189
change in revenue recognition	0.48%	0.18%	240
bill and hold	0.38%	0.27%	191
percentage of completion accounting	0.89%	0.44%	447
unbilled receivables	2.72%	1.61%	1,365
long term or accrued receivables	2.20%	1.08%	1,101
Cash flow			
selling receivables with recourse	0.19%	0.04%	93
accounts payable w/ financing or extended payment terms	0.26%	0.04%	132
Other			
substantial doubt	1.17%	0.63%	585
materially and adversely affected	22.78%	10.79%	11,417
sale (and) leaseback	9.39%	5.99%	4,706

Summary: Screens to keep in mind

- Short interest between 5-15% of float and increasing
- Short interest increasing as stock price declines (shorts pressing)
- Accrual issues– inventory growth, A/R growth, negative cashflow
- Auditor changes, and/or non “big 6” auditor
- Management changes (especially CFOs), and/or significant insider selling
- IPOs from roughly 3 months ago (ahead of the traditional “unlock” period)
- Declining revenues with increasing margins
- Increasing revenues with decreasing margins
- Debt/EBITDA > 7x, Interest/EBITDA > .75x

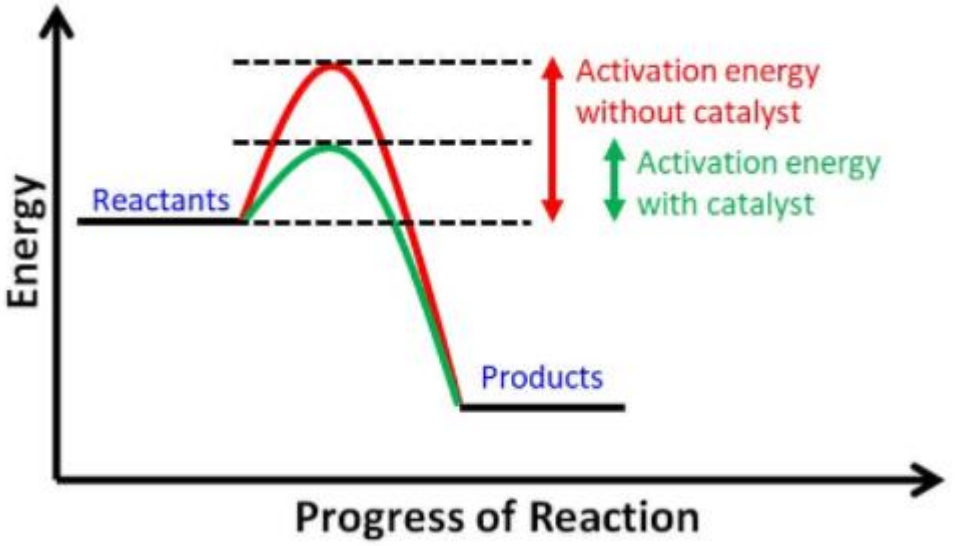
The limits of screening

- As we have already discussed (Beneish, e.g.), screening is just the beginning of the short-selling investment process
- Data are not always clean (especially around M&A), and many seemingly-troubling developments actually have perfectly reasonable explanations; the signal to noise ratio is frequently low
- The goal of screens is to generate ideas that have a high likelihood of turning into profitable investments, over some period
  - It is too much, however, to expect that these investments will be realized immediately
  - A better philosophy is to expect screening to unearth potential investments that may be compelling at some future price or time

Catalysts and Timing

What are catalysts?

- In chemistry, a material that increases the rate of a reaction without being consumed (by lowering the activation energy, at least the way we were taught it)
- In investing, a catalyst is definite timing around events that should lead to a revaluation (lower) of a stock's price
- As the Efficient Markets Hypothesis would tell you, if everyone anticipates the catalyst, then the stock price already reflects it!



Are catalysts necessary?

- **Yes**, since short ideas should have a definite path to "working" within 6-12 months
- **Yes**, since frauds will appreciate dramatically based on reported (fabricated) results without negative information developments
- **Yes**, since many investment managers will preferentially enter short positions that have well-defined events associated with them
- **Yes**, since catalysts introduce discipline into the shorting process that prevents thesis creep

- **No**, since most catalysts are well-anticipated and thus not catalysts at all
- **No**, since the market will use a mosaic of information to discount future developments
- **No**, since a catalyst is the least important part of a short thesis compared to valuation and fundamental developments
- **No**, since catalysts frequently have regulatory or legal elements that are inherently difficult to research

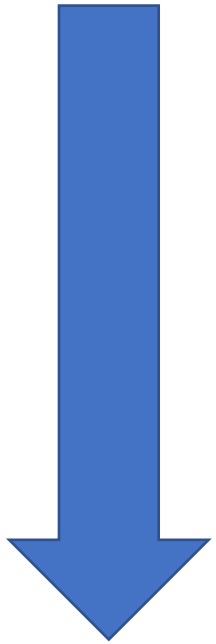
So, are catalysts necessary? Maybe!

To be more precise

- Great short theses will have **multiple catalysts**
- These can vary from known events (earnings, activist reports, share unlocks) to expected events (regulatory developments, failed product launches) to anticipated developments with unknown timing (competitive launches, insider selling/secondaries, business pressures)
- Catalysts that are specific but well-anticipated are **unhelpful**, while catalysts that are probabilistic and poorly anticipated are **helpful**

Catalysts

Type of short



- Earnings Misses
- Technical Dislocations
- Frauds
- Competition
- Overvaluation

Importance of having catalyst

Fundamental Research

The list is long

- For large investing institutions, the research resources available include (but are not limited to):
  - Expert networks
  - Credit card data panels
  - Satellite data
  - Import manifests
  - App downloads/usage
  - Retail sales scanner data
  - Exhaustive news databases
  - Private plane tracking
  - Email and website scraping
  - Dedicated consultants
  - International investigators
  - Large-scale FOIA requests
  - Private investigators
- There are likely dozens of others that we haven’t run across
- The point is that the investing world is awash in information, but…

Value added research (VAR) still works!

- Remember that frequently the most valuable information is that gathered through traditional VAR channels
- Cold-calling, reaching out through LinkedIn (cold or through a shared contact), or other methods of reaching people with unique perspectives will provide you with insight that other investors do not have
- This can all be done legally and without restricting trading in the stock, as long as the contact is not currently or recently an employee of the target company, is not violating any employment or confidentiality agreements, and is not in possession of MNPI (Material Non-Public Information)